2010 Project Abstract
For the Period Ending June 30, 2012

Funding Source: Environment and Natural Resources Trust Fund

Legal Citation: M.L. 2010, Chap. 362, Sec. 2, Subd. 8a

Appropriate Amount: $368,000

PROJECT TITLE:	Minnesota Conservation Apprenticeship Academy
PROJECT MANAGER:	Steve Woods
AFFILIATION:	Board of Water and Soil Resources
MAILING ADDRESS:	520 Lafayette Road
CITY/STATE/ZIP:	St. Paul, MN 55155
PHONE:	651-297-5615
E-MAIL:	steve.woods@state.mn.us
WEBSITE:	www.bwsr.state.mn.us
FUNDING SOURCE:	Environment and Natural Resources Trust Fund
LEGAL CITATION:	M.L. 2010, Chap. 362, Sec. 2, Subd. 8a

APPROPRIATION AMOUNT: $368,000

Overall Project Outcome and Results

Many of Minnesota's conservation districts' most experienced conservation professionals and practitioners are nearing retirement age but due to budget constraints will not be replaced until they have left employment. Consequently, Minnesota is missing a great opportunity to transfer knowledge and experience to the next generation responsible for Minnesota's conservation.

While college graduates with conservation-related degrees are knowledgeable in technology, theory, and research methods, their practical, on-the-ground skills need development. Communicating with landowners and adjusting designs for field nuances are vital skills for the success of conservation projects and are best learned from seasoned professionals. In turn, apprentices bring knowledge of emerging technologies and other innovations to improve the quality and productivity of current conservation efforts. This allows for a cross-pollination of ideas and solutions for natural resource challenges.

From 2011 to 2012, 65 students were placed with 60 Conservation Districts. During this time, the apprentices planted 33,339 trees, took 5,219 samples to monitor water quality; provided environmental education to 1,495 people; conducted 1,372 surveys; restored 1,542 acres of habitat through invasive species removal; completed 466,773 square feet of rain garden planting and maintenance; 272,173 square feet of erosion control and shoreline restoration; and 12,933,645 square feet of seeding. Due to the 2011 state shut down, a shifting of allocated funds allowed for the placement of an additional 35 students with conservation districts in May of 2013.

This program has benefits to both students and conservation districts. 100% of apprentices indicated the hands-on experience gained during the apprenticeship will enhance their future

academic studies, and that they now have increased technical conservation skills and are more prepared for a future career in conservation.

98% of the Districts were satisfied with the work their apprentices completed, and 100% indicate they would participate in the program again. Managers also indicated that the work conducted by the apprentices increased the amount of conservation practices delivered by their districts during the program period.

Project Results Use and Dissemination

***This section NOT intended to count toward recommended 300 word length for Abstract**

Directions:

1. *How has information from your project been used and/or disseminated?*

Information from the project has been disseminated through reports to LCCMR, press releases by BWSR and the Governor's Office, local press releases by SWCDs, and through the Conservation Corps newsletter and annual report. Information was used to recruit apprentices and increase awareness of the project.

2. *What communications and outreach activities have been done in relation to your project? For example: have tools or techniques developed through your project been adopted by a group; presentations relating to the project been made; has work pertaining to the project been published?*

Communication and outreach activities include the aforementioned reports, press releases, and electronic newsletters. Additionally, BWSR and Conservation Corps staff conducted outreach to SWCDs to find optimal matches between districts and apprentices. Through the course of their work, the apprentices conducted significant outreach to land owners and residents in topics ranging from easement protection, to water quality education, to plant biodiversity.

Environment and Natural Resources Trust Fund (ENRTF)
2010 Work Program Final Report

Date of Report: August 15, 2013
Final Report
Date of Work Program Approval: June 16, 2010
Project Completion Date: June 30, 2013

I. PROJECT TITLE: Minnesota Conservation Apprenticeship Academy

Project Manager: Steve Woods
Affiliation: Board of Water and Soil Resources
Mailing Address: 520 Lafayette Road
City / State / Zip: St. Paul, MN 55155
Telephone Number: 651-297-7748
E-mail Address: steve.woods@state.mn.us
Fax Number: 651-297-5615
Web Site Address: www.bwsr.state.mn.us

Location: Statewide applicability

Total ENRTF Project Budget:	**ENRTF Appropriation**	**$ 368,000**
	Minus Amount Spent:	**$ 367,036**
	Equal Balance:	**$ 964**

Legal Citation: M.L. 2010, Chap. 362, Sec. 2, Subd. 8a

Appropriation Language:
$368,000 is from the trust fund to the Board of Water and Soil Resources in cooperation with the Minnesota Conservation Corps or its successor to train and mentor future conservation professionals by providing apprenticeship service opportunities to soil and water conservation districts. This appropriation is available until June 30, 2013, by which time the project must be completed and the final products delivered.

II. FINAL PROJECT SUMMARY AND RESULTS:

Many of Minnesota's conservation districts' most experienced conservation professionals and practitioners are nearing retirement age but due to budget constraints will not be replaced until they have left employment. Consequently, Minnesota is missing a great opportunity to transfer knowledge and experience to the next generation responsible for Minnesota's conservation.

While college graduates with conservation-related degrees are knowledgeable in technology, theory, and research methods, their practical, on-the-ground skills need development. Communicating with landowners and adjusting designs for field nuances are vital skills for the success of conservation projects and are best learned from seasoned professionals. In turn, apprentices bring knowledge of emerging technologies and other innovations to improve the quality and productivity of current conservation efforts. This allows for a cross-pollination of ideas and solutions for natural resource challenges.

From 2011 to 2012, 65 students were placed with 60 Conservation Districts. During this time, the apprentices planted 33,339 trees, took 5,219 samples to monitor water quality; provided environmental education to 1,495 people; conducted 1,372 surveys; restored 1,542 acres of habitat through invasive species removal; completed 466,773 square feet of rain garden planting and maintenance; 272,173 square feet of erosion control and shoreline restoration; and 12,933,645 square feet of seeding. Due to the 2011 state shut down, a shifting of allocated funds allowed for the placement of an additional 35 students with conservation districts in May of 2013.

This program has benefits to both students and conservation districts. 100% of apprentices indicated the hands-on experience gained during the apprenticeship will enhance their future academic studies, and that they now have increased technical conservation skills and are more prepared for a future career in conservation.

98% of the Districts were satisfied with the work their apprentices completed, and 100% indicate they would participate in the program again. Managers also indicated that the work conducted by the apprentices increased the amount of conservation practices delivered by their districts during the program period.

III. PROGRESS SUMMARY AS OF: August 15, 2013

SERVICE WORK PERFORMED

A total of 100 apprentices were placed at SWCDs in 2011, 2012, and May/June of 2013. Additional apprentices were supported through the program due to lost time during the MN state government shutdown in 2011.

The diversity of project work done by 100 apprentices represented the variety of projects specific to each region and district participating in the program. Apprentices conducted water quality monitoring, installed conservation practices, conducted site inspections, recruited landowners for conservation programs, assisted landowners and SWCD staff with management plans, and much more.

Sample of work accomplished: In 2011 and 2012, 65 apprentices planted 33,339 trees, forbs, and grasses; took 5,219 samples to monitor water quality; provided environmental education to 1,498 people; restored 1,542 acres of habitat through invasive species removal; 555,979 square feet of rain garden planting and maintenance; 301,463 square feet of erosion control and shoreline restoration; 336 acres of native of seeding.

When asked how projects would have been completed without an apprentice, Corryn Trask of Lake of the Woods County SWCD stated, “Longer days and less sleep at night. Or we would have collected less data and probably wouldn’t be as far along as we are”.

98% of SWCDs were satisfied with their apprentice’s performance on projects. [1]

100% of SWCDs believed the apprentice applicants provided for initial review in the selection process met the needs outlined in their project proposal.[1]

96% of SWCDs were satisfied with the skills and qualities of the apprentice placed at their site. [1]

100% of SWCD partners believed they received adequate support from the Conservation Corps to mentor their apprentice and said they would partner with the Corps again. [1]

“I was extremely pleased with our corpsmember. He has many talents, performed well and was up to any task. He fit in with the office personnel very well.”
- Kerry Saxton, Wright County SWCD

“We are thankful to have been selected to host a CCM apprentice position and are very pleased at how it turned out. It is a moral boost to be able to mentor someone starting out in their career.”
- Mark Schaetzke, Freeborn County SWCD

Site visits: Conservation Corps conducted site visits throughout July and August in 2011 and 2012, one site visit per placement site to ensure successful progress was made in the apprentice work plan. Conservation Corps staff met with the apprentice and SWCD supervisor, together and separately, to assess successes and challenges. Corps staff also visited a representative project in which the apprentice participated.

APPRENTICE DEMOGRAPHICS

Apprentices are currently pursuing degrees or recently completed degrees from the following colleges and universities in the following areas of study:

Schools represented: Saint Cloud State University, Saint Mary's, University of Winona, College of Saint Benedict-Saint John's University, University of Minnesota Twin Cities, University Wisconsin La Crosse, Gustavus Adolphus College, University of Minnesota Duluth, University of Minnesota Crookston, University of Minnesota Morris, South Dakota State University, University of St. Thomas, Augsburg College, University of Wisconsin Stevens Point, Bemidji State University, Minnesota State University Moorhead, University of Wisconsin River Falls

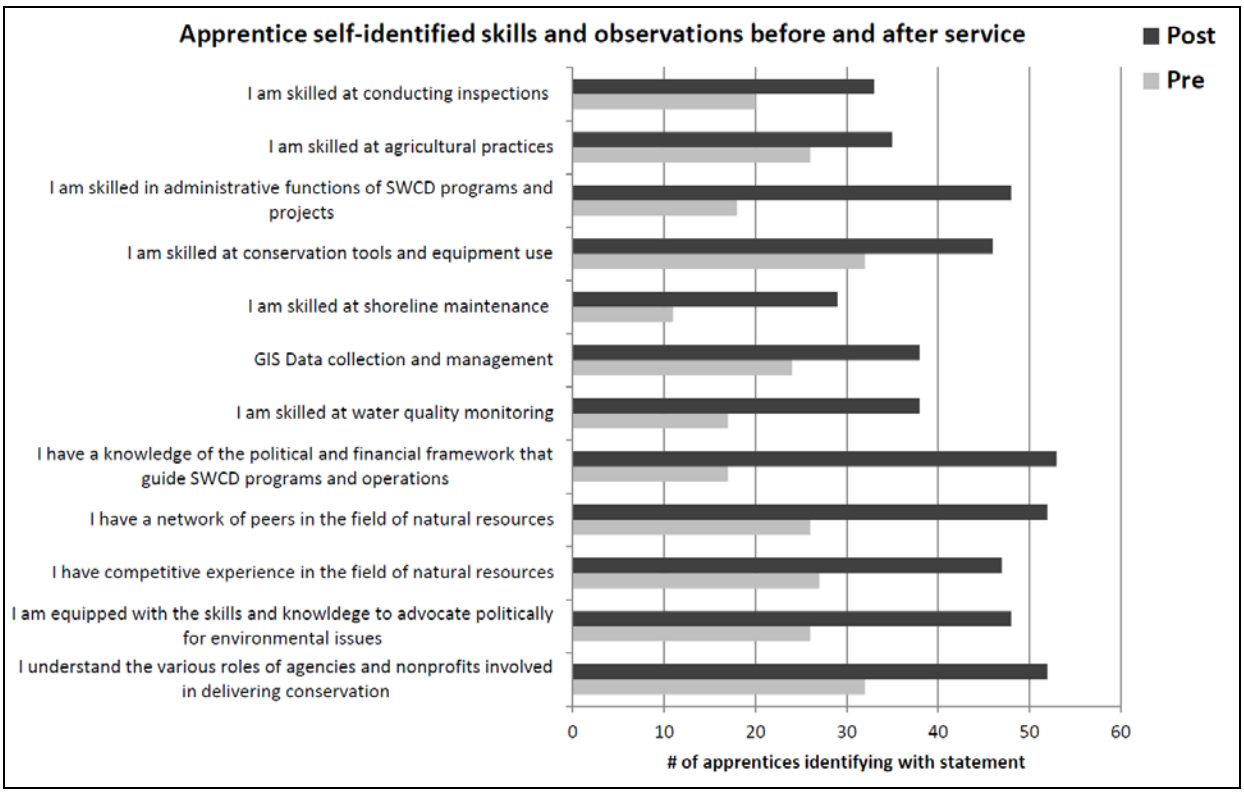
Areas of study represented: Environmental Studies, Natural Resource Management, Environmental Science/Policy/Management, Conservation, Technical Communication, Biology, Environmental/Civil Engineering, Agricultural Economics, Electronic Publishing, Water Resources, Environmental Chemistry, Agronomy, and Geography

APPRENTICE GAINS

100% of apprentices believe this hands-on will enhance their future academic studies.[2]

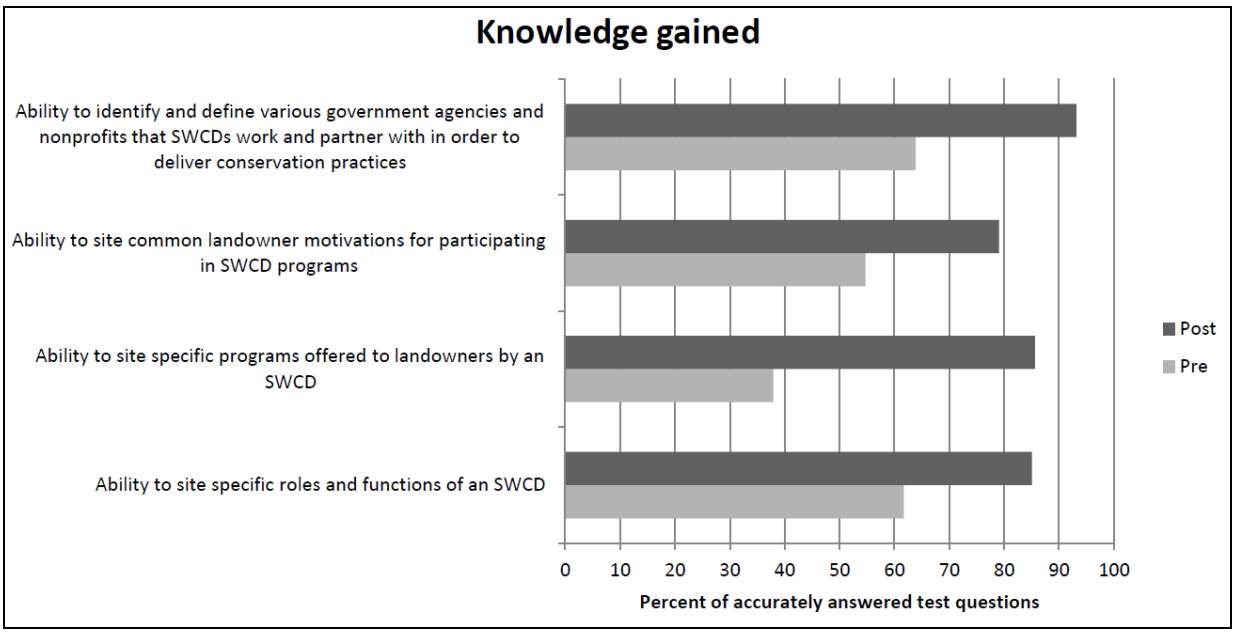
100% of apprentices believe they now have increased technical conservation skills and are more prepared for a future career in conservation.[2]

“Being in the Conservation Academy allowed me to put practices I only had known in theory into reality. Working with the Sherburne SWCD staff was the best technical and hands-on experience I could hope for. The knowledge and experience I have gained will greatly help my future career in conservation.”
- Marta Behling, Sherburne SWCD Apprentice



In addition to hands-on skills in conservation, the Corps and BWSR determined a core objective of the apprentice experience should be to demonstrate an increased understanding of how an SWCD works with landowners on the local level to deliver conservation practices through relationships with numerous government agencies and nonprofits.

In a knowledge survey administered to apprentices before and after their term of service, apprentices demonstrated the following knowledge increases attributed to their experience in the program.



APPRENTICE ACADEMY SERVICE LEARNING FORUM

A customized social networking platform, Ning.com, was utilized to foster an online community and enhance learning through monthly critical discussion. Below are the three forum topics discussed with several representative insights from apprentices.

Apprentices initial impressions of working in an SWCD

“I have not only had the opportunity to learn the daily operation of the SWCD office but also the overall picture. I was able to attend a board meeting in my county and it was really shocking to see how much effort is needed at every level to secure funding for projects. I didn't expect the level of coordination between local, state, and federal government agencies.”

What is a Watershed District?

“WD's and SWCD's are really similar governmental units, with similar funding, similar leadership, similar staff sizes, and similar focuses. The big difference is the land and water systems that they cover--where SWCD boundaries are mainly political, WD's are entirely centered around the confluence of some watershed system, allowing themselves to more definitively focus on the tributaries and issues of their particular watershed. The two organizations would definitely work together on water quality issues, community outreach, and more generally getting money and time to go to where it's needed to both preemptively take care of issues in their district and remediate problems that have already gotten ugly.”

What it means to be a successful SWCD

“A successful SWCD should be defined by the quantity of its projects as well as the quality, and by its reputation in the community. If the county and its residents have a good relationship with the SWCD and progress is being made to improve soil and water conditions than the SWCD is succeeding as far as I am concerned. Obviously, this is easier said than done. It takes a lot of communication, cooperation, and patience with other agencies for funding, and with landowners during the planning process, but after working here and reading about some of the other counties, SWCD's have succeeded at completing thousands of conservation projects over the years and continue to take on more.”

2013 Apprentice first impressions

“The Cottonwood County SWCD is involved with the Greater Blue Earth River Watershed Board (GBERBA) as the Watonwan River Watershed is located in part of Cottonwood County. My advisor is the Administrative coordinator of GBERBA and it has been interesting to learn more about watersheds. So far other than learning about watersheds I have been planting trees for field windbreaks, farmstead windbreaks, and shelter belts. I have also been working on putting together an invasive species tour that is going to be held on July 31st. So far I have learned a lot and am excited to keep learning.”

“I did not know much about SWCDs before I started this apprenticeship. I knew that they did water testing, soil testing, and tree planting. What I have learned about my SWCD site that I was not really expecting is that we have more involvement with land owners than I thought. I did not think that many people would see the value in things such as tree windbreaks and natural lakeshore restorations. I have been involved with working with farmers, land owners, and lakeshore property owners. We are working with farmers in grazing, irrigation, and planting windbreaks. I planted trees for a land owner`s hunting property. I also helped with numerous natural lakeshore restorations that we just wrapped up yesterday. I was not expecting the amount of landowner involvement or the wide variety of work.”

WHERE ARE THEY NOW?

In total, 100 students have participated in this program to date. Of the 65 participants from 2011 and 2012, 34 (52%) are currently employed or completing a degree in natural resource management or a related field. A survey of program alumni was conducted via email and telephone, and achieved a 57% response rate.

Nathan Dennis
2011 Apprentice Placement: Hubbard County SWCD
Currently Employed: DNR
"The Academy has taught me how to tweak and emphasize key subjects/job duties on my resume and give it a more professional appeal. I have been applying to several positions and continuously get good reviews from the agencies applied for. The Academy has made it all the easier and left me with some great contacts and references. I am currently working on a small DNR project in the Grand Rapids MN area. I can honestly say that my time with the Academy landed me the position! I would urge any students thinking about pursuing the biology/conservation/soil fields to enroll in this program! It sets up a strong base to build on both personally and professionally."

Robert Bauer
2011 Apprentice Placement: Crow Wing County SWCD
Currently Employed: Crow Wing County SWCD
"The Apprenticeship Academy increased my interest in public service and increased my understanding of how local governments accomplish conservation goals. I had previously not considered pursuing the Peace Corps program because I felt that an individual cannot make a profound change in a short period of time but I am considering that I may eventually apply to serve in the Peace Corps because I found that the Apprenticeship helped the SWCD to be an effective change-maker by allowing full-time staff to focus on the overload of conservation work that they do. I also found that I enjoy the messy process of educating the public and helping people to accomplish their conservation goals and want to serve in that way professionally."

Neva Widner
2011 Apprentice Placement: Carlton County SWCD
Currently Employed: Carlton County SWCD
"The Apprenticeship Academy provided me the opportunity to develop a set of professional skills and network to become competitive in my pursuit of acquiring a conservation position. As a direct result to my apprenticeship, I am now employed full time by my apprenticeship SWCD as a Water Resources Technician. I view the Apprenticeship Academy as a vital component to the long-term effectiveness of Minnesota SWCD functionality, by providing the apprentice the means to transition the future conservationists from the classroom to the field and the SWCD the additional affordable staff support."

Kirsten Kieta
2011 Apprentice Placement: Renville County SWCD
Currently Employed: USGS
"I had previously planned to go to school for environmental policy, leaving the science part of my degree in the past. After the Apprenticeship Academy and subsequent work at USGS I have the intention of going back to school for natural resources/water management with a stress on the 'hard' science. Rather than be a creator of policy I now hope to impact how policy is created by doing meaningful scientific investigations relating to wetlands/grasslands which I was first introduced to at the Renville County SWCD."

Kiel Tschumperlin
2011 Apprentice Placement: Martin County SWCD
Currently Employed: Heron Lake Watershed District
"[The Academy] provided me with experience I needed to acquire the job that I now have. Without experience working at the Martin SWCD, I would not have gotten this job. My interviewers later told me that my experience at the SWCD and being familiar with some of the nuances of government made me better qualified on top of my agricultural background for the Watershed Coordinator position I now hold at the Heron Lake Watershed District."

Matias Valero
2011 & 2012 Apprentice Placement: South St. Louis County SWCD
Currently Employed: South St. Louis County SWCD/TSA
"My experience in my Apprenticeship has both inspired and educated me in the field of conservation, and has led directly to my first 'big' job working with the TSA engineering staff to help the Soil and Water districts across the North Shore. I've learned more through the Apprenticeship than I probably did in my four years of class at the U. Thank you."

Mitchell Ness
2011 Apprentice Placement: Yellow Medicine SWCD
Currently Employed: NRCS
"[The Academy] has impacted my professional pursuits by gaining me the valuable work experience needed for me to be hired by a federal agency in conservation."

Frances Gerde
2011 Apprentice Placement: Sherburne County SWCD
Currently Employed: Sherburne County SWCD
"The Conservation Apprenticeship Academy has meant more to me than I thought it would. It has been the best work experience I have ever had. I feel much more confident about my future career opportunities and I thoroughly enjoyed my time in the program."

IV. OUTLINE OF PROJECT RESULTS*:*

RESULT/ACTIVITY 1: develop academy structure, recruit participating SWCDs, and develop 30 employment agreements

Description: The intent is to create a solid foundation for running an apprentice program for multiple years. Result one is administratively focused as the details of the employment arrangements are critical for all parties—MCC, SWCDs, and the prospective apprentice.

MCC will contact SWCDs about interest in the program and solicit some notion of the quality of the experience they can provide the apprentices. The same needs are there for finding the students at institutions. We need to develop contacts at schools, evaluating the programs in which the candidates are enrolled so they have the background necessary to take advantage of the placement, and create selection criteria. The screening and selecting of individuals for the program will be carried out by MCC as well.

MCC staff will administer the AmeriCorps enrollment requirements etc. for those selected. For example, an initial training session is necessary prior to placement to orient the participants similar to other MCC corps members. BWSR will seek a contracting party to assist in providing additional training beyond core MCC training.

Summary Budget Information for Result/Activity 1:

ENRTF Budget:	**$60,718**
Amount Spent:	**$60,803**
Balance:	**$(85)**

Deliverable/Outcome	Completion Date	Budget
1. executed contract between BWSR and MCC	August 30, 2010	$ 2,000
2. employment agreement format and program documentation describing schedule and duties; employment agreements and mgmt	October 15, 2010	$30,000
3. list of interested SWCDs (incl. primary mentor)	November 30, 2010	$ 3,000
4. year two employment agreements & mgmt	May 1, 2012	$23,718
5. year two interested SWCDs list	November 30, 2011	$ 2,000

Result Completion Date: June 1, 2012
Result Status as of June 1, 2011: Deliverables 1, 2, and 3 all accomplished. Year one participants have employment agreements mentioned in deliverable 4.
Result Status as of October 30, 2011: Unchanged. Year two activities for deliverables 3, 4, and 5 commencing before year end.
Result Status as of November 30, 2012: Deliverables 1-5 all accomplished.
Final Report Summary as of June 30, 2013: Deliverables 1-5 all accomplished.

RESULT/ACTIVITY 2: Recruit, select, and train academy participants; and repeat for year two

Description: BWSR and MCC will approach University of Minnesota, MnSCU, and other local university environmental programs for assistance in recruiting candidates. MCC will work to match potential participants with willing SWCDs and Technical Service Areas (TSA – a joint powers entity of SWCDs). Both the SWCD and the apprentices will be provided training to clarify expectations and requirements for the successful participation in the program. MCC will serve as the employer of record and handle all payroll and personnel related issues (e.g. AmeriCorps credits) until conclusion of summer employment.

Summary Budget Information for Result/Activity 2:

ENRTF Budget:	**$307,282**
Amount Spent:	**$306,233**
Balance:	**$ 1,049**

Deliverable/Outcome	Completion Date	Budget
1. recruiting time and materials for use at educational institutions	October 15, 2010	$ 5,000
2. match candidates with interested SWCDs	January 31, 2010	$ 3,000
3. employ 30 apprentices in year one	October 15, 2011	$ 93,888
4. close out year one and evaluate	December 31, 2011	$ 0
5. employ 35 apprentices in year two	October 15, 2012	$166,958
6. close out and evaluate	November 30, 2012	$ 3,000
7. employ 35 apprentices May and June of year 3	June 30, 2013	$35,436

Result Completion Date: June 30, 2013
Result Status as of June 1, 2011: Deliverable 1, 2, and 3 are all accomplished. Evaluation forms for tasks are completed.
Result Status as of October 30, 2011: Deliverable 3 disrupted by government shutdown and suspension of state grant for approximately three weeks. MCC kept program going for a short time before exhausting their available grant in-eligible dollars. (No reimbursement is being sought for funds spent during the shutdown.) Some apprentices were able to extend their employment deeper into the summer. Evaluation results summarized previously in Section II of this document.
Result Status as of November 30, 2012: Deliverable 1-6 all accomplished.
Final Report Summary as of June 30, 2013: All deliverables met. 35 apprentices also started in 2013 as part of the amended work order. The state government shutdown in 2011 caused a disruption in the program and resulted in a remaining financial balance to support additional apprentices in the 2013 summer season. This money went towards the apprentices who began in May and June of 2013.

V. TOTAL ENRTF PROJECT BUDGET:

Personnel: $ 5,000
Contracts : $ 363,000
Staff Salaries: $ 76,490
Apprentice Stipends: $ 249,355
Apprentice Orientation and Training: $ 14,311
Apprentice Recruitment: $ 6,002
Travel: $ 15,878 (within contract; state employee travel will be in-kind)

Equal Balance: $964

TOTAL ENRTF PROJECT BUDGET: $368,000

Explanation of Capital Expenditures Greater Than $3,500: NA

VI. PROJECT STRATEGY:

A. Project Partners: MCC via contract, MN Association of SWCDs, individuals SWCDs, University and State College systems

B. Project Impact and Long-term Strategy: Effort provides immediate technical assistance to accelerate conservation delivery utilizing typical funding sources such as RIM, WRP, CRP, EQIP, flood recovery, cost-share, and the constitutional funds for habitat and clean water. In the long-term we expect the participants will will enlighten the each other—the interns gain experience, the SWCDs gain emerging technologies. Our hope is that, following the completion of LCCMR participation, that the program can ultimately utilize the new Clean Water Fund as it is not a program which previously existed and is therefore not supplanting of existing efforts.

C. Other Funds Proposed to be Spent during the Project Period: In-kind staff hours of the SWCDs and BWSR staff will be the largest direct money. (Indirect funds described in “Project Impact” are very large but more realistically associated with the design and construction of projects more so than the apprentices.)

D. Spending History: There have not been previous LCMR or LCCMR approrpiations

VII. DISSEMINATION: The MCC will be the primary disseminator and provide a link on their website (www.conservationcorps.org) describing the program. BWSR and MASWCD will also offer a brief description of the program and a link to the MCC site. MASWCD has already been spreading this idea nationally through the National Association of Conservation Districts.
October 30, 2011 update: Survey results are being tabulated and distributed in a progress report format to the participants. MCC appeared at BWSR Academy in October to meet with SWCDs, relay results, and generate interest for next year. Len Price will be presenting first year summary to full BWSR Board this winter. Marketing materials are being updated for use in recruiting at Universities this fall.

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than June 1, 2011, October 30, 2011, June 1, 2012, and November 30, 2012. A final work program report and associated products **cannot** be submitted between June 30 and August 1, 2011 as requested by the LCCMR due to the need for the summer internships to run into September. Final end date is therefore June 30, 2013.

IX. RESEARCH PROJECTS: NA

[1] **Number of SWCD partners: 60**	**Number of surveys returned: 53**	**Response rate: 88%**
[2] **Number of apprentices: 65**	**Number of surveys returned: 54**	**Response rate: 83%**

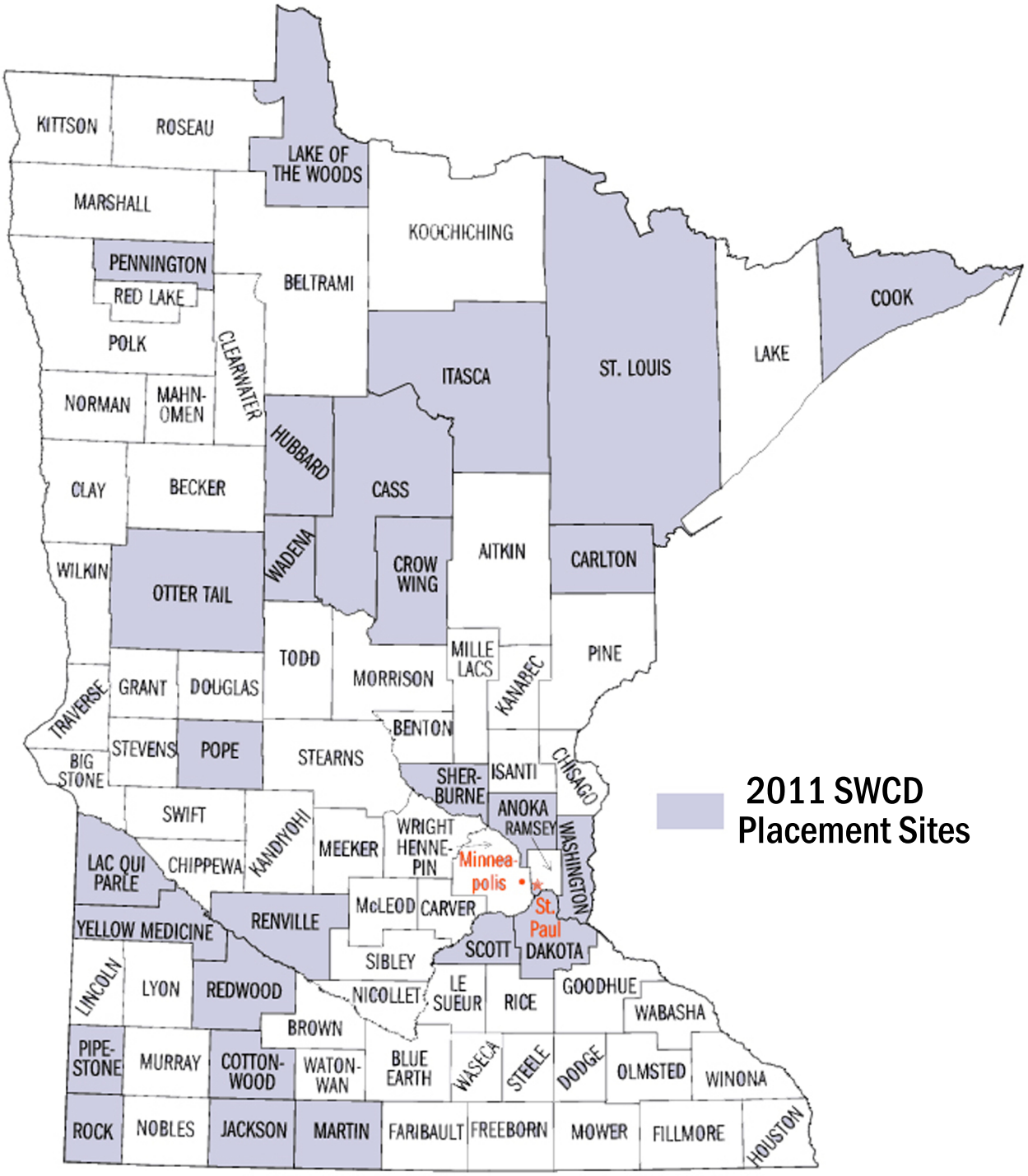
Attachment A: Budget Detail for 2010 Projects - Summary and a Budget page for each partner (if applicable)

Project Title: Minnesota *Conservation Program Apprenticeship Academy*

Project Manager Name: *Jenny Gieseke*

Trust Fund Appropriation: $ *$368,000*

2010 Trust Fund Budget	Result 1 Budget 4/22/13	Amount Spent *(6/30/13)*	Balance *(6/30/13)*	Result 2 Budget 4/22/13	Amount Spent *(6/30/13)*	Balance *(6/30/13)*	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM								
BWSR								
PERSONNEL: wages and benefits Angie Becker-Kudelka training coordinator @ 0.05 FTE (non-general fund employee)	$ 5,000	$ 5,000	$ -		$ -	$ -	$ 5,000	$ -
Contracts - MINNESOTA CONSERVATION CORPS								
Professional/technical								
Program Manager @ 80% FTE, Recruiter @ 6% FTE, Administration	$ 51,612	$ 51,697	$ (85)	$ 24,879	$ 24,793	$ 86	$ 76,491	$ 1
30 SWCD Apprentices for 540 hours per year for two years		$ -	$ -	$ 250,317	$ 249,355	$ 962	$ 250,317	$ 962
Other direct operating costs			$ -			$ -	$ -	
Apprentice orientation and training, sub-contract tech train		$ -	$ -	$ 14,311	$ 14,311	$ -	$ 14,311	$ -
Apprentice recruitment/advertising expense, background checks		$ -	$ -	$ 6,002	$ 6,002	$ -	$ 6,002	$ -
Travel expenses in Minnesota *(Mileage for 1 staff vehicle @$.50 per mile)*	$ 4,106	$ 4,106	$ -	$ 11,773	$ 11,772	$ 1	$ 15,879	$ 1
COLUMN TOTAL	**$60,718**	**$60,803**	**-$85**	**$307,282**	**$306,233**	**$1,049**	**$368,000**	**$964**



Conservation Apprenticeship Academy

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

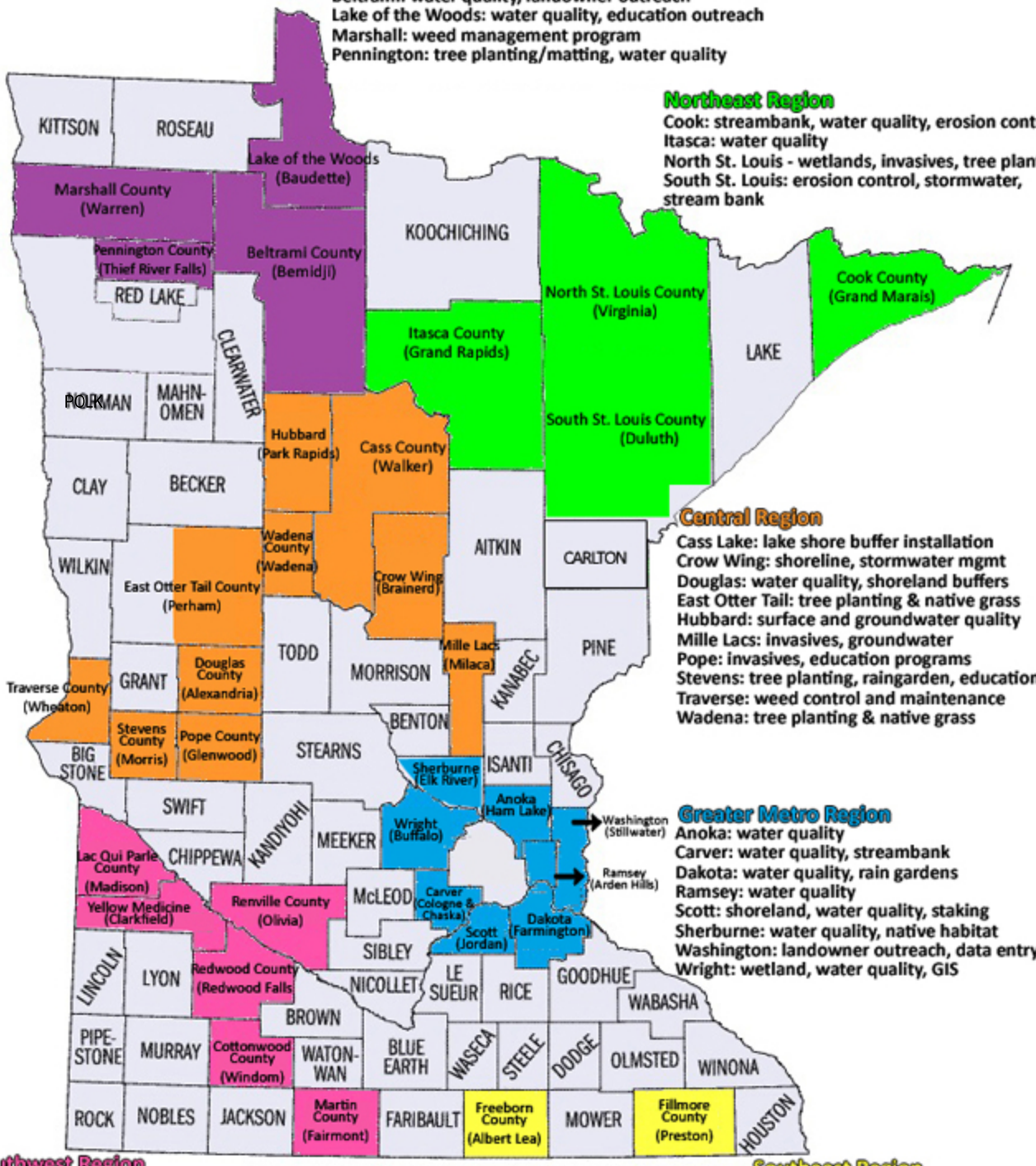
MASWCD

Minnesota Board of Water & Soil Resources

AMERICORPS

conservation corps MINNESOTA

SWCD Regions and Project Types



Northwest Region
Beltrami: water quality, landowner outreach
Lake of the Woods: water quality, education outreach
Marshall: weed management program
Pennington: tree planting/matting, water quality

Northeast Region
Cook: streambank, water quality, erosion control
Itasca: water quality
North St. Louis - wetlands, invasives, tree planting
South St. Louis: erosion control, stormwater, stream bank

Central Region
Cass Lake: lake shore buffer installation
Crow Wing: shoreline, stormwater mgmt
Douglas: water quality, shoreland buffers
East Otter Tail: tree planting & native grass
Hubbard: surface and groundwater quality
Mille Lacs: invasives, groundwater
Pope: invasives, education programs
Stevens: tree planting, raingarden, education
Traverse: weed control and maintenance
Wadena: tree planting & native grass

Greater Metro Region
Anoka: water quality
Carver: water quality, streambank
Dakota: water quality, rain gardens
Ramsey: water quality
Scott: shoreland, water quality, staking
Sherburne: water quality, native habitat
Washington: landowner outreach, data entry
Wright: wetland, water quality, GIS

Southwest Region
Cottonwood: Fish Lake drainage project
Lac Qui Parle: floodplain well-pits, tree-planting
Martin: stormwater, native species
Redwood: conservation programs
Renville: wetland and feedlot programs

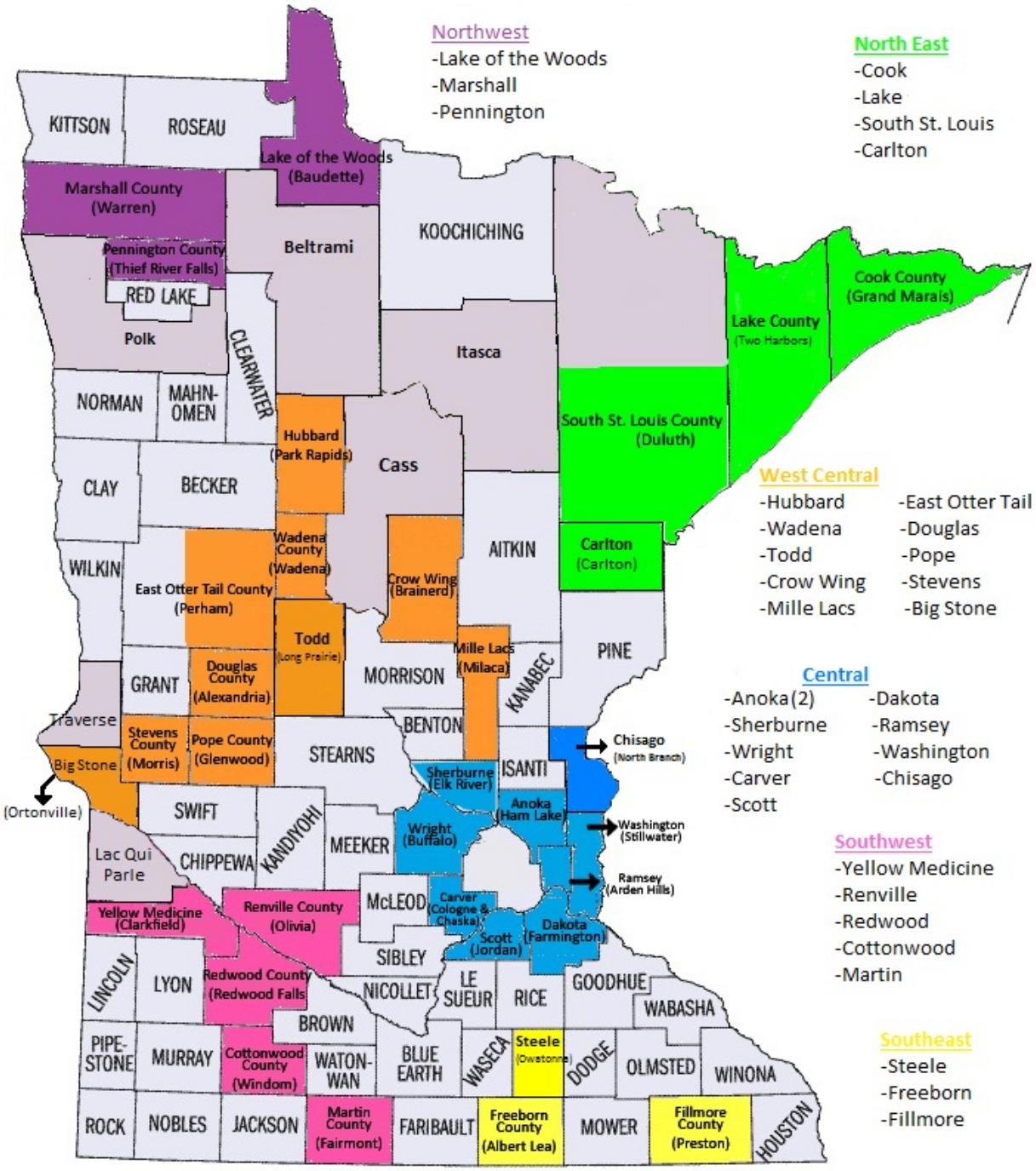
Yellow Medicine: conservation easement

Southeast Region
Fillmore: water quality
Freeborn: watershed, surveys, maps

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND
MASWCD
Minnesota Board of Water & Soil Resources
AMERICORPS
conservation corps MINNESOTA

Conservation Apprenticeship Academy 2012

2013 Placement Map



Conservation Apprenticeship Academy

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

MASWCD

Minnesota Board of Water & Soil Resources

AMERICORPS

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Supplemental Materials

- 2011 Shureburne SWCD Article
- 2011 Pine Journal Article http://www.pinejournal.com/event/article/id/24048/group/News/
- 2013 Canby News Article http://images.burrellesluce.com/image/15220/15220_1994
- Conservation Corps Website Information http://conservationcorps.org/apprentice-academy/
- 2013 BWSR Snapshots Newsletter Article

Summer Interns Head to SWCD Offices

Submitted by: DeAnna Doran

Soil & Water Conservation Districts (SWCDs) are providing summer jobs to 30 university students this summer in the first round of apprentices funded by the Legislative Citizen Commission on Minnesota Resources (LCCMR). The students are employed by the Conservation Corps of Minnesota and Iowa but report daily to their Districts for a wide variety of work designed to expose them to the realities of a career in soil and water conservation.

The program idea was launched overlooking a conservation practice in rural Pope County when (now retired) Pope SWCD technician Kim Kreuger mentioned he was about to retire. His comment started a discussion that noted the need for new talent to learn from experienced technicians about those things not found in textbooks. There is no financial cost to a district for the extra set of hands in the office and field. The value the district and other partners including NRCS and BWSR provide to the interns is experience.

Funding from the LCCMR is already in hand for the summer of 2012. Two additional years are anticipated for the summers of '13 and '14 due to a surprise addition of the program to the recommended projects list after the start of the 2011 legislative session. Participating students will be tracked in the coming years to measure whether the experience leads to more graduates pursuing work with SWCDs.

Sherburne SWCD is excited about this opportunity for our SWCD staff to serve as mentors for individuals interested in careers related to natural resources and conservation. The following SWCD's along with Sherburne are hosting an apprentice through this partnership:

Anoka, Carlton, Cass, Cook, Cottonwood/Jackson, Crow Wing, Dakota, Hubbard, Itasca, Lac Qui Parle, Lake of the Woods, Martin, East Otter Tail, West Otter Tail, Pennington, Pipestone, Pope, Redwood, Renville, Rock, Scott, South St. Louis, Wadena, Washington, and Yellow Medicine.

Meet our Intern!

My name is Frances Gerde and I am originally from Bloomington, MN. I graduated from the University of Wisconsin-Stevens Point (UWSP), Stevens Point, WI with a Bachelor of Science degree; majoring in Water Resources. I am a hard working individual who is a quick learner and loves being outdoors. I am concerned with preserving the native species that we are losing because of invasive species. I maintained an on campus job working at the UWSP herbarium, mounting plant specimens from all over Wisconsin for educational usage and I stayed involved with campus organizations that related to my major. I have always held an interest in preserving our natural resources and my areas of interest are plant restoration and invasive species. I have worked with terrestrial plants for the past three summers at several parks around the metro area in Minneapolis. I also volunteered in an aquatic biomonitoring entomology lab on campus to gain experience with the insect side of invasive species in the Wisconsin water systems. I would like to gain more experience with habitat restoration and invasive species control techniques and prevention. I feel this internship will help me attain those goals!

PINE JOURNAL Carlton County's Newspaper

Published July 09, 2011, 04:53 PM

Summer intern serves with the Carlton County SWCD

Neva Winder is serving as a conservation apprentice for the Carlton County Soil and Water Conservation District (SWCD) this summer. She recently graduated from the College of Saint Benedict/Saint John's University with a Bachelor of Arts degree, double majoring in biology and environmental studies.

Neva Winder is serving as a conservation apprentice for the Carlton County Soil and Water Conservation District (SWCD) this summer. She recently graduated from the College of Saint Benedict/Saint John's University with a Bachelor of Arts degree, double majoring in biology and environmental studies.

Winder's apprenticeship in Carlton County is a part of a new program of Conservation Corps Minnesota: The Conservation Apprenticeship Academy. Last year Conservation Corps Minnesota received Legislative-Citizen Commission on Minnesota Resources funding to launch this program, combined with AmeriCorps scholarship funding for apprentices.

From May through August, Winder and 29 other Conservation Corps apprentices will serve in Minnesota SWCDs throughout Minnesota. Corps members are mentored by natural resource professionals and learn hands-on skills in managing soil and water resources and assisting landowners with conservation-related activities.

"The program is a win/win," said Brad Matlack, manager at the Carlton SWCD. "The SWCD gives Neva some hands-on, real time experience in management of natural resources at the local government level, and Neva gives the SWCD her time for the busy summer months of field work along with her skills in GIS data management. We have a lot of projects in various stages so Neva will get exposure to many aspects of the work that happens at the SWCD."

Specifically, Winder will work in the field with SWCD staff assisting them in water monitoring, topographic surveys, tree plantings and grazing practice certifications. Along with this field work she will develop GIS data layers for the Nemadji and Kettle river watersheds. This data will be incorporated into projects as they move along.

"I look forward to an educational and experience-packed summer here at the Carlton County SWCD!" Winder said.

Tags:carlton county, news, outdoors

http://www.pinejournal.com/event/article/id/24048/group/News/

Canby News

Date: Wednesday, June 05, 2013
Location: CANBY, MN
Circulation (DMA): 1,865 (15)
Type (Frequency): Newspaper (W)
Page: 5
Section: Main
Keyword: Minnesota Board of Water & Soil Resources

Summer intern Patrick Burkowski joins Yellow Medicine SWCD

Patrick Bukowski

The Yellow Medicine Soil and Water Conservation District (SWCD) is providing a summer job to Patrick Bukowski in the third round of apprentices funded by the Legislative Citizen Commission on Minnesota Resources (LCCMR). Patrick is employed by the Conservation Corps of Minnesota and Iowa but reports daily to the Yellow Medicine SWCD for a wide variety of work designed to expose him to the realities of a career in soil and water conservation.

Patrick was born and raised in the Clarkfield area. He went to Yellow Medicine East High School where he graduated in 2012. He currently is studying ag business at South Dakota State University in Brookings, SD. After school, he plans to come back and live in the area and hopefully get a well-paying job.

The program idea was launched overlooking a conservation practice in rural Pope County when (now retired) Pope SWCD technician, Kim Kreuger, mentioned he was about to retire. His comment started a discussion that noted the need for new talent to learn from experienced technicians about those things not found in textbooks. There is no financial cost to the SWCD for the extra set of hands in the office and field. The value the SWCD and other partners, including the Natural Resources Conservation Service and the Board of Water and Soil Resources, provide to the interns is experience.

This is a great opportunity for corps members to get hands-on experience with the field operations and strategic planning efforts through the diverse expertise of SWCDs. This chance to apply what is learned in the classroom to the real world is a powerful way to prepare the future conservation workforce.

Account: 15220 (1994)
MN-53

From novice to professional:

Conservation Corps apprenticeship leads to career position

Widner takes water quality samples during her summer apprenticeship at Carlton SWCD.

The summer of 2011 was one that Neva Widner will never forget.

As a conservation apprentice at the Carlton County Soil and Water Conservation District (SWCD), Widner performed water quality monitoring and surveyed wetlands, streams and runoff on farms. One of her biggest challenges occurred when a torrential rainstorm in the Nemadji Watershed required immediate response.

"The rain event really tested my monitoring skills," Widner said. "Within a matter of hours, 5.5 inches of rain fell, and rivers were the highest recorded in the 37 years of historical flow records. I could truly take inventory of my knowledge and skills."

Her apprentice experience at Carlton SWCD directly led to her to a full-time job as a Water Resources Technician in 2012.

As the most experienced conservation leaders are nearing retirement age and walking out the door with the knowledge and experience they've built over decades, university graduates are subsequently walking in the door, knowledgeable in theory, research methods and emerging technologies, but lacking practical on-the-job skills important for success. The Minnesota Conservation Apprentice Academy allows youth and mentors to work side by side to build a solid foundation for the future management of the state's natural resources.

Applications for 2013 Conservation Apprentice Academy are being accepted now through March 29. Apprentices will be placed with SWCDs to conduct water quality monitoring, install conservation practices, conduct site inspections, recruit landowners for conservation projects, assist landowners and SWCD staff with management plans, and much more.

Applicants must be ages 18-25 and be available to work full-time from May 20 – August 23. Statewide positions are available. Detailed program information can be found at the Conservation Corps website.

Reflecting on her apprenticeship, Widner said, "The Apprenticeship Academy provided me the opportunity to develop a set of professional skills and network to become competitive in my pursuit of acquiring a conservation position. I view the Apprenticeship Academy as a vital component to the long-term effectiveness of Minnesota SWCD functionality, by providing the apprentice the means to transition from the classroom to the field, and the SWCD the additional affordable staff support."

Widner's experience with the Minnesota Conservation Apprentice Academy will come full circle in the summer of 2013 – she will host an apprentice at the Carlton SWCD, passing her knowledge and expertise to the next generation of student conservationists.

The Board of Water and Soil Resources manages the Minnesota Conservation Apprentice Academy project with funds appropriated through the Minnesota Environment and Natural Resources Trust Fund. The Conservation Corps serves as the employer and uses these funds to match apprentices with mentor SWCDs, provide a monthly apprentice stipend, check in with mentors and apprentices throughout the summer, and track long-term results.

http://conservationcorps.org/apprentice-academy/

AmeriCorps: Conservation Apprenticeship Academy

Spend your summer serving alongside a natural resource professional in a Minnesota Soil and Water Conservation District. Learn hands-on skills in managing soil and water resources while earning a stipend and making progress to receiving an AmeriCorps education award.

Gain valuable experience in . . .

• Soil and water conservation skills: water-quality monitoring, assessments, field surveys, best practices in land and water management.
• Landowner and community engagement: assist landowners with developing soil and water management plans; lead educational activities on water resources.
• Personal development: First Aid/CPR training, communication, teamwork, safety and risk management.

AmeriCorps members receive . . .

A living stipend twice per month, health insurance, student loan forbearance during the member's term, a post-service AmeriCorps education award, protective equipment and a uniform. 15-20% of the service term is dedicated to technical and personal-skill training.

Read about Neva, who landed a job in a SWCD after her apprenticeship.

Qualifications

• 18-25 years old.
Positive attitude and strong commitment to service and community work.
Willingness to work independently and on a team.
Ability to communicate effectively with staff, community members and landowners.

Ability to work outdoors in adverse conditions and lift 50 pounds.
• Valid driver's license.
• Pass criminal, NSOPR and driver history record checks.

Additional preferred qualifications

Training or experience in natural resource management, agriculture, GIS/GPS and MS Office.

This program is available to all, without regard to race, color, national origin, disability, sex, sexual orientation, political affiliation or religion. The Conservation Corps engages AmeriCorps members, ages 18-25, as defined under the American Conservation and Youth Service Corps Act, a subtitle of the National and Community Service Act of 1990. Reasonable accommodations provided upon request.

Applications are no longer being accepted for the 2013 service term.

Sign up to receive email notification of all Corps Opportunities.

The Minnesota Environment and Natural Resources Trust Fund has appropriated funds, as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR), to train and mentor future conservation professionals by providing apprenticeship service opportunities to Soil and Water Conservation Districts. Up to 35 corpsmembers (apprentices) are eligible to be placed in Soil and Water Conservation Districts and Technical Service Areas throughout the state.

2010 Project Abstract
For the Period Ending June 30, 2013

PROJECT TITLE: Engaging Students in Environmental Stewardship through Adventure Learning
PROJECT MANAGER: Nicole Rom
AFFILIATION: Executive Director, Will Steger Foundation
MAILING ADDRESS: 2801 21st Avenue South, Suite 110
CITY/STATE/ZIP: Minneapolis, MN 55407
PHONE: (612) 278-7101
E-MAIL: nicole@willstegerfoundation.org
WEBSITE: www.willstegerfoundation.org and classroom.willstegerfoundation.org
FUNDING SOURCE: Environment and Natural Resources Trust Fund
LEGAL CITATION: M.L. 2010, Chp. 362, Sec. 2, Subd. 8b

APPROPRIATION AMOUNT: $250,000.00

Overall Project Outcome and Results

The Will Steger Foundation developed *Engaging Students in Environmental Stewardship through Adventure Learning (MCC)* with the understanding that environmental stewardship begins with a local connection and sense of appreciation, or environmental sensitivity, towards the natural environment. This project's primary audience, educators, have the unique opportunity to lead their students through the environmental education continuum of knowledge, awareness, and skills that lead to an informed and active environmental citizenry.

Climate change is one of the most critical environmental issues of our time and educators have an important role to play in educating their students and providing them the skills to mitigate and adapt to climate change. In order to make the issue relevant and connected to the lives of those reached through our project, we focused specifically on the impacts of climate change on Minnesota's biomes. Additionally, we wove in stories from Will Steger's life and examples of his own early observations of the natural world and his curiosity of weather and climate. We also tapped into the expertise of many Minnesota scientists and educators in the development of our Grades 3-12 curriculum, online classroom and two public forums and three Summer Institutes for climate change education.

Over the three years of the project we were able to reach and increase the climate literacy of over 5000 educators, members of the public and students via our Summer Institutes for Climate Change Education, year round workshops, conference presentations, school visits, field trips, public forums and our online classroom (classroom.willstegerfoundation.org). The project also resulted in the development of a number of valuable, mutually beneficial, and long-term partnerships. The partnership with the Mississippi River Fund, National Park Foundation and Mississippi National River and Recreation Area resulted in the ability to support 20 student service projects and field trips for over 500 students to enhance their learning on Minnesota's changing climate. *MCC* was recognized in 2012 by Environmental Initiative in the area of environmental education in part due to these important partnerships. A final evaluation report showed overall success for the project in providing a curriculum and training that increased climate literacy, environmental stewardship and educator confidence in teaching about climate change.

Project Results Use and Dissemination

Directions:

1. *How has information from your project been used and/or disseminated?*
   Over 500 formal and informal educators from all four biomes received a copy of the *Minnesota's Changing Climate Curriculum* via three Summer Institutes and customized workshops for school districts and at professional education conferences. The curriculum was used to teach over 10,000 Grades 3-12 students about Minnesota's unique biomes, what makes them unique, how they are

threatened by climate change and what they can do to mitigate the impacts. Additionally, the curriculum has been shared nationally and regionally via the Climate Literacy Network, the Great Lakes Education Collaborative, Green Teacher, Humphrey Institutes Innovations in Education Forum and the North American Association for Environmental Education as a model of place based climate change education.

Additionally, over 1,000 students submitted their observations of Minnesota's biomes during the school year to our online classroom, with at least 2,000 more viewing and/or commenting on their observations.

What communications and outreach activities have been done in relation to your project? For example: have tools or techniques developed through your project been adopted by a group; presentations relating to the project been made; has work pertaining to the project been published?

Minnesota's Changing Climate curriculum has been used as a framework to develop curriculum specifically focused on the Mississippi River and climate change impacts on Wisconsin. Additionally the Minnesota Phenology Network and Minnesota Master Naturalists have used portions of it and endorse its effectiveness for communicating the connection between phenology and climate change. The curriculum has been aligned with the St. Paul Public Schools "power standards" and Minneapolis Public schools elementary STEM standards and used as an example of how to meet those standards. Finally, teachers from Minnesota American Indian reservations that are participating in The CYCLES project, a project of the STEM Center at the University of Minnesota, received training and are using the curriculum in their schools because the place based focus of the curriculum resonates culturally.

The online classroom, created in partnership with Hamline's Center for Global Environmental Education, has been used by educators around the state to learn more about Minnesota's unique biomes, their cultural history and climate change impacts. Finally, the Minnesota Phenology Network has utilized it has the perfect curriculum for connecting individuals with a reason why phenology is important.

Environment and Natural Resources Trust Fund (ENRTF)
2010 Work Program Final Report

Date of Report: August 8, 2013
Date of Next Progress Report: Final Report
Date of Work Program Approval:
Project Completion Date: June 30, 2013

I. PROJECT TITLE: Engaging Students in Environmental Stewardship through Adventure Learning

Project Manager: Nicole Rom
Affiliation: Executive Director, Will Steger Foundation
Mailing Address: 2801 21st Avenue South, Suite 110
City / State / Zip: Minneapolis, MN 55407
Telephone Number: (612) 278-7147
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Fax Number: (612) 278-7101
Web Site Address: www.willstegerfoundation.org

Location: Minnesota Statewide

Total ENRTF Project Budget:	**ENRTF Appropriation**	**$250,000.00**
	Minus Amount Spent:	**$250,000.00**
	Equal Balance:	**$0**

Legal Citation: M.L. 2010, Chp. 362, Sec. 2, Subd. 8b

Appropriation Language:
$250,000 is from the trust fund to the commissioner of natural resources for an agreement with the Will Steger Foundation to provide curriculum, teacher training, online learning, and grants to schools on investigating the connection between Minnesota's changing climate and the impacts on ecosystems and natural resources. This appropriation is available until June 30, 2013, by which time the project must be completed and final products delivered.

II. FINAL PROJECT SUMMARY AND RESULTS:

The Will Steger Foundation developed Engaging Students in Environmental Stewardship through Adventure Learning (MCC) with the understanding that environmental stewardship begins with a local connection and sense of appreciation, or environmental sensitivity, towards the natural environment. This project's primary audience, educators, have the unique opportunity to lead their students through the environmental education continuum of knowledge, awareness, and skills that lead to an informed and active environmental citizenry.

Climate change is one of the most critical environmental issues of our time and educators have an important role to play in educating their students and providing them the skills to mitigate and adapt to climate change. In order to make the issue relevant and connected to the lives of those reached through our project, we focused specifically on the impacts of climate change on Minnesota's biomes. Additionally, we wove in stories from Will Steger's life and examples of his own early observations of the natural world and his curiosity of weather and climate. We also tapped into the expertise of many Minnesota scientists and educators in the development of our Grades 3-12 curriculum, online classroom and two public forums and three Summer Institutes for climate change education.

Over the three years of the project we were able to reach and increase the climate literacy of over 5000 educators, members of the public and students via our Summer Institutes for Climate Change Education, year round workshops, conference presentations, school visits, field trips, public forums and our online classroom (classroom.willstegerfoundation.org). The project also resulted in the development of a number of valuable, mutually beneficial, and long-term partnerships. The partnership with the Mississippi River Fund, National Park Foundation and Mississippi National River and Recreation Area resulted in the ability to support 20 student service projects and field trips for over 500 students to enhance their learning on Minnesota's changing climate. MCC was recognized in 2012 by Environmental Initiative in the area of environmental education in part due to these important partnerships. A final evaluation report showed overall success for the project in providing a curriculum and training that increased climate literacy, environmental stewardship and educator confidence in teaching about climate change.

III. PROGRESS SUMMARY AS OF October 31, 2010:

To support the *Engaging Students in Environmental Stewardship through Adventure Learning* project positions were posted and hired for an Education Program Manager, Videographer, Graphic Designer, Evaluation Team, and project assistant/intern.

Significant effort was put into raising awareness about the project and recruiting classrooms to participate during the 2011-2012 school year. To assist in the effort a number of different materials, both multimedia and paper based tools were developed in collaboration with a Videographer, Webmaster, Graphic Designer, Education Program Manager and Project Assistant. Outreach occurred through our Summer Institute for Climate Change Education, conferences, our website, and established educator networks.

A "teaser lesson" that showcases Will's archived journals from his childhood and later in life was developed and shared via the Summer Institute and in subsequent conference presentations. In addition, an activity was piloted at two conferences that will be used in the final curriculum.

<u>Please note budget amendment request in Section V approved January 26, 2011.</u>

IIIa. PROGRESS SUMMARY AS OF March 31, 2011:

Engaging Students in Environmental Stewardship through Adventure Learning content research and creation have been the focus of this period of time. The first draft of the *Minnesota's Changing Climate* curriculum was researched, written and sent out for review in March. In addition, we hired Hamline's Center for Global Environmental Education (CGEE) to design much of the online classroom and we have worked with them to ensure consistency between the curriculum and the online component. Recruitment and planning for the Summer Institute has continued and we have been pleased with the number of applicants we have (70) with a few months to go (Summer Institute is August 11-12, 2011). Finally, through a unique partnership with the National Park Foundation, Mississippi River Fund and the Mississippi National River and Recreation Area we gained the opportunity to offer $500 mini grants to metro middle school teachers that attend the Institute. We also applied for a grant from the Donald Weesner Charitable Trust to offer each educator attending the Institute an "Explore Minnesota Biomes" kit that will include equipment and cameras to observe their natural environment.

IIIb. PROGRESS SUMMARY AS OF August 31, 2011:

The *Minnesota's Changing Climate* Grades 3-8 and 9-12 curriculum was finalized and had its first printing. In addition the *Minnesota's Changing Climate* online classroom (classroom.willstegerfoundation.org) was made public including a learning module, curriculum and supporting materials and a social networking feature. The 6th annual Summer Institute for Climate Change Education occurred on August 11 and 12, with over 100 registrants representing all four biomes of Minnesota. Initial evaluation of the project occurred at the Institute.

Please note there is a budget amendment request in Section V approved October 12, 2011.

IIIc. PROGRESS SUMMARY AS OF November 30, 2011:

Minnesota's Changing Climate teacher support began this fall, as well as continued outreach and dissemination of the curriculum. Will Steger made four school visits to recognize those implementing *Minnesota's Changing Climate*. Two more visits are planned for the winter and early spring. The use of the online classroom observations section has been consistent. Initial outreach and planning for Summer Institute 2012 began.

IIId. PROGRESS SUMMARY AS OF April 30, 2012:

We were honored to learn that the *Engaging Students in Environmental Stewardship through Adventure Learning* project was one of three environmental education projects statewide to be nominated for the Environmental Initiative Awards (http://bit.ly/Kpbfuj). The online classroom continues to be posted to by students around the state and we were able to offer two additional curriculum trainings. Registration for Summer Institute 2012 continues and we are busy editing a second edition of the curriculum based on educator feedback to be ready for this summer's educator cohort.

Amendment Request Result 1 May 23, 2012:

- Due to an unanticipated demand for school visits and presentations on the curriculum our expenditures were greater than expected in Deliverable 6. Additionally, Deliverable 5, web support for the curriculum, expenditures exceeded our expectations. Based on our needs for the final printing and distribution of the curriculum we request to move $1822.36 from Deliverable 4, printing and add $1319.50 to Deliverable 5, web support and $502.86 to Deliverable 6, curriculum outreach.

Amendment Request Result 2 May 23, 2012:

- Our expenditures for Deliverable 1, Summer Institute 2010, exceeded expectations, but because of unanticipated in kind donations, we under spent for Deliverable 2, Summer Institute 2011. We request to move $3973.25 from Deliverable 2 to Deliverable 1.

Amendment Request Result 3 May 23, 2012:

- Will Steger's journals became more integral to the curriculum than expected and we exceeded our expenditures in Deliverable 1 by $375. Looking ahead we have adequate funds to maintain our online program and request to move $375 from Deliverable 2 to Deliverable 1.

Amendment Approved: June 14, 2012

IIIe. PROGRESS SUMMARY AS OF August 31, 2012

We held our seventh annual Summer Institute for Climate Change Education featuring a newly revised version of *Minnesota's Changing Climate* August 7 and 8. 90 educators attended and evaluation results show overwhelmingly positive reviews, as well as increased knowledge on climate change in Minnesota. We were able to bring Dr. Genie Scott from the National Center for Science Education to speak at both a public forum before the Institute, and at the Institute. The online classroom continued to be utilized and our evaluation team was able to get final curriculum survey results that they are developing into a final report.

IIIe. PROGRESS SUMMARY AS OF March 6, 2013

We continue to support educators using our curriculum through workshops, exhibiting at conferences and the online classroom.

Amendment Request Result 1 March 6, 2013

- We have spent less on travel/mileage than anticipated and request to move a total of $2722.89 from Deliverables1 ($1183.77),3($1.49) and 4($1537.63) to Deliverable 5, web support, to ensure the online classroom is maintained for the duration of the project. This is reflected in the Attachment A Result 1with a movement of $0.97 moved from the supplies line and $2721.92 from the travel line to Online/Web Support.

Amendment Request Result 2 March 6, 2013

- We request to move $300 from the line for travel/mileage to the line for online/web support.

Amendment Request Result 3 March 6, 2013

- In the Attachment A we request to move $1480.25 from the line for travel/mileage to the line for printing. This will enable us to print our last batch of curriculum for distribution to educators.

Amendment Request Result 4 March 6, 2013

- In the Attachment A we request to move $870.98 from the line for travel/mileage to the line for printing. This will enable us to print our last batch of curriculum for distribution to educators.

Amendment Approved: April 1, 2013

IV. OUTLINE OF PROJECT RESULTS*:*

RESULT/ACTIVITY 1: Minnesota's Changing Climate Adventure Learning Curriculum for Grades 3-12

Description: An age-appropriate climate change curriculum for grades 3-5; 6-8; 9-12 that is reviewed by Minnesota educators, the Union of Concerned Scientists and the National Education Association. The curriculum will be interdisciplinary and experiential in nature. The curriculum will foster an understanding of Minnesota's diverse ecosystems and develop a sense of place, educate on the basics of climate change and implications for Minnesota, the Midwest and the globe, and ultimately empower student leadership and action on climate change solutions. The curriculum will include an adventure story from polar explorer Will Steger's archives, units on Minnesota's ecosystems and foster skills necessary to be a citizen naturalist – observing and documenting Minnesota's changing climate and investigation implications of a changing climate. The curriculum will reach 10,000 students in grades 3-12 throughout Minnesota schools by 2013.

Amendment Request Result/Activity 1 Approved January 26, 2011:

- In going through the Result 1 budget in the Work Program we noticed that it did not include all of funds included in the budget lines in Attachment A. This is an oversight from the original workplan and we are requesting to add these funds to the **Work Program** to cover supplies, travel expenses, and digitizing service. The budget for these expenses is accounted for in Attachment A.

Summary Budget Information for Result/Activity 1:

***Revised* ENRTF Budget:** **$91,313.84**

Amount Spent: **$91,313.84**

Balance: **$0**

Deliverable/Outcome	Completion Date	Budget
1. Research, Development and Revision of Grades 3-12 Minnesota's Changing Climate Curriculum • Multidisciplinary curriculum on Minnesota's diverse ecosystems (bogs and fens, prairie, deciduous, coniferous), the impacts of climate change, and lesson planning for student-led action projects • Aligned to MN standards	June 2013	$52,827.61

2. Graphic design, and revision – final production of curriculum	June 2013	$2947.50
3. Archive research for curriculum components	June 2011	$1437.39
4. Printing and distribution of curriculum	June 2013	$22,806.59
5. Web support for curriculum, software, evaluation	June 2013	$9791.89
6. Curriculum outreach	June 2013	$1,502.86

Result/Activity Completion Date: June 2013

Result 1 Status as of: August 31, 2012
We were able to consolidate teacher feedback and make revisions to MCC curriculum for a second printing. The new version was distributed at the June Minnesota Association for Environmental Education conference (15 teachers), an August and September workshop for St. Paul Schools science teachers (70 teachers) and the Minnesota Independent School Forum conference session (30 teachers). Additionally educators at the 2012 Summer Institute for Climate Change Education received the curriculum (90 teachers), as well as a kit of materials for implementing a number of the activities.

The 2012-2013 school year will focus on supporting teachers using the curriculum and continuing with distribution of the curriculum via training institutes and conferences. A workshop is scheduled for December with teachers that work at schools primarily serving American Indian youth.

Result 1 Status as of: April 30, 2012
We have continued to gather feedback from teachers on the curriculum as we work on editing the curriculum for distribution at Summer Institute 2012. Additionally, teachers who download the curriculum, attend a training or information session on MCC, or attended our Institute receive bi-monthly communications with updates and resources.

The curriculum was distributed at trainings for the Minnesota Science Teacher's Association and the Minnesota Phenology Network's annual meeting. We were able to reach over 250 educators at the MnSTA conference and discuss further partnership opportunities with the Minnesota Phenology Network, focusing on the phenology strand of our curriculum.

Will Steger, our education program manager and education assistant made visits to Proctor Middle School and Hawley Elementary and High School. Will did school assembly presentations at the schools and then classes shared what they had been learning. We were also taken outside to the areas where students were doing their journaling and observations. Through these visits, we were able to document educators increased comfort and confidence with bringing their students outside and important 21st century skills being used by their students. The student's questions and well-developed skills of observation and journaling outdoors were a great testament to what the outcome of teacher training in combination with a well-developed and implemented curriculum can be.

Result 1 Status as of: November 30, 2011

As teachers begin to implement the *Minnesota's Changing Climate* curriculum in their classroom we are gathering feedback and extensions to add to the second edition. Teachers who download the curriculum or attended our Institute receive bi-monthly communications with updates and resources.

Curriculum outreach and distribution continued with presentations at the Minnesota Homeschoolers Association (10 participants), the Friend's School of Minnesota (5 teachers), and Education Minnesota (35 participants in session, 9000 conference attendees).

Will Steger, our education program manager and education assistant made visits to Crosby Farm Park with the Friends School of Minnesota, Salem Hills Elementary, Roseville Middle School and Metro Tech Academy. During the visits Will talked about climate change, his adventures and heard from the students about the work they have been doing around *Minnesota's Changing Climate.* A few schools have created public service announcements about action projects they have or will be implementing. These videos can be watched at: http://classroom.willstegerfoundation.org/get-social/view-observations-by-others/itemlist/tag/video.

Result 1 Status as of: August 31, 2011
Late spring and summer consisted of consolidating the Grades 3-8 and 9-12 *Minnesota's Changing Climate* curriculum reviews and editing, sending the curriculum to the designer and finally running the first printing. The curriculum was introduced and distributed to 25 teachers at the Minneapolis Public Schools Elementary Science Institute, 90 participants of the Will Steger Foundation Summer Institute, and 20 teachers at the Minnesota Independent School Forum. Over 90% of educators introduced to the curriculum said that it was useful and engaging and matched their curricular goals. In addition, 84% said that the curriculum meets a need for which they have inadequate resources.

We additionally reached over 100 other educators through presentations at the Midwest Environmental Education Conference in Rochester, and the Minnesota Master Naturalists Conference. The fall will include curriculum distribution via presentations at Education Minnesota, and the Minnesota Homeschoolers Alliance. In addition the curriculum is available free to download from the Will Steger Foundation website, http://classroom.willstegerfoundation.org.

The 2011-2012 school year will focus on supporting teachers using the curriculum, making revisions and continuing with distribution of the curriculum via training institutes and conferences.

Result 1 Status as of: March 31, 2011
Winter and spring were focused on research and writing of the curriculum by the Education Program Manager and the Project Assistant. Some coordination with the online classroom development team at CGEE was necessary to maintain connections with the content for both. The curriculum was sent out to a number of curricula, science and climate change experts in Minnesota for review and their comments are being incorporated into the curriculum final draft. The graphic designer designed a few

activities for piloting at conferences and for teachers to use in their classroom, as well as worked on the overall look of the curriculum final. We exhibited at the Minnesota Science Teachers Association Conference and raised awareness about the project with over 200 science teachers from all over the state. The Education Program Manager attended the Minnesota State Science Standards workshop to learn more about aligning the curriculum with state standards and hired a short-term intern from the St. Kate's pre-service STEM program to align the curriculum with science standards.

This spring and summer will be spent finalizing the curriculum, designing and printing it and getting it ready to share at the Summer Institute.

Result 1 Status as of: October 31, 2010
Videographer, graphic designer and project assistant positions were posted and filled. In anticipation of the opportunity to share news of this project at the 2010 Summer Institute for Climate Change Education a "teaser" lesson was developed (see attached). The lesson featured the importance of journaling to connect with the outdoors and included excerpts from Will Steger's journals. The Education Program Manager spent time developing the lesson in collaboration with a graphic designer, an archive researcher, and printer. In addition the lesson and the opportunity to be involved with the project as a whole was posted to our website (http://www.willstegerfoundation.org/new-minnesotas-changing-climate) and blog (http://www.willstegerfoundation.org/climate-lessons). The lesson was then shared at the Summer Institute for Climate Change Education in August (75 participants) and used as an example at outreach events throughout the fall. Outreach events include; Minneapolis Public School Elementary Science Institute, Minnesota Homeschoolers Alliance, Education Minnesota Professional Conference, Minnesota Naturalists Association, the University of Minnesota STEM Education Program, Humboldt High School, and The Green Schools National Conference. There were a total of 75 teachers involved with piloting potential activities for the curriculum this fall.

Development of the curricular content will continue through the spring with continued support from the project assistant, web team, and archive research. Meeting with the online classroom development team will be important to maintain a theme and consistency of the project.

Result 1 Final Report Summary
The Minnesota's Changing Climate curriculum framework was developed around four important ideas. Recognizing the importance of place in making issues and concepts relevant, the curriculum highlights Minnesota's four biomes and their unique biotic characteristics and encourages educators to take their students outside to explore their biome. Additionally, the curriculum's foundation is climate change science from peer reviewed journals, first person interviews with local scientists and state or federal resources. Knowing that stories and local heroes can inspire hope and change, Will Steger's adventures and lifelong journals are included with each lesson. Finally, climate change education needs to include opportunities for action and environmental stewardship. The final lesson of the curriculum gives students the opportunity to develop their own action projects related to climate change. Educators piloted lessons and were surveyed the first year of implementation and their feedback was used to

revise the curriculum for the second year of implementation. The final evaluation showed that almost all felt that the curriculum was "helpful" or "very helpful" for teaching about climate change and environmental stewardship. Five strengths and three challenges were revealed through the evaluation they were:
Strength 1: The local focus on Minnesota and connections to students' experiences and the world
Strength 2: The active, hands-on, inquiry-based nature of the curriculum
Strength 3: The clarity of the lessons and teacher guide, including specific content and materials
Strength 4: The ability to adapt the lessons to fit their students and curriculum
Strength 5: There was a lot of support for implementing the curriculum
Challenge 1: Greater differentiation of the curriculum
Challenge 2: Lack of time and other resources

600 Grades 3-12 educators received a copy of and were trained in the Minnesota's Changing Climate curriculum. Workshops ranged from an hour introduction to the resource to 2-day intensive institutes including activities from the curriculum and content specialists to provide in depth information about the concepts covered in the curriculum. Educators that received training were from each biome in Minnesota; work in urban, suburban and rural settings; are formal and informal educators; and work with students of all demographics. In addition to the curriculum itself, we were able to distribute 150 sets of curriculum kits that included the resources to successfully facilitate a number of the activities in the curriculum. During the 2011-2012 school year Will Steger and Will Steger Foundation education staff made visits to six schools located in all four biomes of Minnesota. Will did a presentation for each entire school and then visited the classroom of the teacher that had attended our Institute to see how they had been implementing the curriculum. 3000 students throughout Minnesota were reached through these school visits. Finally, a $25,000 grant from Weesner Family Foundation allowed us to distribute 100 biome kits to educators at our 2011 Institute. The kits contained field guides, cameras and other resources to explore outside. In addition to distribution of the kits, the Will Steger Foundation has 5 kits available for educators to borrow for three-week periods. The curriculum can be downloaded for free at http://classroom.willstegerfoundation.org. $25,000 was donated from foundations to support our work on this project and $39,000 of salary was donated through administrative and support of staff at the Will Steger Foundation.

RESULT/ACTIVITY 2: Institutes for Educators on Climate Change Education

Description: The Institutes for Educators on Climate Change Education are professional development opportunities for Minnesota educators. They are a vehicle for empowering educators by seeking to build their comfort and confidence with the topic of climate change and the lesson plans included in Minnesota's Changing Climate. The Institutes are designed in collaboration with partners, including the Science Museum of Minnesota, Saint Paul Public Schools and academic institutions. Between 2010-2012, 300 Minnesota educators will be informed and/or trained in Minnesota's Changing Climate.

Summary Budget Information for Result/Activity 2:

ENRTF Budget: **$71,613.25**

Amount Spent: **$71,613.25**

Balance: **$0**

Deliverable/Outcome	Completion Date	Budget
1. 2010 Summer Institute – Announce project opportunity	September 2010	$16,992.36
2. 2011 Institute Workshops– Unveil curriculum and program, train educators	September 2012	$30,382.75
3. 2012 Institute Workshops– Share successes and challenges, evaluation	June 2013	$24238.14

Result/Activity Completion Date: June 2013

Result 2 Status as of: August 31, 2012

Over 90 educators attended the 7th annual Summer Institute for Climate Change Education on August 7 and 8 at the School of Environmental Studies in Apple Valley, MN. This Summer Institute focused on climate science basics, introduced the second edition of the Minnesota's Changing Climate curriculum and provided training on many of the hands-on activities from the Minnesota's Changing Climate curriculum. Educators had the opportunity to hear from Dr. John Abraham, Dr. Eugenie Scott and Will Steger as well as a variety of excellent breakout speakers. The breakout speakers provided skills, resources and excellent information to enrich the use of the Minnesota's Changing Climate curriculum in the classroom. The evening before the Institue began, we co-hosted a public forum with Dr. Genie Scott of the National Center for Science Education at the Humphrey Institute. (250 attendees)

We were able to distribute to each teacher kits with materials needed to implement the curriculum. Evaluation results show increased confidence in teaching about climate change as a result of the Institute and increase climate literacy.

We were able to secure donations of food and teacher goodies from Aveda, General Mills, Valley Natural Foods, Common Roots, French Meadow Café, Kowalskis, The Wedge, Mississippi Market, Birchwood, Peace Coffee, The Jeffers Foundation and Chinook Book. We were also able to continue our partnership with the National Park Foundation , National Park Service and Mississippi River Fund by providing 12 of the metro area teachers with funds to visit the Mississippi with their students at Ft. Snelling State Park.

A recap of the Institute can be viewed at http://willstegerfoundation.org/summer-institute.

An institute workshop is scheduled for December with teachers that work at schools primarily serving American Indian youth. An Institute is tentatively planned for June, 2013 to be held at Ft. Snelling State Park.

Result 2 Status as of: April 30, 2012

Summer Institute 2012 outreach and registration began in January. As of May 23, 2012 we have 60 educators from around the state registered. A map showing location of participants can be viewed at: http://bit.ly/JI1U2s We have confirmed presentations for

most of the eight breakout sessions and Dr. John Abraham and Will Steger will keynote the two days. The Institute will take place at the School of Environmental Studies in Apple Valley August 7-8.

We have also confirmed Dr. Eugenie Scott as the speaker for our public forum the evening of August 6, at the Humphrey School of Public Affairs (http://bit.ly/JV5rcD). Dr. Eugenie Scott is the Executive Director of the National Center for Science Education (NCSE). For the past 30 years NCSE has primarily focused on defending the teaching of evolution in the classroom. In 2012, in response to complaints from teachers that they were coming under fire for teaching global warming and other climate change concepts, NCSE decided to support the teaching of climate change in addition to evolution.

We were able to hire a Summer Institute intern that will begin June 4, 2012.

Additional curriculum trainings were offered at the Minnesota Science Teachers Association conference (40 participants), the Minnesota Phenology Conference (15 participants).

The rest of the spring and summer will be spent planning and implementing the Summer Institute. This will involve finalizing the agenda and speakers, asking for donations of food, and finalizing the plan for 2012-2013 to be shared with the teachers.

Result 2 Status as of: November 30, 2011
The dates of August 7-8, 2012 were set for Summer Institute 2012. Initial outreach began and registration will open late January 2012.

Result 2 Status as of: August 31, 2011
The 2011 Summer Institute for Climate Change Education was held at the School of Environmental Studies in Apple Valley, MN. Over 100 educators from across the state of Minnesota registered, which is the highest number of Summer Institute participants to date. Participants received training on our new Minnesota's Changing Climate curriculum and online classroom and attended a variety of breakout sessions that provided supporting information to enhance the use of the curriculum. Due to a grant from the Donald Weesner Trust we were able to distribute *Explore Minnesota's Biomes Kits*, which contain a digital camera, rain gauge, thermometer, field guides and other tools to help students explore the outdoors. 20 middle school metro teachers are eligible for $500 action project grants due to the Parks Climate Challenge, collaboration with the National Park Foundation, National Park Service and the Mississippi River Fund. At the conclusion of the Institute, 93% of participants were confident in their ability to implement the curriculum. All Summer Institute participants plan to implement Minnesota's Changing Climate curriculum this school year. We were able to secure donations of food, space and educator giveaways from; The School of Environmental Studies, common roots catering, French Meadow bakery, Kowalski's Markets, Linden Hills Coop, Prairie Restorations Inc, The Jeffers Foundation, Chinook Book, Peace Coffee, Seward Coop, Valley Natural Foods and the Freshwater Society.

A Summer Institute recap video, as well as more details of the Institute are available at: http://classroom.willstegerfoundation.org/about/summer-institute. A video that

describes our collaboration with the National Park Foundation through the Parks Climate Challenge is available at: http://www.youtube.com/watch?v=_ge0lrl7Rhg.

A public forum, *Sense of Place in a Changing Climate*, was held the evening of August 11 and had over 200 attendees, including teachers from the Summer Institute. The panel consisted of Don Shelby, J. Drake Hamilton (Fresh Energy), and Will Steger and was moderated by MPR's Mid-morning host, Kerri Miller. The forum can we watched at: http://www.willstegerfoundation.org/climate-news/item/1292.

Result 2 Status as of: March 31, 2011
Outreach for the Summer Institute continued and as of June 7, 2011 we had 71 educators signed up from around the state. We will be focusing more on the Aspen Parkland (NW corner) of the state, as this is where we have the most limited involvement. We secured the School of Environmental Studies in Apple Valley, MN for small fee, as a location for our two-day Institute August 11-12, 2011 and began to develop an agenda and invite speakers.

An evening public forum will be included in the Summer Institute and we have finalized the speakers and theme of the forum. The forum will be a panel discussion called, *Sense of Place in a Changing Climate* and will be held at the Town and Country Club in St. Paul. The panel will consist of three Minnesotans discussing their connection to Minnesota, how climate change is impacting their sense of place, and why they are concerned or how this impacts their daily lives. The purpose of the event is to raise awareness about the impacts of climate change on our state's natural resources and what we as citizens can do through the personal stories and "testimony" of prominent Minnesotans. The panel will consist of Don Shelby, J. Drake Hamilton (Fresh Energy), and Will Steger and will be moderated by MPR's Mid-morning host, Kerri Miller.

As a result of a unique partnership with the National Park Foundation, Mississippi River Fund and the Mississippi National River and Recreation Area (National Park Service) we are able to offer $500 mini-grants to 20 metro middle school teachers that will be doing action projects that specifically mitigate the impacts of climate change on the Mississippi. These teachers will also receive additional training that highlights the national park and climate change.

The spring and summer will be spent planning and implementing the Summer Institute. This will involve finalizing the agenda and speakers, asking for donations of food, and finalizing the plan for 2011-2012 to be shared with the teachers.

Result 2 Status as of: October 31, 2010
An intern and the Education Program Manager put significant energy into planning our 2010 Summer Institute for Climate Change Education that was held on August 12, 2010 at the University of Minnesota, St. Paul Campus. We reached 75 educators in person and via moderated webinar and provided scholarships to 25 educators. Participants engaged with Minnesota's Changing Climate Curriculum through an activity using weather instruments. They also gained a deeper perspective on engaging students on the topic through our keynote speaker, Dr. Naomi Oreskes. The Institute was recorded

and videos are posted to our website (http://www.willstegerfoundation.org/summer-institute) for the educators to use in their classroom or further professional development. Outreach materials recruiting educators for the project and Summer Institute 2011 were developed, printed and distributed at the Summer Institute 2010. (See attached) Finally we were able to secure donations from; Aveda, Birchwood Café, Blue Sky Guide, Do It Green Guide, Eureka Recycling, French Meadow Bakery, Linden Hills Cooperative, Orion Magazine, Peace Coffee, Stonyfield Farm, Whole Foods, and Valley Natural Foods. The National Education Association and St. Paul Public Schools provided general support and outreach, and the University of Minnesota – Institute on the Environment & Office of International Programs supported with outreach and facility costs.

The Education Program Manager and Project Assistant will use the spring of 2011 to plan for the Summer Institute 2011 including securing a venue, speakers and recruitment of classrooms.

Result 2 Final Report Summary

Three Will Steger Foundation Institutes for Climate Change Education, three public forums and twenty workshops were conducted during this project. This resulted in the increased climate literacy and environmental stewardship of over 500 formal and informal educators representing over 10,000 students statewide, as well as the increased awareness of over 400 members of the general public through our public forums. Food and supply donations for breakfast, lunch and snacks was secured for 75 attendees in 2010, 100 attendees in 2011 and 100 attendees in 2012 for a value of $18,000. Speakers and volunteers additionally provided their services in kind in 2010, 2011 and 2012.

Public Forums were held 2010-2012 in conjunction with each Summer Institute to provide an evening option for educators and to raise awareness about Minnesota's changing climate. The Humphrey Institute donated their space for the forums and they featured Dr. Naomi Oreskes, a sense of place panel with Kerri Miller, Don Shelby, Will Steger and J. Drake Hamilton and Dr. Genie Scott. Approximately 250 members of the public and educators attended each forum. Overviews of each of the forums can found at http://www.willstegerfoundation.org/climate-news/item/1292, http://vimeo.com/14809445, and http://willstegerfoundation.org/media-room/video-gallery/viewvideo/243/education/summer-institute-2012-genie-scott-ncse.

Final evaluation of the Institutes showed overwhelming satisfaction with the experience and increased confidence and competence in teaching climate change. Reflecting back on the Summer Institute after implementing the curriculum, most teachers indicated that the Summer Institute had been helpful or very helpful. Approximately 1 in 5 teachers indicated that the institute was very unhelpful; open-ended responses indicate that these teachers would have liked more hands-on activities and more guidance in adapting the curriculum to meet particular instructional demands, such as integrating it into their existing instruction and modifying it for select grade levels and student groups. This feedback was taken into account when planning institutes held the summer of 2013. Returning teachers indicated that the value of the institute extended beyond the opportunities it provided for preparing to teach the MCC curriculum; it also was a place

to share ideas and experiences and gain a sense of renewed purpose with like-minded educators. Recaps of the Institutes can be found at http://willstegerfoundation.org/summer-institute.

A partnership with the Mississippi River Fund and the Mississippi National River and Recreation Area and $20,000 in funding from the National Park Foundation made it possible to provide additional training, mini grants and field trips to a cohort of teachers attending the Institutes in 2011 and 2012. A video that describes our collaboration with the National Park Foundation through the Parks Climate Challenge is available at: http://www.youtube.com/watch?v=_ge0lrl7Rhg. This collaboration has continued and an Institute featuring the river and the curriculum is being held in August of 2013.

RESULT/ACTIVITY 3: Online-interactive Adventure Learning Classroom

Description: The online-interactive Adventure Learning Classroom will include multimedia resources linked to specific lesson plans in Minnesota's Changing Climate, including expedition videos, audio and video journals and an extensive image gallery. The curriculum will be available on the Will Steger Foundation web site for purchase (hard copy) and free PDF download in the online classroom. The online classroom will also include a social networking feature for educators and their classrooms to build a community of learners. The program will also reach an additional 25,000 visitors via the Will Steger Foundation Web site and through cross-promotion with partners and educational associations newsletters and websites

Summary Budget Information for Result/Activity 3:

ENRTF Budget: **$67,079.40**

Amount Spent: **$67,079.40**

Balance: **$0**

Deliverable/Outcome	Completion Date	Budget
1. Review Will Steger's archived journals and select up to 10 adventure stories including images, journals and videos	September 2011	$13,067.35
2. Develop and maintain interactive, online program in conjunction with the curriculum and evaluation tools and digitize archives	June 2013	$48,507.05
3. Monitor and support online classroom and social networking features	June 2013	$5,505

Result/Activity Completion Date: June 2013

Result 3 Status as of: August 31, 2012

The online classroom continues to be used by teachers and students. Over 100 observations have been posted during the month of September. They can be viewed at http://classroom.willstegerfoundation.org/get-social/view-student-submissions/view-observations-by-others.

We will continue to add to the classroom, and this fall will include a link to the Parks Climate Challenge work that is being done at Ft. Snelling State Park, including long

term weather data that is being collected. That information will be found at http://classroom.willstegerfoundation.org/about/parks-climate-challenge/parks-climate-challenge-2012.

Result 3 Status as of: April 30, 2012
The online classroom has continued to be used throughout the school year with over 800 submissions. A page was added for information about Summer Institute 2012 (http://classroom.willstegerfoundation.org/about/summer-institute/summer-institute-2012). Through the web portal, students have been able to share observations, photos and action projects, as well as view and comment on other student submissions from around the state. Teachers have used the classroom in a variety of ways, including as homework and a final assessment. One school has posted throughout the entire year and they are using it as a virtual place to reflect back on what they have observed. We will continue to maintain and support the classroom during the 2012-2013 school year.

Result 3 status as of: November 30, 2011
The online classroom's observation sharing section has been highly utilized by classrooms around the state with over 500 student submissions so far this school year. They can be seen at: http://classroom.willstegerfoundation.org/get-social/view-observations-by-others/. The curriculum has been downloaded from the website by over 60 educators.

Result 3 Status as of: August 31, 2011
The spring and summer were spent working collaboratively with Hamline's Center for Global Environmental Education to design the learning module portion of the online classroom and with the Technology director to create the social network and other content. The project assistant, Education Program Manager and videographer worked closely selecting and interviewing scientists and Will Steger to include in videos about Minnesota's biomes inserted in the learning module. The online classroom went live for the Summer Institute on August 11 and educators were trained in how to use it including where to download curriculum and how to teach students how to submit their observations of the natural world. It can be viewed at http://classroom.willstegerfoundation.org.

The 2011-2012 school year will be focused on outreach around the classroom, updating the classroom, supporting teachers and students that are using it and posting their observations.

Result 3 Status as of: March 31, 2011
After interviews with a number of candidates we selected Hamline's Center for Global Environmental Education to design the online classroom. We have had a number of meetings and planning sessions to finalize content. In collaboration with our videographer, we have been working on the creation of a number of videos that will be included in the classroom. These videos highlight Minnesota's biomes, climate change impacts and Minnesota sense of place. They include interviews with a number of Minnesota scientists and Will Steger. The online classroom will launch at the Summer Institute.

Result 3 Status as of: October 31, 2010
The Education Program Manager began review of the Will Steger archives to select journal entries to include on the site and for the future online classroom. In addition Will Steger was filmed and a few videos developed and posted on our site that give an overview of the project and preview of the content. (http://www.willstegerfoundation.org/new-minnesotas-changing-climate)

Throughout the winter of 2010 and spring of 2011 the Education Project Manager will develop and share a position description for an instructional design and web development team to develop the online classroom portion of this project. Interviews will be conducted in November with the assistance of the project assistant, web designer, and videographer.

Result 3 Final Report Summary
A Minnesota's Changing Climate online classroom (http://classroom.willstegerfoundation.org/) was developed by a Webmaster and a contract web design team at Hamline University's Center for Global Environmental Education. The classroom features an entire learning module that is referenced in the curriculum. The learning module introduces all four biomes through videos of scientists and Will Steger, historical journal entries and case studies of climate change impacts. The classroom also gave students from around the state the opportunity to share their observations and action projects. Over the two years this feature was available over 1,000 students posted to the site, http://classroom.willstegerfoundation.org/get-social/view-student-submissions/view-observations-by-others. In addition, educators may download the Minnesota's Changing Climate curriculum and worksheets from the site. Teachers used the classroom to help prepare their lessons, and they showed or asked students to look at the videos and still images. Most teachers thought the features they used, especially the image gallery and handouts, were "very helpful." Information about climate change basics and the ability for students to see what other students had posted in the Online Classroom received the lowest ratings, although almost all teachers rated them helpful. We had not anticipated the classroom being used by adults as well as students and this insight will be useful in development of future programming. Since the online classroom was launched in August of 2011 it has had over 9,000 unique visitors with over 16,000 visits.

RESULT/ACTIVITY 4: Evaluation:

Description: The overall evaluation will use both formative and summative approaches and will involve the use of an outside contract evaluator. We will solicit ongoing feedback from educators on the curriculum and Summer Institute; provide an online survey with curriculum download and in-person surveys at the Summer Institute. The overarching goal of the evaluation is to determine to what extent the curriculum empowered student leadership and action on climate change solutions. Evaluation will assess student motivation for learning, skill development and changes in stewardship behavior. We will include in the curriculum a final project that schools will select and

share online; this will provide a concrete way for schools to demonstrate the impact of the curriculum on student learning.

Summary Budget Information for Result/Activity 4:

ENRTF Budget: **$19,993.51**

Amount Spent: **$19,993.51**

Balance: **$0**

Deliverable/Outcome	Completion Date	Budget
1. Curriculum Evaluation	May 2013	$10,409.79
2. Online Classroom Feedback and Evaluation	May 2013	$7,133.72
3. Site visits/Travel to schools	May 2013	$2,450

Result Completion Date: June 2013

Result 4 Status as of: August 31, 2012

Our evaluation team shared the evaluation results from the year-end survey with the teacher's at the Institute. A final report is being developed and will be available next month. Results were helpful in that they showed which lessons were being implemented and how the online classroom was being used. In general, results were positive and teachers that were trained in the curriculum were using at least some of it in their classroom.

Highlights of the initial results include:

- It gives a great picture of how climate change is happening here in Minnesota.
- This curriculum fills a niche that no other curriculum fills. It is relevant, brief, and engaging because it addresses the world around us in MN.
- The graphs and data that were available. I also thought the colored maps were wonderful.
- I valued the observation that was part of the journaling curriculum.

Result 4 Status as of: April 30, 2012

Our outside evaluation team has been contacting teachers and developing the final evaluation throughout the spring. They will present their findings at this Summer's Institute.

Result 4 Status as of: November 30, 2011

Our outside evaluators presented an initial report from the Institute in early September. Highlights from the report include:

- All respondents reported that they thought the curriculum would be "useful for teaching about climate change" and "useful for teaching about environmental stewardship."
- Most said it would be useful in their teaching (96% agree or strongly agree) and expected that their students will find it engaging
- Most said it matches their curricular goals (91% agree or strongly agree) and thought it is comprehensive (90% agree or strongly agree).
- All said that they would definitely (67%) or likely (33%) implement the curriculum next year. When asked what parts of the curriculum they would were most likely

to implement, each of the first five lessons was selected by 76% to 80% of the respondents. Lesson 6 ("What Can I Do?") was selected by 91%.

Result 4 Status as of: March 31, 2011
We have had a few meetings to discuss evaluation at the Summer Institute and the evaluators have worked on a plan for evaluating the project throughout the t2011-2012 school year.

Result Status as of: October 31, 2010
An evaluator position was posted and an evaluator team was hired. Initial meetings were conducted to create an evaluation plan and the evaluator team attended the Summer Institute.

Result 4 Final Report Summary
An outside evaluation team was able to provide and analyze evaluations from the Summer Institutes of 2011 and 2012, as well as follow up with teachers about their curriculum implementation. The feedback they provided proved invaluable in planning the 2012 Institute and in revision of the curriculum for a second education. The executive summary concluded that overall, "the Will Steger Foundation is on the right track for meeting their project goals. The MCC curriculum is a much-needed and much-appreciated resource for teaching about climate change and promoting environmental stewardship. The annual Summer Institutes provide valuable professional development for teachers, effectively prepares them for implementing the MCC curriculum, and is a supportive community that inspires and refreshes its participants. In general, WSF should keep doing what it's been doing: refining the MCC Curriculum, maintaining its Online Classroom, holding Summer Institutes, and providing teachers with personalized support. The Foundation's close contact and good relationship with its teachers allow it to understand and improve teachers' and students' experience, deepen their understanding of climate change, and promote environmental stewardship. As grant funding draws to a close, WSF should look for ways to sustain close contact with teachers, expand its reach, and codify some of the lessons learned. For example, WSF could take common areas of support and create webinars and other more permanent scaffolds for teachers. Although these resources would not wholly replace personalized just-in-time supports, they could provide support for a larger number of teachers."

V. TOTAL ENRTF PROJECT BUDGET:

Please note. We are requesting to make the budget amendments described below. Budgets in individual categories have been adjusted. Amendment Approved: June 14, 2012

Personnel: $79,522.76

The Education Program Manager (0.75 % of FTE) will be responsible for coordinating the entire LCCMR project over 3 years. This person will be responsible for the research and development of the grades 3-12 curricula; coordinating with contractors on program development, including the archives, evaluation and online classroom components and integration with the curriculum; Summer Institute program development and execution;

and finally collaborating with relevant partners. This person will reach out to and present at state-based professional education conferences and develop relationships with educators, school districts, and professional education associations. Finally, the Education Program Manager will be responsible for working with schools as they implement the curriculum and online tools and conducting the evaluation.

Education Program Manager Budget Amendment Request Approved October 12, 2011

- In Result 1, Curriculum we request to move $2240 to the Summer Institute Coordinator Contract line. The Education Program Manager works less than .75 FTE and relies on the Institute Coordinator position to support the revision and distribution of the curriculum for Institutes through the end of the project.
- In Result 2, Summer Institute we request to move $6260 to the Summer Institute Coordinator Line. The Education Program Manager works less than .75 FTE and relies on the Institute Coordinator position to plan and implement the majority of the Summer Institute 2012.
- In Result 3, Online Adventure Learning, we request to move $5000 to the Online/Web Support Line. The new online classroom requires technological support in order to implement the project throughout the 2011-2012 school year.
- In Result 3, Online Adventure Learning, we request to move $2000 to the Archive/Multimedia Support Line. The new online classroom requires the expertise of our videographer to create and add new content during the 2011-2012 school year.
- In Result 4, Evaluation, we request to move $9000 to the evaluator line. The Education Program Manager hired an outside evaluation team for the sake of objectivity, as well as a lack of time or expertise. This line item was included in the original workplan, but somehow was not included on the spreadsheet. We request to add that line.

Contracts: $99,560.00

Contracts include the following support services:
Online/Web support: The Will Steger Foundation's Technology Director will develop social networking tools to support the online classroom available on the Will Steger Foundation Web site. The Technology Director will also be responsible for creating new features of displaying the lessons and Will Steger's archives to harness the power and methodology of Adventure Learning.

Online/Web Support Amendment Request Approved October 12, 2011

- In Result 3, Online Adventure Learning, we request to add $5000 to the Online/Web Support Line from the Education Program Manager line. The new online classroom requires technological support in order to implement the project throughout the 2011-2012 school year.

Archive/Multimedia Support: The Will Steger Foundation's Media Development Director will be responsible for reviewing Will Steger's archives, working collaboratively with the project team (which includes WSF Exec. Director, Educ. Program Manager, Technology Director and Media Development Director) to integrate the archives into the curriculum

and online classroom. The Media Director will also be responsible for producing video stories to support the program and documenting the Summer Institute for future use and dissemination.

Archive Multimedia Support Amendment Request Approved October 12, 2011

- In Result 3, Online Adventure Learning, we request to add $2000 to the Archive/Multimedia Support Line from the Education Program Manager line. The new online classroom requires the expertise of our videographer to create and add new content during the 2011-2012 school year.

Archive Multimedia Amendment Request Approved January 26, 2011

- Within the Archive/Multimedia Support line we request to decrease Result 1 (Curriculum) and increase Result 2(Summer Institute). We underestimated the amount of multimedia support we would need at the Summer Institute 2010 and consequently overspent in this result.

Digitalization: WSF will work with a third party digitalization service to transfer the archives into an appropriate digital format for use in the curriculum and online classroom.

Summer Institute Coordinator: This short-term contract position (May-August each year) will manage event logistics and on-site coordination, assist with recruiting participants and securing corporate support. This person will also handle communication with speakers and participants in the lead up to the Institute and handle registration. This person will plan Summer Institute committee meetings with relevant partners.

Summer Institute Coordinator Amendment Request Approved October 12, 2011

- In Result 1, Curriculum we request to move $2240 to the Summer Institute Coordinator Contract line from the Education Program Manager line. The Education Program Manager works less than .75 FTE and relies on the Institute Coordinator position to support the revision and distribution of the curriculum for Institutes through the end of the project.
- In Result 2, Summer Institute we request to move $6260 to the Summer Institute Coordinator Line from the Education Program Manager line. The Education Program Manager works less than .75 FTE and relies on the Institute Coordinator position to plan and implement the majority of the Summer Institute 2012.

Summer Institute Coordinator Budget Amendment Request Approved January 26, 2011

- We were able to hire one person that is filling the role of project assistant; encompassing both a school year intern and summer institute coordinator. This consolidation into one role has made it much easier for communication, consistency and quality of work. For this reason we request to decrease Result 2: Summer Institute Coordinator.

Graphic Design: This short-term contract position will be responsible for the design of the grades 3-5, 6-8 and 9-12 curriculum. This curriculum will match the look and feel of the Will Steger Foundation's existing climate change education resources.

Graphic Design For Curriculum Budget Amendment Request Approved January 26, 2011

- Within the Graphic Design for Curriculum line we request to decrease Result 1 and increase Results 2, 3, and 4. These costs were incurred from the printing of informational materials that were aligned to all of the results and consequently billed to all of them. The budget manager charged these using the Report Deliverables as a guide, rather than the Attachment A and consequently spent in areas where there was not money available.

Evaluator: This contract position will be responsible for designing and implementing an evaluation of the final curriculum.

Evaluator Budget Amendment Request Approved October 12, 2011

- In Result 4, Evaluation, we request to move $9000 to evaluator. The Education Program Manager hired an outside evaluation team for the sake of objectivity, as well as a lack of time or expertise. This line item was included in the original workplan, but somehow was not included on the spreadsheet. We request to add that line.

Interns: The Will Steger Foundation will recruit three interns to support the project. Two interns will be responsible for supporting the logistics and coordination of the Summer Institute (2011 and 2012) and will be supervised by the Education Program Manager. The third intern will collaborate with the project team and directly support the Media Development Director with reviewing and selecting the archives.

Interns Budget Amendment Request Approved January 26, 2011

- We were able to hire one person that is filling the role of project assistant; encompassing both a school year intern and summer institute coordinator. This consolidation into one role has made it much easier for communication, consistency and quality of work. For this reason we request to decrease Result 2: Interns.
- As mentioned in the earlier request, we have consolidated the intern and summer institute coordinator positions and therefore need less funds in the intern area and are requesting to decrease Result 3: Interns.

Equipment/Tools/Supplies: $15,277.23

Supplies include educator packets to be distributed to teachers at the Summer Institute, and web-based tools to support the online classroom and evaluation tools. Additionally, this includes using external webinar support for the Summer Institute to recruit educators that are not able to participate in the Institute in-person.

Travel: $28,225.00

A portion of the travel will allow the Education Program Manager to attend relevant education conferences in Minnesota to promote the program, to visit participating schools and to conduct the evaluation. This also includes travel reimbursement requests for educators that require it to attend the Institute, as well as Summer Institute speakers.

Travel Expenses in Minnesota Budget Amendment Request Approved January 26, 2011

- We are requesting to increase Result 1: Travel Expenses in Minnesota. This is based on a recognized need for travel funds for the Education Program Manager, Intern and Summer Institute Coordinator to recruit participating classrooms this year, and support classrooms next year statewide.
- Our largest amendment request is an increase of $10,000 to travel expenses in Result 2: Travel Expenses in Minnesota. We realize this is a large addition, but we significantly underestimated the cost of bringing approximately 50 educators from outstate Minnesota to our Summer Institute 2011 and 2012, paying their mileage and accommodations. We know that this is the only way most of these educators will be able to participate in the project, and statewide involvement is key to the project's success. Our estimates are based on .50 for mileage and $80 a night for accommodations for approximately 50 educators. (To view our applicants so far see our Google map: http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=206495859425893573749.000496d4df90f7f9c714c&ll=46.286224,-93.955078&spn=7.592676,22.565918&z=6)

Additional Budget Items (printing): $27,415

Printing: WSF will provide every educator that attends the Institute with a hard-copy version of the curriculum that is relevant to the grade they teach. This will support the printing and dissemination of a minimum of 300 curricula.

Printing Budget Amendment Request Approved January 26, 2011

- We are requesting to decrease Result 1: Printing. Our printing costs for the curriculum were overestimated, and it is assumed we will not need as much money for printing and distribution.
- We are requesting to increase Result 2: Printing. In past years St. Paul Public Schools has been able to provide larger in kind support to offset printing costs and were not able to provide as large a sum this summer. Consequently we overspent in Result 2 on the Printing Line. We have factored printing costs for Summer Institute 2011 into this addition.

Summer Institute Facility Rental: WSF will cooperate with relevant facilities (Science Museum of Minnesota, University of Minnesota) to provide 100 educators with a one-day professional development opportunity. This covers the cost of the facility rental for the Summer Institute result.

Summer Institute Facility Rental Budget Amendment Request Approved January 26, 2011

- We are requesting to decrease Result 2: Summer Institute Facility Rental $10,500. This is a significant change in the budget, but we were able to secure free facility rental at last year's Institute and have done so again for this year's. Realizing the great need to bring teacher's to the Institute this summer, we request to move the majority of this surplus to Result 2: Travel expenses.

Educator Recruitment: The Education Program Manager will collaborate with education list-serves and associations to publicize the curriculum, online classroom and Summer Institute. This includes the production of flyers and materials to promote the program.

Outreach Educator Recruitment Budget Amendment Request Approved January 26, 2011

- We are requesting to increase Result 1: Outreach/Educator Recruitment. The cost for getting an exhibit table at Education Minnesota, was higher than anticipated, but a very effective tool for outreach and recruitment of teachers. We would like to be able to do this again next fall, as well as exhibit at another local conference, the Midwest Environmental Education Conference.

TOTAL ENRTF PROJECT BUDGET: $250,000

Explanation of Capital Expenditures Greater Than $3,500: None

VI. PROJECT STRATEGY:

A. Project Partners:

These partners may collaborate in the development, evaluation and implementation of the project through in-kind cooperation:

Curriculum Development: National Education Association/Education Minnesota, St. Paul Public Schools, Minnesota Historical Society True North: Mapping Minnesota's History, Science Museum of Minnesota, Union of Concerned Scientists

Professional Development: National Education Association/Education Minnesota, St. Paul Public Schools, University of Minnesota, Science Museum of Minnesota, Minnesota Alliance for Geographic Education, Minnesota Association of Secondary School Principals, and additional professional education associations.

Online interactive classroom: Minnesota Historical Society, Minnesota History Center, Science Museum of Minnesota

B. Project Impact and Long-term Strategy:

Minnesota's Changing Climate is part of a suite of climate change education programming the Will Steger Foundation has pioneered and will continue to develop as a core component of the organization's ten-year strategic plan. This program fills a

critical need, while also adding value to existing resources, and will be featured in perpetuity on the Foundation's website. Future financial support from diverse revenue sources will sustain this program. To date, the Foundation has created four climate change curricula, endorsed by the National Education Association, Union of Concerned Scientists and National Geographic, reaching thousands of educators nationwide. The Will Steger Foundation is committed to delivering relevant and factual climate change content and tools for action to empower student leadership in the mainstream classroom.

C. Other Funds Proposed to be spent during the Project Period:

Will Steger Foundation earned revenue from private foundations, corporations and individuals (which will be support staff and office support of this project): $72,919.43

Saint Paul Public Schools (for Summer Institute program support): $15,000

National Education Association Education Program Support: $18,000

Summer Institute meals and snacks: $5,300

St. Paul Public Schools Technology Support (for Summer Institute): $6,000

Existing WSF climate change education resources/curricula: $15,000

Media Development/multi-media videos and images: $15,000

Total In-Kind: $147,219.43

D. Spending HIstory:

The Will Steger Foundation has executed three Summer Institues for Climate Change Education since 2006, supporting over 250 educators with 5-day, 3-day and 1-day professional development opportunities on climate change education. The Summer Institutes that will be developed to support the LCCMR project will be based on the lessons learned from hosting previous Institutes. WSF has collaborated with partner institutions and school districts to recruit and execute the Institute. WSF has also garnered significant in-kind resources to support the program, including food, snacks, keynote speakers such as Dr. James Hansen, New York Times' Andrew Revkin and author Bill McKibben. The costs associated with the development, graphic layout and printing of the curriculum are based on past curricula produced by WSF.

To develop existing climate change education resources, WSF has received funding from private individuals, foundations, and the National Education Association. The Summer Institute receives support from school districts, universities and corporations. Budgets have been determined based on past expenditures for similar programming.

VII. DISSEMINATION:

Educators will be recruited through educator list-serves, education associations (such as Education Minnesota, the MN Alliance for Geographic Education and the MN Association of Secondary School Principals, MSTA, etc), graduate programs in education, and at educator conferences. In addition, current educators engaged in WSF programs and those that attended previous Summer Institutes will be contacted to utilize this new program.

The entire project and all of its components will be available online at the Will Steger Foundation Web site: www.willstegerfoundation.org. Curriculum will be printed and distributed by project partners and through the Summer Institute for Educators for Climate Change Education beginning in August 2011. All project results will be archived on the Will Steger Foundation Web site and will be accessible after the project is completed. School-to-school engagement and evaluative feedback will be showcased on the Will Steger Foundation Web site, through education association outlets (Web site, newsletters) and local media.

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than December 2010, May 2011, September 2011, December 2011, May 2012, and September 2012. A final work program report and associated products will be submitted by August 2013 as requested by the LCCMR.

Project Title: Minnesota's Changing Climate: Engaging Students through Adventure Learning

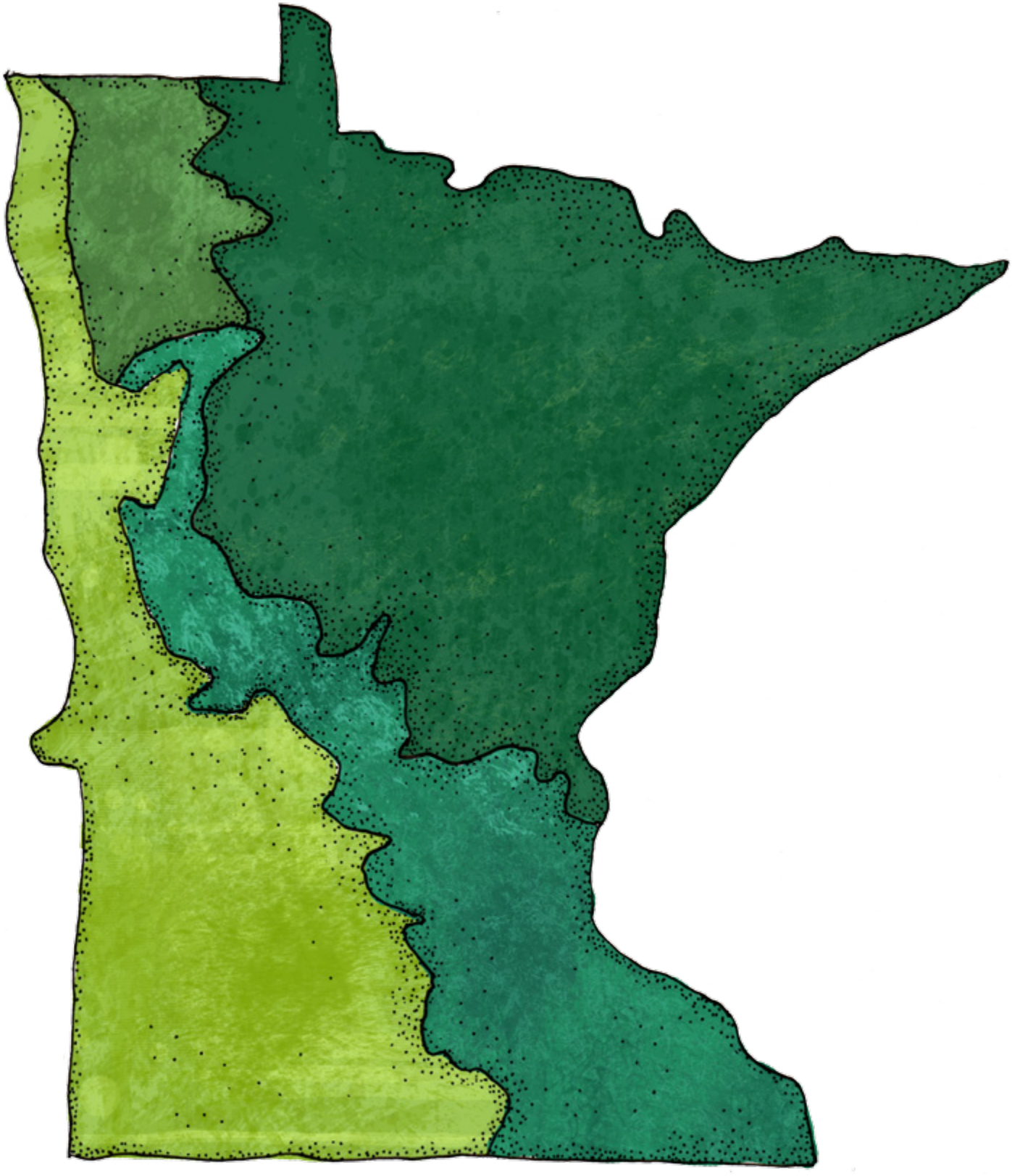
Project Manager Name: Nicole Rom

Trust Fund Appropriation: $ 250,000

Amendment approved - Mar 5, 2013

2010 Trust Fund Budget

Budget Item	Beginning Result 1 Budget - Approved 3/5/13	Current Balance Result 1	Amount Spent through 6/30/13	Beginning Result 2 Budget - Approved 3/5/13	Current Balance Result 2	Amount Spent through 6/30/13	Beginning Result 3 Budget - Approved 3/5/13	Current Balance Result 3	Amount Spent through 6/30/13	Beginning Result 4 Budget - Approved 3/5/13	Current Balance Result 4	Amount Spent through 6/30/13	Beginning Total Budget	Current Balance Total	Total Amount Spent through 6/30/13
	Result 1 - Curriculum			Result 2 - Summer Institute			Result 3 - Online Adventure Learning			Result 4 - Evaluation			Project Total		
Use information from Attachment A from Work Program															
Personnel Wages and Benefits															
Education Program Mgr .75 FTE	$ 49,771.38	$ -	$ 49,771.38	$ 14,544.55	$ -	$ 14,544.55	$ 13,804.55	$ -	$ 13,804.55	$ 1,402.28	$ -	$ 1,402.28	$ 79,522.76	$ -	$ 79,522.76
Contracts									$ -			$ -	$ -		$ -
Online/Web Support	$ 9,791.89	$ -	$ 9,791.89	$ 6,049.50	$ -	$ 6,049.50	$ 27,998.00	$ -	$ 27,998.00	$ 3,833.00	$ -	$ 3,833.00	$ 47,672.39	$ -	$ 47,672.39
Archive/Multimedia Support	$ 504.38	$ -	$ 504.38	$ 2,945.62	$ -	$ 2,945.62	$ 8,900.00	$ -	$ 8,900.00	$ 1,150.00	$ -	$ 1,150.00	$ 13,500.00	$ -	$ 13,500.00
Digitalizing Service	$ 934.50	$ -	$ 934.50	$ 934.50	$ -	$ 934.50	$ 3,738.00	$ -	$ 3,738.00	$ 623.00	$ -	$ 623.00	$ 6,230.00	$ -	$ 6,230.00
Summer Institute Coordinator	$ 2,240.00	$ -	$ 2,240.00	$ 18,260.00	$ -	$ 18,260.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,500.00	$ -	$ 20,500.00
Graphic Design for Curriculum	$ 2,947.50	$ -	$ 2,947.50	$ 22.50	$ -	$ 22.50	$ 22.50	$ -	$ 22.50	$ 7.50	$ -	$ 7.50	$ 3,000.00	$ -	$ 3,000.00
Evaluators			$ -			$ -			$ -	$ 9,000.00		$ 9,000.00	$ 9,000.00		$ 9,000.00
Interns	$ -	$ -	$ -	$ 3,000.00	$ -	$ 3,000.00	$ 1,000.00	$ -	$ 1,000.00	$ -	$ -	$ -	$ 4,000.00	$ -	$ 4,000.00
Printing (curriculum, educator packets)	$ 19,700.00	$ -	$ 19,700.00	$ 1,800.00	$ -	$ 1,800.00	$ 1,480.25	$ -	$ 1,480.25	$ 870.98	$ -	$ 870.98	$ 23,851.23	$ -	$ 23,851.23
Supplies (list specific categories)	$ 1,468.25	$ -	$ 1,468.25	$ 2,291.58	$ -	$ 2,291.58	$ 9,166.35	$ -	$ 9,166.35	$ 1,527.73	$ -	$ 1,527.73	$ 14,453.91	$ -	$ 14,453.91
Travel Expenses in Minnesota (reimbursement for keynote speaker travel, program travel, site visits, teacher travel)	$ 2,453.08	$ -	$ 2,453.08	$ 19,200.00	$ -	$ 19,200.00	$ 294.75	$ -	$ 294.75	$ 904.02	$ -	$ 904.02	$ 22,851.85	$ -	$ 22,851.85
Summer institute Facility Rental	$ -	$ -	$ -	$ 1,890.00	$ -	$ 1,890.00	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,890.00	$ -	$ 1,890.00
Outreach/Educator Recruitment	$ 1,502.86	$ -	$ 1,502.86	$ 675.00	$ -	$ 675.00	$ 675.00	$ -	$ 675.00	$ 675.00	$ -	$ 675.00	$ 3,527.86	$ -	$ 3,527.86
Column Total	**$ 91,313.84**	**$ -**	**$ 91,313.84**	**$ 71,613.25**		**$ 71,613.25**	**$ 67,079.40**		**$ 67,079.40**	**$ 19,993.51**	**$ -**	**$ 19,993.51**	**$ 250,000.00**		$ 250,000.00



Engaging Students in Environmental Stewardship through Adventure Learning: ENRTF Final Report Appendices

WILL STEGER FOUNDATION

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

Engaging Students in Environmental Stewardship through Adventure Learning

Project Manager: Nicole Rom
Director of Education: Kristen Poppleton
Affiliation: Executive Director, Will Steger Foundation
Mailing Address: 2801 21st Avenue South, Suite 110
City / State / Zip: Minneapolis, MN 55407
Telephone Number: (612) 278-7147
E-mail Address: nicole@willstegerfoundation.org
Fax Number: (612) 278-7101
Web Site Address: www.willstegerfoundation.org

Total ENRTF Project Budget: ENRTF Appropriation $ 250,000.0
Legal Citation: M.L. 2010, Chp. 362, Sec. 2, Subd. 8b

PROJECT SUMMARY

The Will Steger Foundation developed Engaging Students in Environmental Stewardship through Adventure Learning (MCC) with the understanding that environmental stewardship begins with a local connection and sense of appreciation, or environmental sensitivity, towards the natural environment. This project's primary audience, educators, have the unique opportunity to lead their students through the environmental education continuum of knowledge, awareness, and skills that lead to an informed and active environmental citizenry.

Climate change is one of the most critical environmental issues of our time and educators have an important role to play in educating their students and providing them the skills to mitigate and adapt to climate change. In order to make the issue relevant and connected to the lives of those reached through our project, we focused specifically on the impacts of climate change on Minnesota's biomes. Additionally, we wove in stories from Will Steger's life and examples of his own early observations of the natural world and his curiosity of weather and climate. We also tapped into the expertise of many Minnesota scientists and educators in the development of our Grades 3-12 curriculum, online classroom and two public forums and three Summer Institutes for climate change education.

Over the three years of the project we were able to reach and increase the climate literacy of over 5000 educators, members of the public and students via our Summer Institutes for Climate Change Education, year round workshops, conference presentations, school visits, field trips, public forums and our online classroom (classroom.willstegerfoundation.org). The project also resulted in the development of a number of valuable, mutually beneficial, and long-term partnerships. The partnership with the Mississippi River Fund, National Park Foundation and Mississippi National River and Recreation Area resulted in the ability to support 20 student service projects and field trips for over 500 students to enhance their learning on Minnesota's changing climate. MCC was recognized in 2012 by Environmental Initiative in the area of environmental education in part due to these important partnerships. A final evaluation report showed overall success for the project in providing a curriculum and training that increased climate literacy, environmental stewardship and educator confidence in teaching about climate change.

ENRTF Final Report Appendices Contents

1. Photo timeline of the project
2. Web links to videos and other important coverage of the project
3. Final Evaluation Report
4. Grades 3-8 Minnesota's Changing Climate Curriculum: 2012 edition
5. Grades 9-12 Minnesota's Changing Climate Curriculm: 2012 edition

Photographic Summary of the Project

Mark Seeley and other local experts spoke at our 2010 Summer Institute for Climate Change Education. 75 educators attended and received "teaser lessons" to introduce the ENRTF project.

Dr. Naomi Oreskes, a climate historian, and Will Steger spoke at a public forum co-sponsored with the Humphrey Institute. 250 members of the public and the educators attending the Summer Institute participated in the forum.

WILL STEGER FOUNDATION

We invite all grades 3-12 educators to join the Will Steger Foundation on an exploration of Minnesota's Changing Climate at our Summer Institute

Due to a unique partnership with the National Park Foundation, Mississippi National River and Recreational Area (National Park Service) and Mississippi River Fund we are pleased to offer Metro area grades 6-8 classrooms **$500 grants** for participating in the 2011 Institute for Climate Change Education and completing climate action projects.

The Summer Institute will be held **August 11-12, 2011** at the School of Environmental Studies in Apple Valley, MN. This year's Institute will focus on our new ENRTF project: *Minnesota's Changing Climate; Engaging Students in Environmental Stewardship Through Adventure Learning*. Participants in this year's Summer Institute are expected to use at least a portion of Minnesota's Changing Climate curriculum in their classroom. There is no cost for this year's Institute and travel and accommodations may be available to those that apply.

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

MISSISSIPPI River Fund

The Summer Institute will include:

- training on this new resource
- a copy of the curriculum, applicable to the teacher's grade level
- sessions focused on Minnesota's natural environment
- workshops focused on skills to explore the outdoor environment
- one continuing education credit (for a fee)
- mileage reimbursement and accommodations through an additional application

Find more information and apply today on our website. www.willstegerfoundation.org/summer-institute

Please contact Ann Benson, Summer Institute Coordinator, ann@willstegerfoundation.org, or call 612-278-7147 with any questions.

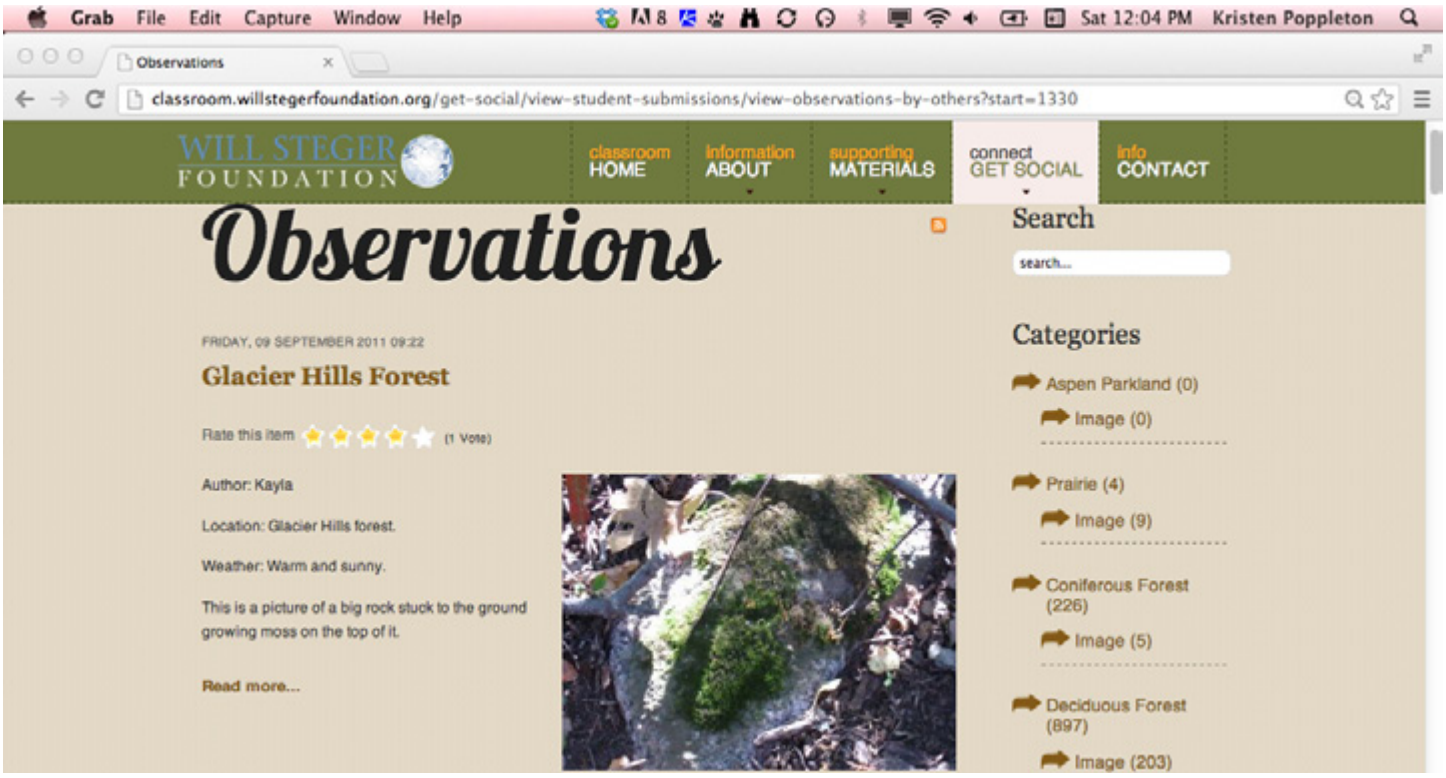
Outreach for our 2011 Summer Institute for Climate Change Education began early. We received additional support from the National Park Foundation for a training that featured climate change impacts on the Mississippi National River and Recreation Area.

100 educators registered for our 2011 Summer Institute for Climate Change Education where our new Minnesota's Changing Climate Curriculum and online classroom were released.

Teachers received climate science content training at the 2011 Institute, as well as skills based training on taking students outside and journaling.

A public forum featuring climate change impacts on our sense of place was held at Town and Country during the 2011 Institute. MPR host Kerri Miller moderated and Will Steger, J. Drake Hamilton and Don Shelby spoke.

An online classroom featuring an entire learning module on Minnesota's biomes and climate change was introduced at the Summer Institute. The module was designed by Hamline's Center for Global Environmental Education.



During the 2011 and 2012 school year over 1000 students shared their observations and photos of their biomes in the online classroom.

Will Steger and Will Steger Foundation education staff visited with 6 schools around the state of Minnesota to see how they were implementing the *Minnesota's Changing Climate* curriculum.

Students showed off their observation skills and their special spots where they spent the year documenting the weather and natural world.

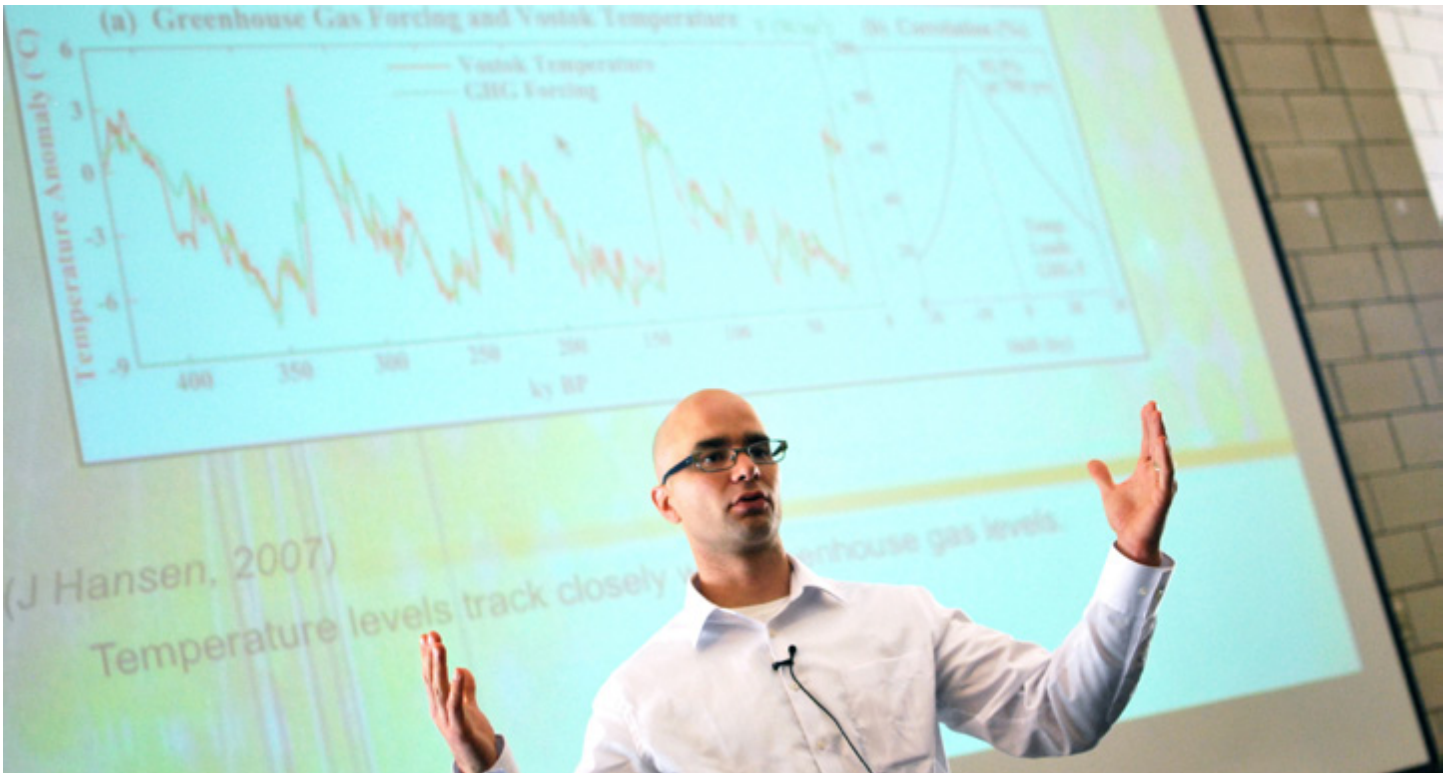
One school showed off what they learned through informational posters they hung in the hallways of their school.

Throughout the project we did outreach at local and regional conferences through exhibits and presentations.

In May of 2012 *Engaging Students in Environmental Stewardship Through Adventure Learning* received an Environmental Initiative Award in the area of Envrionmental Education.

Educators and partners that supported the project were there to help us accept the award.

Our 2012 Summer Institute for Climate Change Education began with a public forum co-sponsoer by the Humphrey Institute. The speaker was Dr. Genie Scott, Director of the Naitonal Center for Science Education.



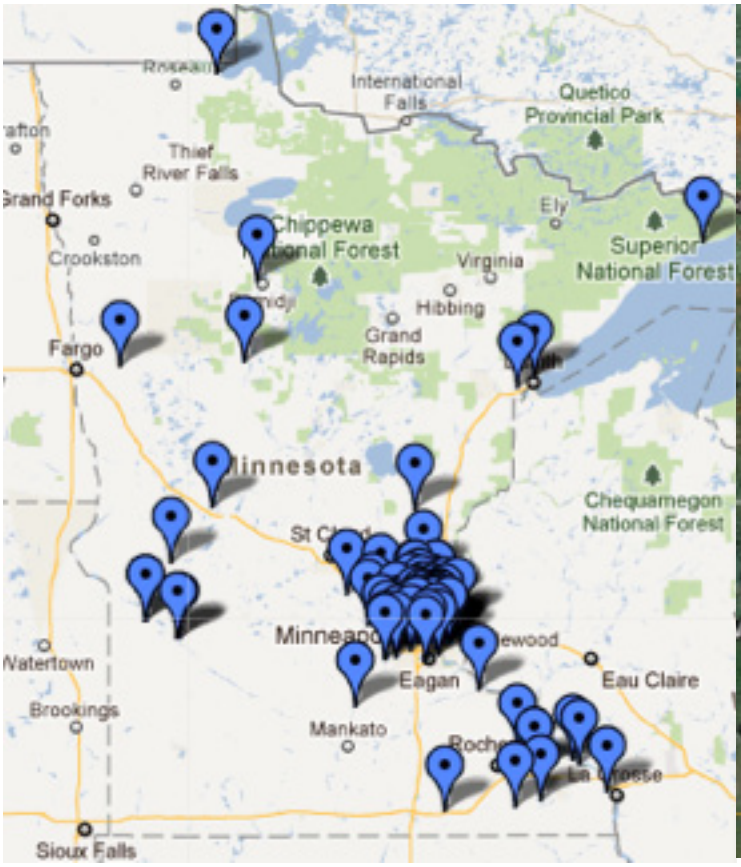
St. Thomas University professor, Dr. John Abraham provided the climate science keynote at the Institute.

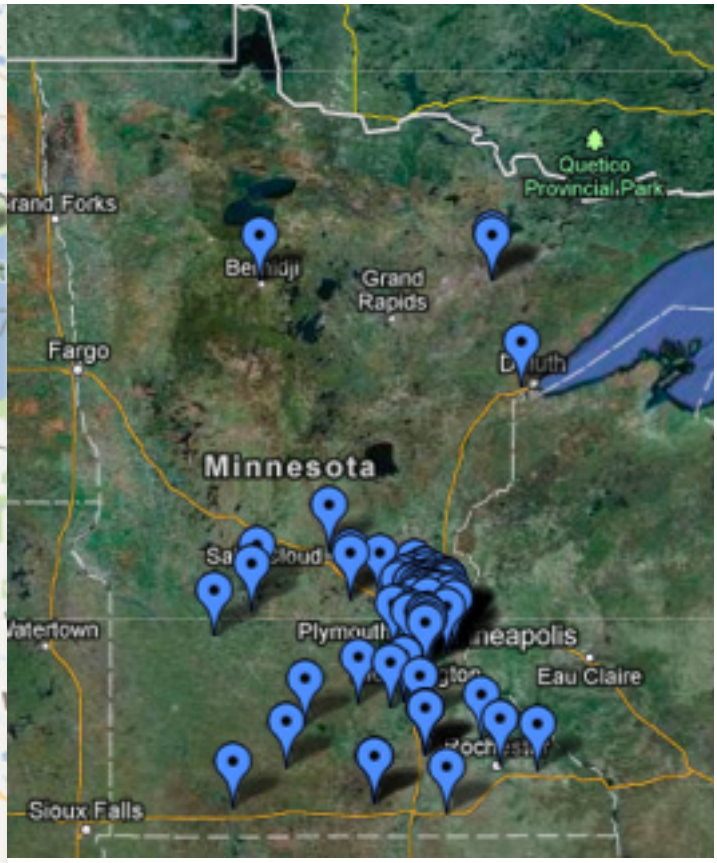
In evaluations from the Institute, educators noted that the time spent networking with other educators was an important part of their experience.

We were able to secure food donations for all meals and snacks during the 2011 and 2012 Institutes.

During the 2012-2013 school year we were able to provide field trips to students of teachers that attended the 2012 Summer Institute. Students learned about climate change impacts on the Mississippi River, weather, phenology and did a service project.

Students did service projects, such as buckthorn removal, during their field trip to Ft. Snelling State Park.





Over 10,000 students were reached through the 2010, 2011 and 2012 Summer Institues for Climate Change Education, statewide school visits, conference presentations, field trips and the online classroom. These maps indicate cities that were visited or were represented by educators in 2011 and 2012.

Explore Minnesota's Biomes Kit

(Minnesota's Changing Climate, all lessons)

Use this kit for the *Take it Outside* components of Minnesota's Changing Climate.

Kit contents:

- Insignia Digital Camera (with case, memory card, and 2-year warranty including incidental damages)
- (3) Field Guides (Prairies & Potholes; Big River, Big Woods; and North Woods, Great Lakes)
- (3) Magnifying Glasses (6X, 8X, 10X Power)
- Rain Gauge
- Thermometer
- (2) Rulers
- Cloud Chart
- Biome Meet and Greet Activity cards (laminated)

"What Does the Data Show?" Kit

(Minnesota's Changing Climate, Lesson 5)

This kit provides all the materials necessary to engage a typical classroom in the Minnesota's Changing Climate Lesson 5 activity: "What does the data show?"

Kit contents include all "objects" mentioned in the table, on Page 70 of MCC. Note: All of these are plastic and toy-sized and all paper cards are laminated:

Educators will continue to be able to check out two kits that extend learning with the Minnesota's Changing Climate Curriculum. Both were distributed to Institute attendees in 2011 and 2012.

Web links to videos and other important coverage of the project

The Minnesota's Changing Climate Online Classroom
http://classroom.willstegerfoundation.org/

Student Submitted Biome Observations
http://classroom.willstegerfoundation.org/get-social/view-student-submissions/view-observations-by-others

Will Steger Journaling Teaser Lesson Video
http://www.willstegerfoundation.org/media-room/video-gallery/viewvideo/191/education/will-steger-speaks-on-journaling

Minnesota's Changing Climate Introduction Video
http://www.willstegerfoundation.org/media-room/video-gallery/viewvideo/223/education/minnesotas-changing-climate-introduction

Summer Institute 2010 Overview and Recap
http://www.willstegerfoundation.org/summer-institute/summer-institute
http://www.willstegerfoundation.org/media-room/video-gallery/viewvideo/188/education/will-steger-foundation-summer-institute-2010-recap

Summer Institute 2011 Overview and Recap
http://classroom.willstegerfoundation.org/about/summer-institute/summer-institute-2011
http://www.willstegerfoundation.org/media-room/video-gallery/viewvideo/230/education/will-steger-foundation-2011-summer-institute-for-climate-change-education

2011 Sense of Place Public Forum Video
http://www.willstegerfoundation.org/media-room/video-gallery/viewvideo/229/education/sense-of-place-in-a-changing-climate

Summer Institute 2012 Overview
http://classroom.willstegerfoundation.org/about/summer-institute/summer-institute-2012
http://www.youtube.com/watch?v=wYey8w6LNdc

2012 MPR Interview with Dr. Genie Scott and Will Steger
http://minnesota.publicradio.org/display/web/2012/08/07/daily-circuit-eugenie-scott-climate-change

Parks Climate Challenge Overview
http://www.willstegerfoundation.org/media-room/video-gallery/viewvideo/231/education/parks-climate-challenge

CYCLES Workshop Overview
http://nasagcce.wordpress.com/2013/02/14/2nd-follow-up-workshop-will-steger-curriculum/

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Final Report
Evaluation Reports for the Will Steger Foundation's Summer Institutes and Minnesota's Changing Climate Curriculum

By Molly Phipps and Steven R. Guberman

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

Executive Summary

In 2010 the Will Steger Foundation received funding from Minnesota's Environmental and Natural Resources Trust Fund for the project, "Engaging Students in Environmental Stewardship through Adventure Learning." Key components of the project included developing curriculum, teacher professional development, and an online classroom about Minnesota's changing climate using Will Steger's journals, photos, audio, video, and skills as an environmentalist. The aim of the project is to increase educators' and students' understanding of climate change impacts in Minnesota and to provide them with the tools necessary for active and life-long stewardship. The resulting curriculum, Minnesota's Changing Climate (MCC), consists of 6 lessons presented in three bands—for grades 3 – 6, 6 - 9, and 9 – 12. The MCC curriculum was introduced to educators at the 2011 Summer Institute and implemented by teachers for the first time in the 2011-2012 academic year.

This document contains the reports of three evaluation studies: (1) an evaluation of the 2011 summer institute, (2) an evaluation of teachers' implementation of the curriculum in the 2011 – 2012 academic year, and (3) an evaluation of teachers who attended the 2011 summer institute and returned for the 2012 summer institute.

1. Evaluation of 2011 Summer Institute for Climate Change Education

The Minnesota's Changing Climate curriculum was introduced at the 2011 Summer Institute (August 12-13) at the Minnesota Zoo's School for Environmental Studies (Apple Valley, MN). Participants completed an online survey of open and closed-ended questions about four aspects of the institute: (a) pre-institute logistics, (b) the format and logistics of the SI program (c) the MCC curriculum, and (d) the speakers and breakout sessions. Participants' applications for the Summer Institute served as additional data points. Time was provided at the end of the institute for participants to complete the evaluation; 82 participants (92% of participants) completed the evaluation.

2. Evaluation of the Curriculum Implementation, 2011-2012

Educators who had attended the 2011 SI were sent an invitation to complete an online survey about their experiences implementing the MCC curriculum. The email provided links to two online surveys — one for participants who had implemented all or part of the MCC Curriculum in their classroom in the past year, and one for participants who had not implemented any of the MCC curriculum. Invitations were sent to 86 educators with active email addresses. The return included 26 completed surveys from participants who had implemented the curriculum and 8 from participants who had not.

3. Evaluation of Returning Educators at the 2012 Summer Institute

To better understand why some participants chose to attend more than one Summer Institute, six educators at the 2012 Summer Institute (also held at the Minnesota Zoo's School for Environmental Studies) who also attended the 2011 Summer Institute were interviewed. Interviews took place on the second day of the institute during lunch or the planning period; they were audio recorded and evaluators took notes during the conversations. There were two interview protocols—one for participants who had taught some of the curriculum and one for

those who had not. All participants were asked their reason for attending the 2012 SI. Educators who had taught any part of the MCC curriculum were asked which lessons and grade levels they had taught, any modifications they had made, if they would use the modifications the next time they taught the lessons, and any recommendations they had for WSF to change the curriculum. Educators who did not teach any part of the curriculum were asked why not, what barriers they faced, if they would teach it during the next school year, and what else WSF could do to help them teach about environmental stewardship and climate change.

Primary Findings

The findings here are drawn from and combine the results of the three evaluation reports. See the individual reports that follow for detailed results of each study.

Summer Institute

The evaluation indicated that the Summer Institute was a success:

Pre-conference preparation: Most participants reported that prior to the institute they were provided with important information in a timely manner and the information they received was useful.

Institute logistics: Almost all participants were pleased with the logistics of the institute. They reported that onsite registration went smoothly, the meeting facility was comfortable, the lunches and snacks were adequate, and they valued the time to interact with other educators.

Schedule: Most participants indicated that the overall length of the Summer Institute (1.5 days for most participants), the length of each day of the institute, and the number and length of breaks were just right.

Mix of activities: Participants reported that they enjoyed the mix of activities—breakout sessions, hands-on activities, keynote presentations, and lectures—and that "just the right amount of time" was devoted to each format, although a sizeable minority would have liked more time devoted to hands-on activities.

Time allocation: A majority of participants reported that the amounts of time devoted to the curriculum and the science behind it were appropriate, although a sizeable minority indicated that more time should have been spent on it.

Full group and breakout sessions: Overall, educators gave high ratings—good or excellent—for each session's presentation, content, and relevance for their classroom although, as shown in the full results, there was some variation from session to session.

Impression of the MCC curriculum: Although most participants were introduced to the MCC curriculum for the first time at the Summer Institute and, therefore, did not have much time to review it, they gave the curriculum high marks. They indicated that it would be useful in their teaching, their students will find it engaging, it is clearly organized and easy to use, and it matches their curricular goals. They reported that the curriculum is comprehensive and meets need for which they had limited resources.

After teaching the curriculum, almost all of the respondents indicated that the curriculum was *helpful* (58-67%) or *very helpful* (29-33%) for teaching about climate change and environmental stewardship.

Preparation for curriculum implementation: Most educators at the Summer Institute indicated that the institute had provided them with good ideas about implementing the curriculum and were confident in their ability to teach it. All of the respondents agreed that the curriculum would be useful for teaching about climate change and would be useful for teaching about environmental stewardship, and almost all said that they were likely to include the curriculum in their teaching next year.

These findings were supported by teachers responses after they had implemented the curriculum: a majority said that they felt *confident* or *very confident* about implementing the curriculum; although some teachers reported feeling *a little unsure*, none indicated that they felt *totally unsure*.

Reflecting back on the Summer Institute after implementing the curriculum, most teachers indicated that the Summer Institute had been *helpful* or *very helpful*. But about 1 in 5 teachers indicated that the institute was *very unhelpful*; open-ended responses indicate that these teachers would have liked more hands-on activities and the Summer Institute and more guidance in adapting the curriculum to meet particular instructional demands, such as integrating it into their existing instruction and modifying it for select grade levels and student groups.

Community: Returning teachers indicated that the value of the institute extended beyond the opportunities it provided for preparing to teach the MCC curriculum; it also was a place to share ideas and experiences and gain a sense of renewed purpose with like-minded educators.

MCC Curriculum and Online Classroom

The evaluation indicates that the MCC curriculum and online classroom were very successful in the first year of implementation. Teachers reported that they used all or some of the curricular materials in their classroom, often with only minor modification; that students enjoyed the lessons and learned important concepts and skills in them; and that they were likely to teach the lessons again. (Responses varied somewhat by lesson; see the full results for these distinctions.) Almost all teachers indicated that the curriculum was "helpful" or "very helpful" for teaching about climate change and environmental stewardship.

The evaluation revealed five strengths and two challenges in implementing the MCC curriculum:

- **Strength 1:** The local focus on Minnesota and connections to students' experiences and the world
- **Strength 2:** The active, hands-on, inquiry-based nature of the curriculum
- **Strength 3:** The clarity of the lessons and teacher guide, including specific content and materials
- **Strength 4:** The ability to adapt the lessons to fit their students and curriculum
- **Strength 5**: There was a lot of support for implementing the curriculum
- **Challenge 1:** Greater differentiation of the curriculum
- **Challenge 2:** Lack of time and other resources

Teachers used the Online Classroom to help prepare their lessons, and they showed or asked students to look at the videos and still images. Most teachers thought the features they used, especially the image gallery and handouts, were "very helpful." Information about climate change basics and the ability for students to see what other students had posted in the Online Classroom received the lowest ratings, although almost all teachers rated them helpful.

Conclusion

Overall, the evaluation indicates that the Will Steger Foundation is on the right track for meeting its project goals. The MCC curriculum is a much-needed and much-appreciated resource for teaching about climate change and promoting environmental stewardship. The annual Summer Institutes provide valuable professional development for teachers, effectively prepares them for implementing the MCC curriculum, and is a supportive community that inspires and refreshes its participants. In general, WSF should keep doing what it's been doing: refining the MCC Curriculum, maintaining its Online Classroom, holding Summer Institutes, and providing teachers with personalized support. The Foundation's close contact and good relationship with its teachers allow it to understand and improve teachers' and students' experience, deepen their understanding of climate change, and promote environmental stewardship. As grant funding draws to a close, WSF should look for ways to sustain close contact with teachers, expand its reach, and codify some of the lessons learned. For example, WSF could take common areas of support and create webinars and other more permanent scaffolds for teachers. Although these resources would not wholly replace personalized just-in-time supports, they could provide support for a larger number of teachers.

Will Steger Foundation
2011 Summer Institute Evaluation

On August 11-12, 2011, the Will Steger Foundation (WSF) held its annual Summer Institute (SI) for Climate Change Education at the School of Environmental Studies at the Minnesota Zoo in Apple Valley, MN. WSF debuted its Minnesota's Changing Climate (MCC) curriculum and accompanying online classroom. The two-day SI included keynote presentations, breakout sessions, networking opportunities, and planning time. Eighty-nine teachers from formal and informal classrooms around the state of Minnesota attended the institute. Twenty of the teachers also participated in the Parks Climate Challenge, a program through the National Parks Service for middle school teachers in the Twin Cities Metro Area.

Methods

Evaluators attended the workshop and took notes at each session they attended. Participants completed a computer-based survey of open and closed-ended questions about four primary aspects of the workshop: (a) pre-institute logistics, (b) the SI program (the format and its logistics), (c) the MCC curriculum, and (d) the speakers and breakout sessions. Participants' applications for the SI served as additional data points. Time was provided at the end of the SI for participants to complete the evaluation; 82 participants completed the evaluation at a completion rate of 92%.

Results

Results are presented as percentages of respondents for each question.

Part 1: Participant Characteristics

We gathered information about participants from their online applications to participate in the Summer Institute. Participants heard about the institute from a variety of sources (see Table 1). The most common source of information was colleagues or friends, followed by the Foundation's newsletter and website. Other sources include conferences (e.g., MnSTA, MNA, MN Naturalists Association, Green Schools, Home School Conference) and email announcements (from the Foundation, school administrators, and colleagues).

Table 1: How Did Applicants Hear About the Summer Institute?

Source of Information	%
WSF newsletter	20
WSF website	16
Colleagues or friends	38
Other newsletters	10
Other	35

Participants selected more than one option, so percentages total more than 100.

Applicants teach a variety of grade levels, spanning elementary, middle, and high school (see Table 2). Applicants also represent a range of educational institutions: In addition to public and private schools, applicants came from nature centers, environmental centers, and post-secondary institutions (e.g., Metropolitan State, University of Minnesota). They were mostly classroom teachers, but also included consultants, administrators, home school parents, and informal educators.

Table 2: Teacher Grade Levels (n=89)

Grade Level	**%**
Elementary	13
Middle	38
High School	29
Other	19

Most of the applicants had not attended a previous WSF Summer Institute (see Table 3), nor had they previously used and WSF curricula (see Table 4)

Table 3: Have Teachers Participated in a Summer Institute Before? (n=82)

	%
Yes	24
No	76

Table 4: Have Teachers Used WSF Curriculum Before? (n=84)

	%
Yes	29
No	71

Part 2: Pre-Institute Logistics

The majority of participants reported that the pre-institute information was useful and that they were kept well informed of important information on a timely basis (see Figure 1).

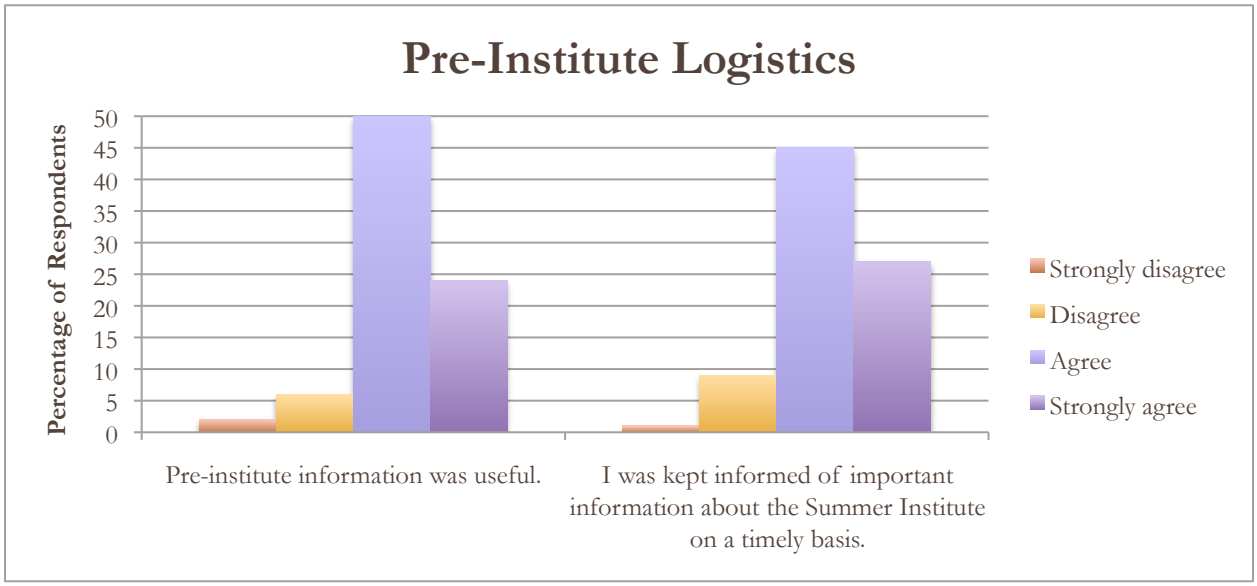

Figure 1: Pre-Institute Logistics

Almost all participants found the online registration process easy (91%) or a little easy (7%). Only one participant thought the online registration process was difficult.

Part 3: The Summer Institute Program

We asked participants to consider several aspects of the SI's format: the mix of session types (breakout sessions, hands-on activities, keynote presentations, and lectures), the length of the institute (each day and overall), the number and length of scheduled breaks, and the time devoted to the new curriculum and the science behind it. For each aspect, we asked participants to rate whether the amount of time devoted to it was "not enough," "too much," or "just right."

Most participants found the mix of activities to be appropriate (see Figure 2). When asked about the mix of session types, over 80% of the respondents indicated that there was "just the right amount" of time devoted to keynote presentations, lectures, and breakout sessions. In contrast, a sizable minority of participants (38%) indicated there were not enough hands-on activities.

- The desire for more hands-on, active sessions came through in participants' comments. When asked what was missing from the institute, participants responded:

Hands on, engaging activities. The first day I was lectured at for 9 hours! That is way to long for anyone to sit and listen. Also, based on the prior information of the institute it led me to believe that we would be exploring the outdoors, and I only went outside for a breakout session once for about 15 minutes. I was very disappointed.

Time outside. I know some sessions went outside but it would have been nice to have more opportunities for exploring the area as a way to demonstrate how we would do this with kids. Especially because this spot is set up for this!

Most participants (83%) indicated that the length of the institute (2 days) was "just right." Most respondents also indicated that the length of each day of the institute was "just right"; 15% indicated that the daily schedule was too long, and 6% that it was too short.

There were three primary reasons that participants thought the institute should be longer: (a) to be able to attend more of the breakout sessions, (b) to be able to go into the material more thoroughly, and (c) to have more time for social networking.

- To attend more breakout sessions:
  I wish there was more time (meaning more days) so I could participate in more of the break out sessions. I really wanted to take the photography course but being required to do both of them (photo 1 and 2) limited the other possibilities for sessions.

  I would have liked to attend all breakout sessions. That is why I stated that length of institute was not enough.

- To go into the material more thoroughly:
  Perhaps the break out sessions could be longer in length, so as to go deeper. I felt a little like I was just getting the tip of the iceberg in all of these areas. I love the choice idea, as we are all at different places.

  Because the workshops were rushed, they were lecture focused. With more time the workshops could have been much better.

  Nothing was missing, but often to get to everything, things felt rushed and information was glossed over, especially at the one-hour breakout sessions. I think add a third day and one more break out session, and make each session longer so all the information can be presented.

  Although I really like the fact that it isn't a week long, 5 day, drawn out institute, I also feel like this is a lot of information jammed into 2 days. Maybe even 3 days, or 2 full days and 1 half day would be better to give us more time to soak up the information and think about the application of everything we have learned.

- To have more time for social networking:
  Time to meet formally with other educators was the main thing that I thought was missing. It's a great opportunity (missed in this case) when we have so many people working throughout the state and with many different age groups/populations. Creating interest groups/areas ahead of time and giving some time (1 breakout session?) for educators to choose to meet to see how we can learn from and support each other in the coming year would be valuable in the future.

  There was not enough time for people who participated for the first time to connect with other people.

Several members of the PCC cohort commented that, because they had several required sessions, they felt limited in the breakout sessions they could attend.

The schedule included several breaks each day, approximately 15 minutes between sessions. Most participants (> 80%) indicated that the number of breaks and their length was "just right," although some thought there were not enough breaks (11%) and that they were not long enough (12%).

Table 5: Participants' Ratings About the Mix of Sessions, Breaks, and Length of the Institute (n=89)

Session Type	Not Enough	Just the Right Amount	Too Much
Breakout Sessions	12	69	1
Hands-on Activities	31	50	1
Keynote Presentations	4	73	5
Lectures	2	68	12
Length of Institute (2 days)	11	71	0
Length of Each Day	5	65	12
Number of Breaks	9	71	2

A majority of participants thought that the time devoted to the new curriculum and the science behind it was "just right," although about one third responded that not enough time was spent on them (Table 5).

The desire for more time devoted to learning about the curriculum and the science of climate change was reflected in participants' comments when asked if anything was missing from the institute. In particular, participants would have liked (a) more information about the curriculum and how to implement it, and (b) more information about the science of climate change.

- More information about the curriculum and how to implement it:

  More time spent "practicing" some of the activities and concepts in the new curriculum.

  There was not enough training the trainer for the lessons. Skip the overview and do the lessons.

  I would have liked to have hands on experience going through the activities in the workbook. Only doing one small activity from one lesson was not enough exposure.

- Participants were especially eager to have more information about implementing the curriculum in particular grade levels:

  Would like to do more with specific grade level cohorts—having that intentionally built it would be great. For example, partner/level people with specific grade levels and varying biomes so we could do collaboration throughout the year.

  I liked the breakout sessions but I wish they were more focused on grade level. I found myself with many elementary teachers wanting to learn different content and methods of teaching than myself as a secondary teacher. I think the institute should make these divisions so that we as teachers can get more age appropriate training.

  I suppose I just wish there were more elementary teachers. It would have also been helpful to have more specific ideas about how to address teaching the youngers about climate change since the foundational years are so important to how they will receive this kind of information in the future. We want them to feel empowered with information and be problem solvers.

- More information about the science of climate change:
  A little more of the science explained to support teachers, especially those with less background (elementary school teachers, for example) would be good.

  I also did not feel like I got data or stories that would help me present the case of climate change to the deniers.

  The institute assumes everyone knows and has some knowledge of climate change in which I do not. I was hoping to get some education on it, before I could teach any of it to my students. Now, I have to teach myself and then apply that knowledge to my classroom. I feel the information on climate change was so vague.

  As an elementary teacher attending with science teachers, I feel inadequate and a bit intimidated. I would love to attend an institute that would make me more scientifically savvy.

Many participants commented on their own lack of knowledge about climate change and thought that learning more of the underlying science during the institute would strengthen their ability to teach the topic and to address colleagues, students, and parents who are skeptical about climate change. In contrast, participants did not indicate that the MCC curriculum itself needed to include more underlying science.

Over time, the location of the institute has varied. The first institute was held at the School of Environmental Studies, the same location as the 2011 institute. Other institutes were held at the University of Minnesota's Conference Center at the Saint Paul Campus. Additionally, institutes have varied in length, ranging from a full week to a single day. This year's SI was one and a half days for all participants and an additional half-day for the middle school teachers participating in the Parks Climate Challenge. Almost all participants (87%) thought the length of the institute was "just right"; a few participants (13%) thought the institute should be longer and none responded that the institute was too long.

Almost all teachers found the meeting logistics acceptable (Figure 2). Over 90% of respondents agreed or strongly agreed that onsite registration went smoothly, the meeting facility was comfortable, the lunches and snacks were adequate, and that they valued the time to interact with other educators. Teachers were least enthusiastic about the new meeting location in Apple Valley, MN, and the built-in planning time, although most agreed or strongly agreed that the location was convenient (89%) and thought the planning time was helpful (87%).

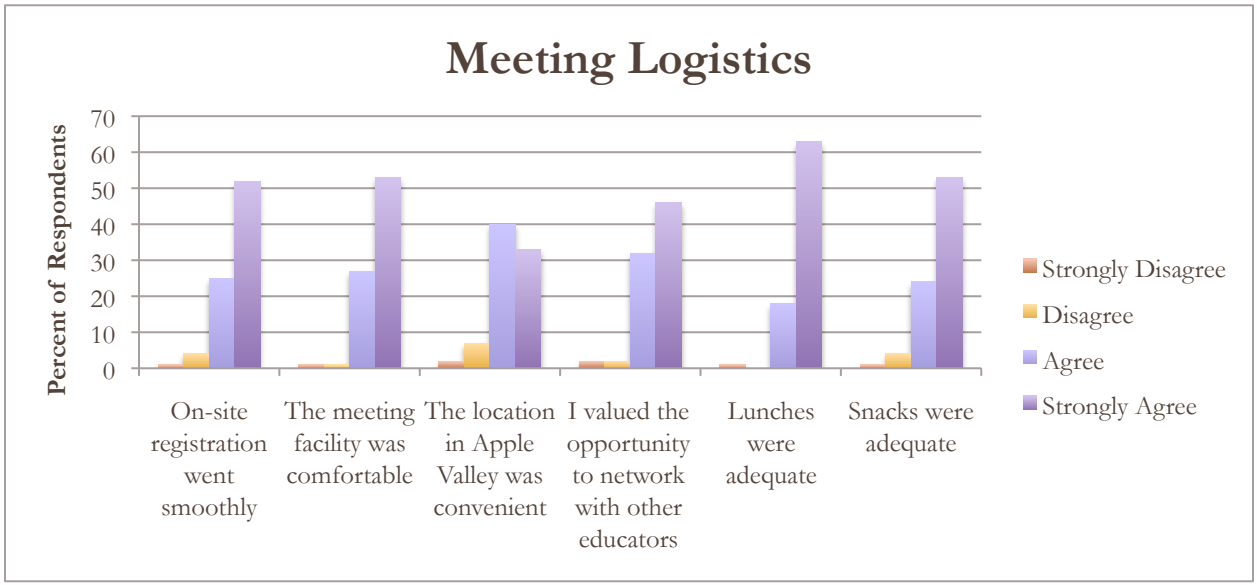

Figure 2: Meeting Logistics

Part 4: Minnesota's Changing Climate Curriculum

Teachers gave Minnesota's Changing Climate Curriculum high marks. More than three fourths of the respondents *agreed* or *strongly agreed* that the curriculum will be useful in their teaching, their students will fond it engaging, that it is clearly organized and easy to use, and it matches their curricular goals (Figure 3).

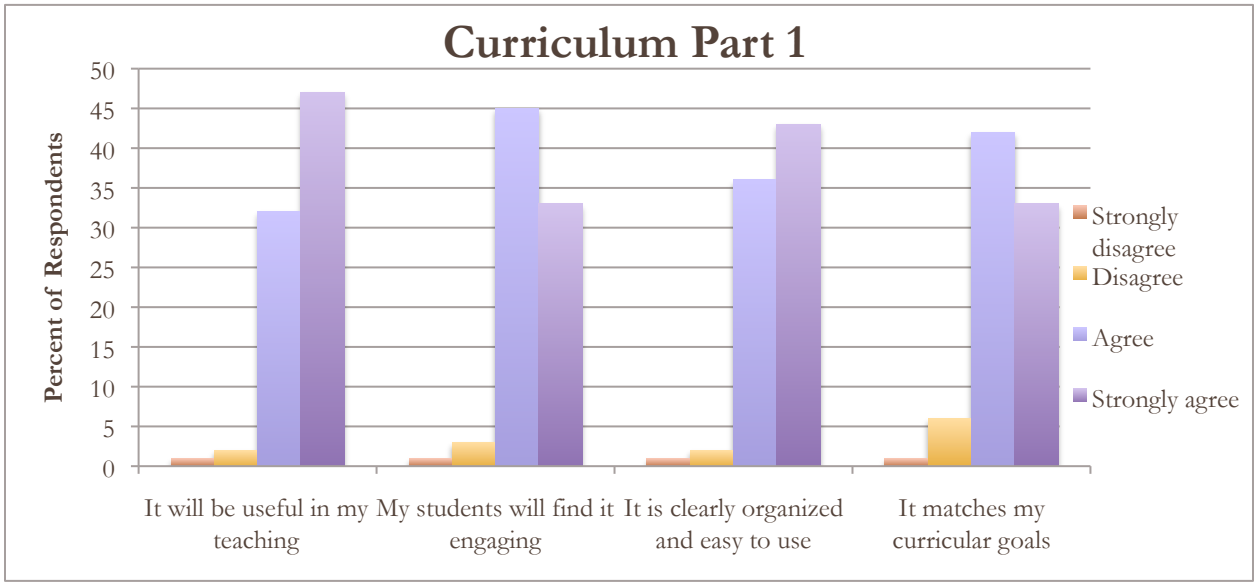

Figure 3: Minnesota's Changing Climate Curriculum (part 1)

Most teachers also *agreed* or *strongly agreed* that the curriculum is comprehensive (74%) and meets a need for which they had inadequate resources (76%) (Figure 4). Most participants also agreed or strongly agreed that the Summer Institute had provided them with h good ideas about implementing the curriculum (72%) and were confident in their ability to teach the curriculum

(76%). All teachers (100%) agreed or strongly agreed that the curriculum would be useful for teaching about climate change and would be useful for teaching about environmental stewardship.

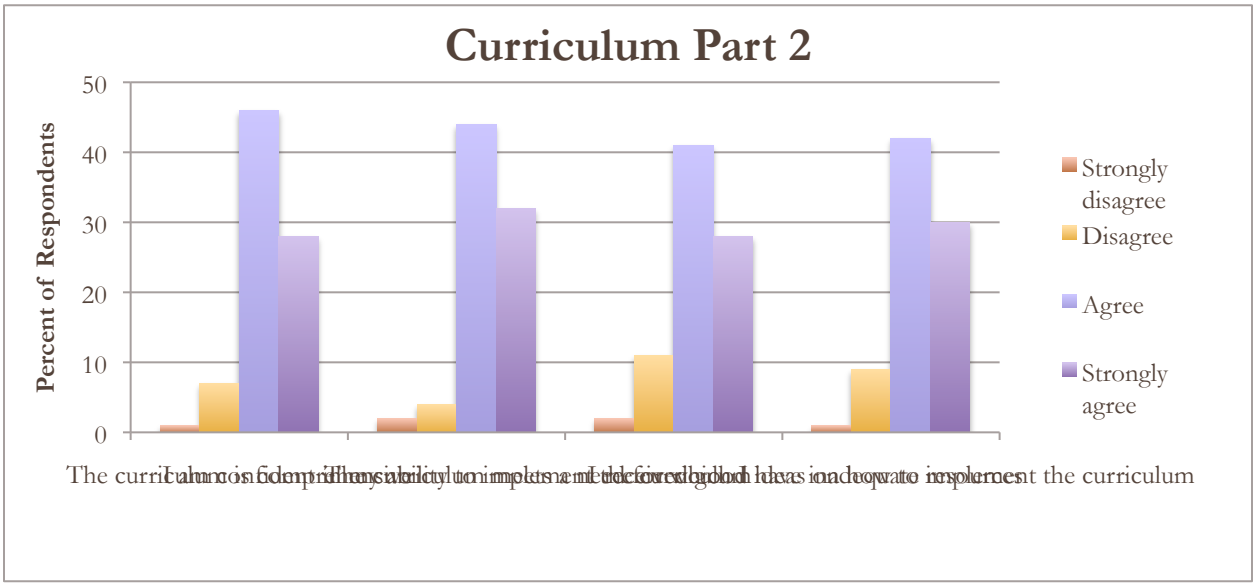

Figure 4: Minnesota's Changing Climate Curriculum (part 2)

Even though they had not spent a lot of time reviewing the curriculum, when asked at the end of the institute to describe its strengths and weaknesses, participants mentioned a variety of characteristics.

Strengths of the Curriculum

Several participants appreciated having a curriculum that addressed climate change, a topic for which they flacked resources and found difficult to teach.

> *The strengths are the fact that it teaches climate change which, to this point, I have not encountered a good curriculum that does so. In addition, it is short and sweet so that I am not overwhelmed by the length of it to the point where I can't fit it into an already busy school year.*

> *It is easy to use and very engaging. It made a topic that is scary and complex more manageable. It helped me see correlations with many of the topics I need to teach. It convinced me that teaching climate is an integral part of teaching what I already teach about populations & ecosystems, diversity of life, outdoor science and energy transfer.*

> *I love that all the research is done for me and all I have to do is read and learn the material to create a knowledge base and then impart it to my students as they navigate the material themselves.*

Several participants noted that a strength of the curriculum is that it is based in the Minnesota academic standards, and that the links to the standards are explicit. This is especially important since teachers often have little time for lessons that are not directly tied to the standards.

> *I am absolutely thrilled that the curriculum references the state standards and that the curriculum is cross disciplinary.*

[A strength of the curriculum is] linkage to the state standards. The depth of the biology standards leaves no time for any extras.

So far, I am impressed with the inclusion of the MN academic standards. I think using this curriculum will meet some standards not yet addressed by my school district.

Participants also noted that the curriculum was adaptable and could easily be integrated with their existing lesson plans or to meet a variety of goals.

Very easily and quickly can be implemented into my existing curriculum.

Each activity is a very manageable size and length, especially for those of us in nature centers who have limited amounts of time with individual groups of children.

The journaling/notebook aspect of this is the part that seems the best for what I teach. Interdisciplinary!! Meeting more than just science standards is the only way I'll be able to get other teachers on my team on board with this. THANK YOU!

Participants like that the curriculum is focused locally, in Minnesota, but could be adapted to their needs.

I like the unique focus on climate science as applied to Minnesota, to our place and space here, which connects with students' personal observation and experience of changes to plant communities, weather and climate, ice and water, etc. The connection of the fundamental science to what students are able to personally observe in their own communities makes the curriculum stronger, in terms of pedagogy.

For me it has what I've been looking for. In the past I've taught GW using WSF curriculum from the 2007 Institute, with success. But I've always felt I needed to bring the issue closer to home. I have been able to come up with limited resources on my own, mainly form the MN DNR website and articles from the MN Volunteer magazine. This new curriculum is just what I was looking for!

It can be applied anywhere—integrated curriculum that is place-based to MN, but can be modified to wherever you are located. It is student-centered.

Teachers replied that a strength of the curriculum is that it uses a variety of approaches to engage students in active learning and in putting their learning to use.

Curriculum follows a clear process which begins with student observations and builds to a call to action. It involves students in service learning. It gets students outside. It provides a framework for my environmental class.

Great data for students to interpret and analyze. Video, interactive and applicable to the 21st Century kid.

The journaling piece of each activity is an exciting way to engage students in critical thinking and giving them opportunities to express themselves.

I love that the focus is also on action and not just learning. I have always told students that learning and knowing is not nearly enough. "Doing" is even more important.

In addition to commenting on the content of the curriculum, participants also pointed to several aspects of its presentation as strengths; they appreciated the layout of the curriculum, its ease of use, and that it is comprehensive.

> *I am really pleased that the curriculum is laid out in the format that it is and that is aligned with the standards. The introduction explaining how the lessons are laid out is helpful and direct. I liked the inclusion of Will Steger's journal entries and that there are interactive and extension activities. The web site as a companion with all of the online interaction and support that was offered with the curriculum is a really unique aspect to the whole experience. Receiving the generous resources and being offered help from all of the instructors and experts was very impressive.*
>
> *Well laid out and easy to use. It contains the videos and other parts necessary to implement easily. I like the fact that there is a hard copy and an online version of things. Since my students are young, there are sometimes a few slow readers, so having the reading material with an auditory option is great. I love the panorama and other interactive aspects of the curriculum.*
>
> *I think its brevity is a strength. I was anticipating something like Project Wild, which is a wonderful resource, however I like how this is different.*
>
> *That it encompasses all subject areas and is applicable to all age levels.*
>
> *Very well laid out—easy to read, easy to understand and visualize how the activity is supposed to be done. I think it's broken down nicely with sections—take it outside, etc. Great pictures.*
>
> *Clear instructions—can use right away in my curriculum.*
>
> *You provided the resources (curriculum, biome kit, online classroom with videos, etc.). The "experts" at WSF are available and want to help.*

Several participants mentioned the online classroom as a strength of the curriculum.

> *I love the on-line classroom. I think students need a venue to share, work like "real" scientists, and interact with their peers. I gained new insights for the journal and believe it will help my students feel like they are doing the work of a real scientist.*
>
> *I love the opportunity for students to put their observations online. I plan on using this for my students as a means to share information and grade them on their quality. I hope they will find it interesting and enjoyable.*
>
> *Finally, I have the on-line curriculum which my students will find engaging and more geared to their level. My students are very visual and I can't wait to use the on-line resources - videos and pictures!*

Weaknesses of the Curriculum

Several participants indicated that they could not see any weaknesses in the curriculum although, as some noted, they had not had much time to become familiar with it. Other participants, though, pointed to several concerns of the when asked if the curriculum had any weaknesses.

The concern that participants noted most often is the perception that the curriculum needs to be better integrated with their existing instruction. As noted above (under strengths), teachers often feel pressure to cover the topics they are required to teach and, therefore, introducing new topics is often problematic. Several participants wanted the curriculum to have more connections to other topics within and outside of science.

> *[The curriculum is] focused on life science. I teach earth science and will look for ways to integrate it more efficiently. Makes it seem like global warming is only a life science issue.*
>
> *I feel that geology could be addressed a little more as it is a part of a system that interacts to create an ecology, climate, system. I will be able to use a lot of the program very easily so it's not a significant problem, but I will write lessons to supplement this area. However, there are many projects that could fit well with climate change issues that could be considered for this program.*
>
> *Basic chemistry behind it. It might be as simple as adding a video or webquest to the online classroom at a kids level. Middle school students have not [have had] chemistry, so even basic formulas and molecules will confuse them.*
>
> *Maybe music and the arts? Every revolution in thought needs music. But I realize you can't do everything at once. You can only do so much at once.*
>
> *Embed this into strategies that schools are already using: AVID interactive science notebooks; speak openly to culturally relevant teaching; time to fit it all in.*

Participants also suggested several additions to the curriculum.

> *Six lessons are not enough keep the idea of climate change sprinkled though out the year.*
>
> *Wish there were 6 lessons per grade level.... I think that would be reasonable to have each grade level complete throughout year. If [grades] 3-6 do these this year.... then what should we do next year?*
>
> *Not enough data to give to students. I would like many sources to divide up amongst the students so we can have a comprehensive view of climate change from many different indicators so students can come to their own conclusions.*
>
> *More data and more ideas for higher order thinking ways to engage the students in this data.*

Several participants suggested changes to the curriculum that would help them teach particular groups of students.

> *More advanced lessons for upper level high schools. Journal articles, case studies, scenarios, etc.*
>
> *Adaption and modification for students with disabilities. That's always the case with curriculum geared for the regular classroom. I do feel however, that this curriculum will be less difficult to adapt and modify for my students.*

I teach grade 6 and it only meets two grade 6 standards. Unfortunately, the two standards it meets are the two standards which are already implemented in everything I do in science already (measurement). I will use the journaling/notebook aspect all year in my classroom, but the other lessons may or may not get done (depending on time constraints and how well I can integrate them into my science standards).

I would have liked more specific lesson plans for 8th grade, instead of a general 3-8 but understand why it was done that way.

The need to match it to my grade level is both an opportunity and a burden. I will look at it is as an opportunity as I learn the subject better by making it work for 4th graders.

Depending on the grade level they taught, some participants thought the curriculum was too complex for their students, and others thought it was not complex enough.

Some of it will take some pre-teaching and may be over the heads of students.

Teaching 8th grade, I will have to beef up some of the material or look more at the 9-12 version to bring it to more of an academic level on par with my students.

For my curriculum, portions of it lack the scientific "rigor" that I need in my everyday lessons. The one that would fit is the lesson that looks at the data/graphs/charts. Also, with a sophisticated group of students, the level might not be challenging enough and I might have to beef it up a bit.

Two thirds of the participants said they would definitely implement the curriculum; the remaining third of teachers would likely implement the curriculum in the coming academic year. Teachers were slightly less enthusiastic about using the online curriculum, 90% were either likely or definitely going to implement (Table 6).

Table 6: How Likely Participants Are to Use the Minnesota's Changing Climate Curriculum in the Next Academic Year

	%
Not at all likely	1
A little likely	9
Likely	45
Definitely	45

When asked which lessons in the curriculum they were most likely to implement, about four fifths of the participants selected each of the first five lessons (Table 7). Over 90% of participants indicated that they would be likely to implement Lesson 6, about taking action in response to what students have learned about climate change.

Table 7: Parts of Curriculum Participants Thought They Would Implement

	%
Lesson 1: What is journaling for?	79
Lesson 2: What defines Minnesota's biomes?	76
Lesson 3: What defines Minnesota's climate?	77
Lesson 4: What is climate change and what does it mean for Minnesota?	80
Lesson 5: What does the data show?	77
Lesson 6: What can I do?	91

Barriers to Implementing the Curriculum

Although most participants indicated their intention to use the curriculum in their classroom, several participants noted barriers to implementation. The two most common barriers are the lack of time and the politics of climate change.

As mentioned previously, finding time to cover everything that they need to teach is a primary concern of many teachers. Several participants saw time as a barrier to teaching the curriculum. Connecting to the standards and integrating with other content areas are two ways to overcome the time barrier.

> *I have good intentions [but] I worry about the time aspect.*
>
> *Time if it doesn't satisfy a standard.*
>
> *One barrier may be finding time in an already loaded curriculum. 4th grade has a rather heavy science load, and we find it difficult sometimes to cover the standards thoroughly. We are trying to be more creative in ways that we teach some of these things through integration. It requires the other teachers at the grade level to be on board.*
>
> *Time…. emphasis is on reading and math curriculum (NCLB) leaves little time for science and social studies…sad, but true. Administration agrees but its difficult for them to turn backs on test scores and opt for doing what's best for kids. I appreciate your emphasis on integrating resources into cross-curriculum.*

Several participants noted that the politically-charged atmosphere around the science of climate change might be a barrier to teaching the curriculum, especially if parents objected.

> *Parental prickling should they hear the words climate change, global warming, etc. I have already had issues in the past with introducing students to fairly basic concepts regarding this issue. Time, time, time and testing…the barrier to all classrooms.*
>
> *I may face some resistance from administration and from parents. There are skeptics within my school community.*
>
> *I'm able to use pretty much what I'd like, but the barrier will come from the very conservative (politically and religiously) students and parents that live in my district.*

I think it would have been nice to have suggestions for interacting with parents who are skeptical of climate change. Additionally I would appreciate if there was a suggestion of how to present the unit in a letter to send home explaining the unit and what students would be studying.

Other possible barriers mentioned by participants include teaching in settings other than classrooms, and their own lack of knowledge about climate change.

As an environmental educator at a nature center, I do not have the ability to do many long-range lessons since we do not see many of the students/schools more than one time in a school year.

As an informal educator, I am not in the classroom very often or very long. So the trick will be pulling out items to use in the time slot I have available.

The lack of knowledge on climate change. How can I do a [Public Service Announcement] if I don't know anything about basic climate change?

Only a few participants mentioned that access to the outdoors, money to buy journals, or accommodating all learners (including students with limited English proficiency) would be a barrier to implementing the curriculum.

I do not have access within walking distance to a nature area and our grounds are devoid of most living plants. The neighborhood is not the safest to walk in, though we do at times. It would be helpful for inner city schools to have the opportunity to go to Fort Snelling or other nature area a few times during the year. Bus cost is difficult at this time due to budget cuts.

What is Missing from the Curriculum?

When asked to describe what is missing from the curriculum, most participants responded either that nothing was missing or they did not have enough time to know. Several participants offered suggestions. Some of the suggestions mirror earlier comments, such as a request for information about dealing with parents who are skeptical of climate change.

I know that the previous curriculum materials did address more of the scientific aspects of climate change, and this curriculum was designed to have a slightly different focus, but I would like to see a little more of the science included.

Would like to have an area on online classroom where you could share data in the form of data tables and graphs.

I think it would have been nice to have suggestions for interacting with parents who are skeptical of climate change. Additionally I would appreciate if there was a suggestion of how to present the unit in a letter to send home explaining the unit and what students would be studying.

I would like more on the economics of climate change.

Information on how [climate change] impacts people who rely on the weather , [such as] farmers, Ojibwa people who do seasonal activities.

The only thing that I noticed was an absence of differentiation ideas and not much that recognized the different learning styles or the applications for multiple intelligences in teaching, but that happens in the lesson planning details and creation of units. It could be a good appendix or supplement though.

I don't feel I can speak to this until I have had the opportunity to really look at the curriculum and implement components in my classroom. Check back in a year. :) :)

Several participants continued to express concern about their own understanding of the science of climate change.

As an elementary teacher attending with science teachers, I feel inadequate and a bit intimidated. I would love to attend an institute that would make me more scientifically savvy.

I still have a hole in my understanding about why climate change can cause droughts in one area of the world/country/state, while another part is flooding. I was hoping to understand that better but it always seems that it is assumed we understand it. Maybe it is something simple and obvious but I just have not understood that. I haven't looked at the entire curriculum but if there is not specific data for addressing the common misconceptions and common false explanations for climate change I think there should include that information.

I am hoping the 6 lessons will be enlightening for me. You are talking to a real beginner in climate change understanding.

Part 5: Participant Ratings of Keynote Presentations and Breakout Sessions

Full Group Presentations

There were four full group presentations at the 2011 Summer Institute: Will Steger, Karen Campbell, and Kristen Poppleton, and Abby Fenton. Teachers rated each presentation for overall presentation (interesting, engaging, clear, and understandable), content, and relevance to their classrooms (Figures 5, 6, 7, & 8).

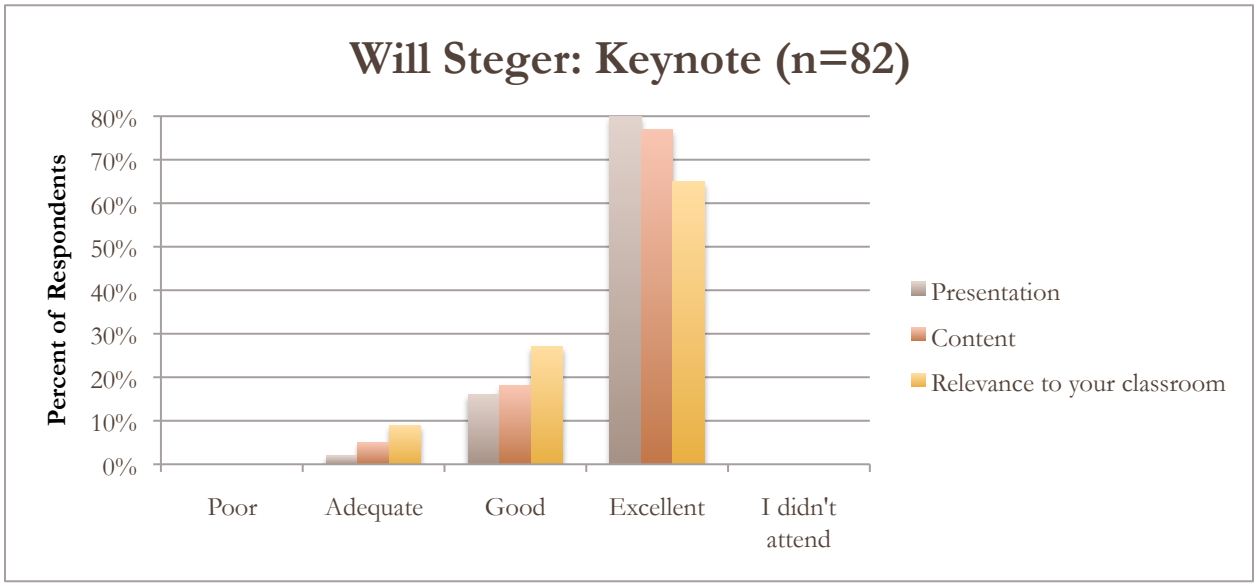

Figure 5: Will Steger Keynote Presentation

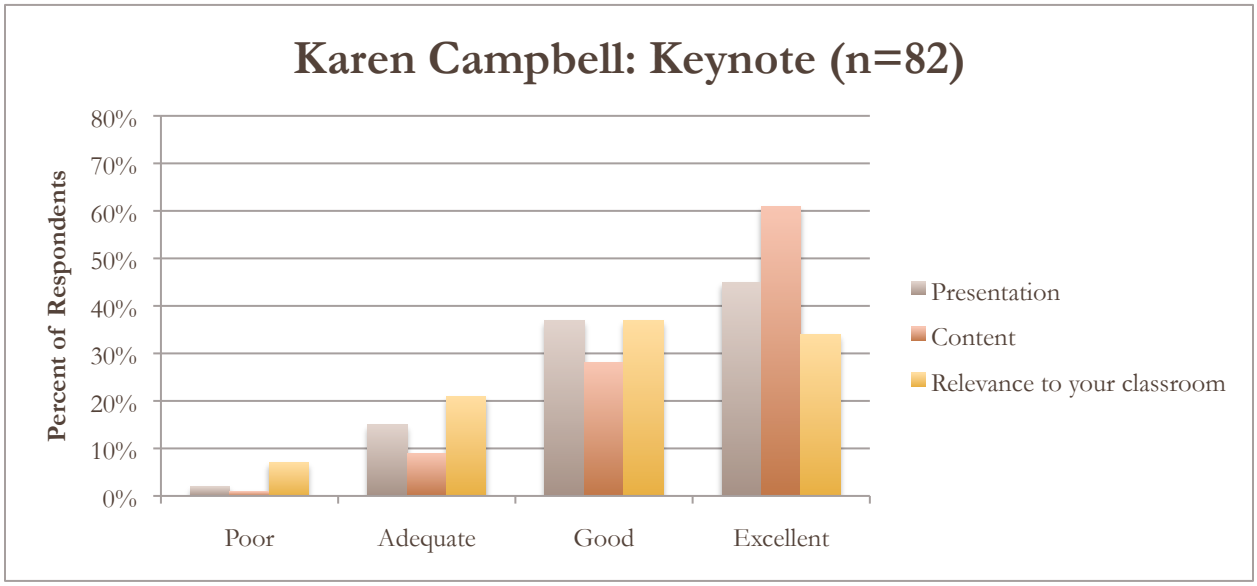

Figure 6: Karen Campbell Keynote Presentation

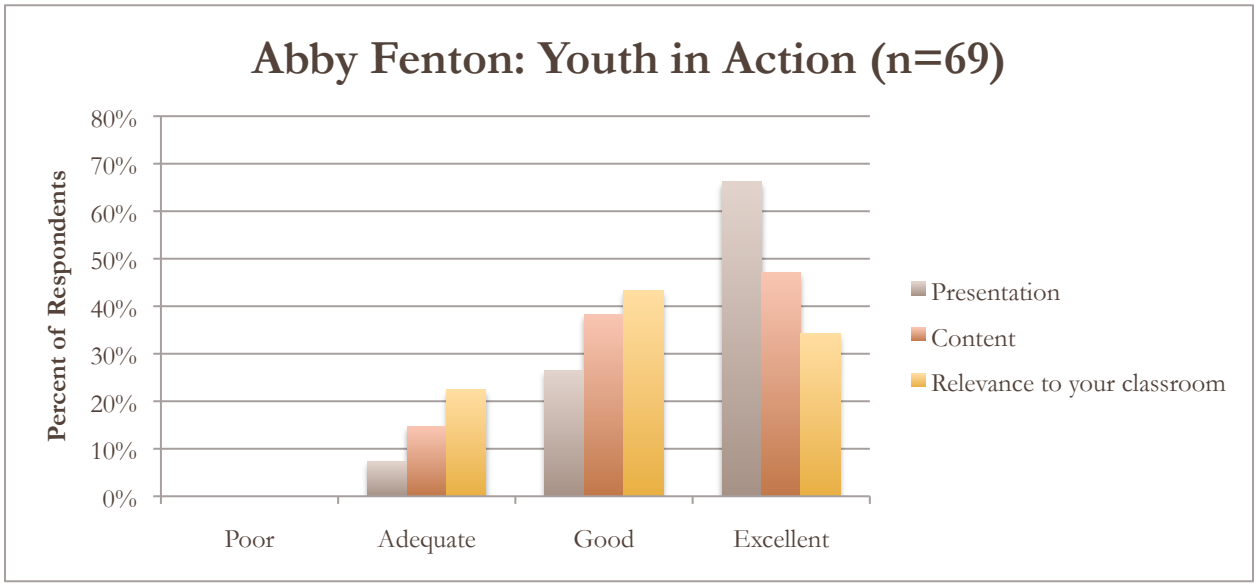

Figure 7: Abby Fenton Youth in Action Presentation

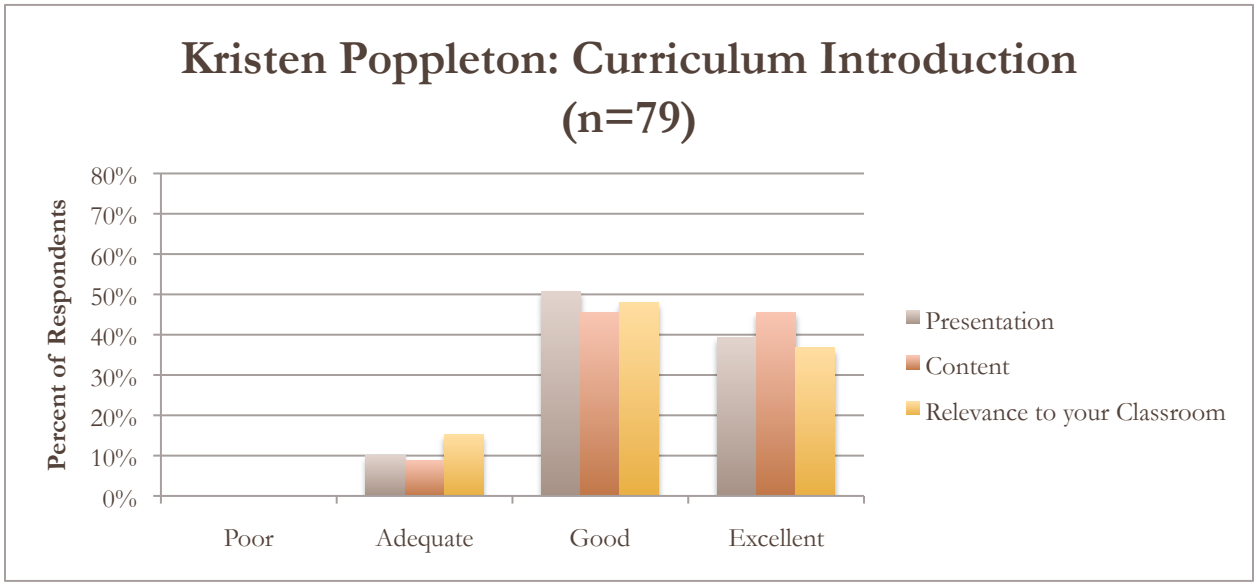

Figure 8: Kirsten Poppleton Curriculum Introduction Presentation

Breakout Sessions

Will Steger Foundation offered a number of breakout sessions to introduce the new curriculum and to support teachers' ability to successfully implement the curriculum. Breakout sessions were a mix of indoor hands-on activities, outdoor hands-on activities, and lectures. Sessions on using the new curriculum and the on-line classroom were required; all other sessions were optional for participants except those participating in the Parks Climate Challenge also had to participate in particular sessions. Participants rated breakout sessions along the same metrics as the full group sessions.

Thursday Afternoon breakout sessions

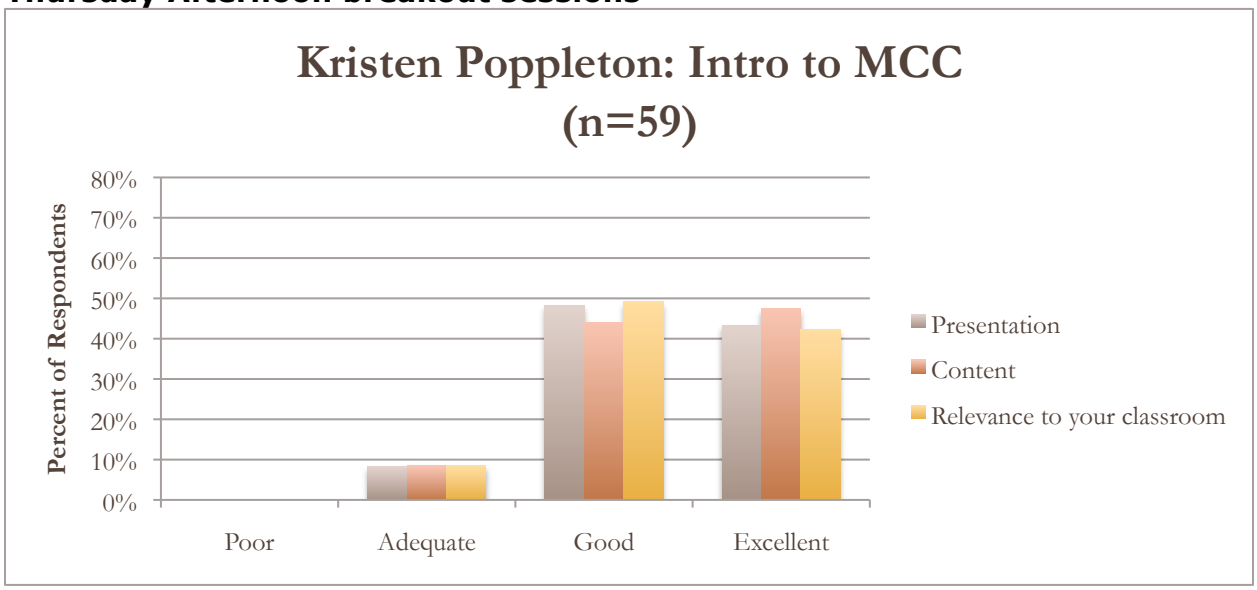

Figure 9: Kristen Poppleton's Introduction to Minnesota's Changing Climate Curriculum Breakout Session

Kristen Poppleton's sessions introducing Minnesota's Changing Climate Curriculum were well attended and well received almost-equally across all three measures (Figure 9).

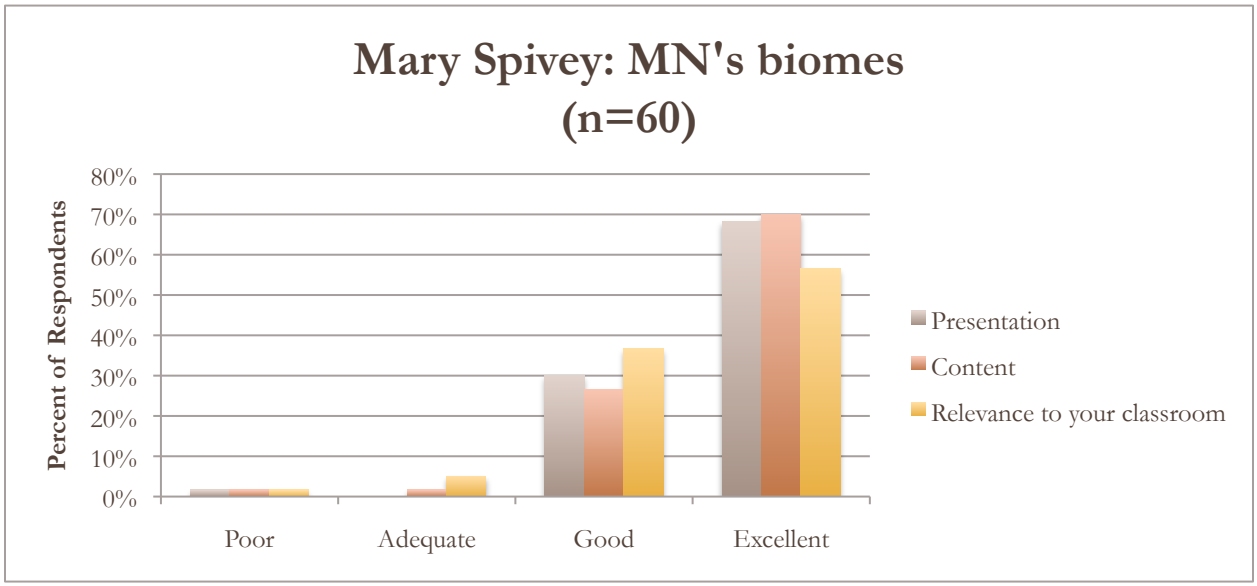

Figure 10: Mary Spivey's Minnesota's Biomes Breakout Session

Mary Spivey's sessions on Minnesota's biomes were well attended and highly rated. Mary's presentation and content were rated higher than the relevance to teachers' classrooms (Figure 10).

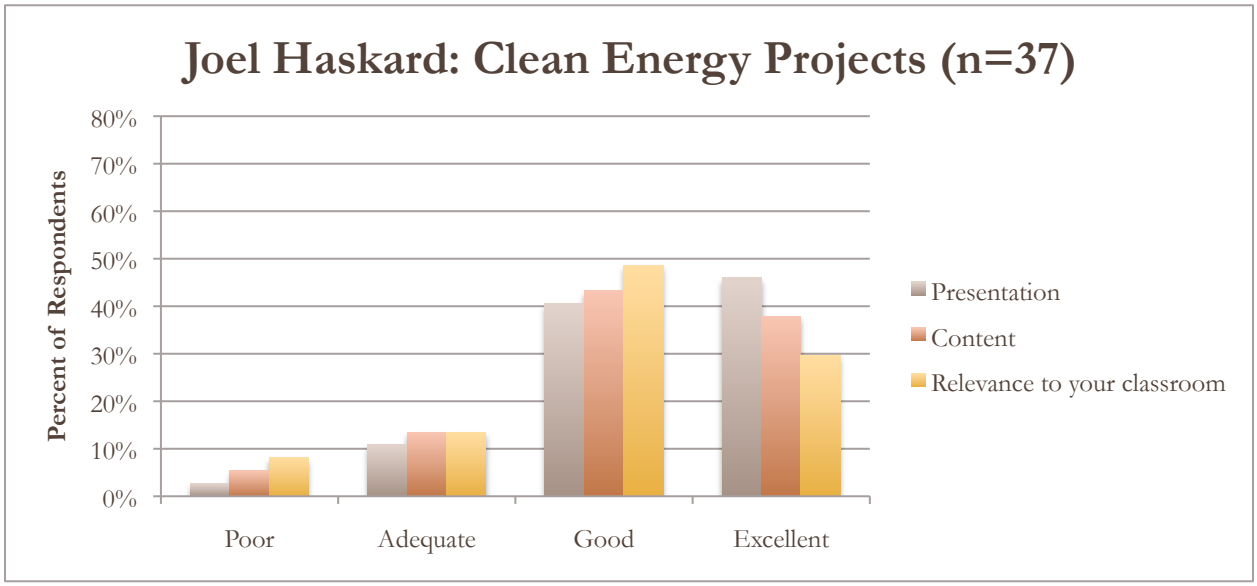

Figure 11: Joel Haskard's Clean Energy Projects Breakout Session

The majority of participants who attended Joel Haskard's presentations on clean energy projects found it either good or excellent on all measures, but Joel's presentations received the most 'poor' ratings (Figure 11).

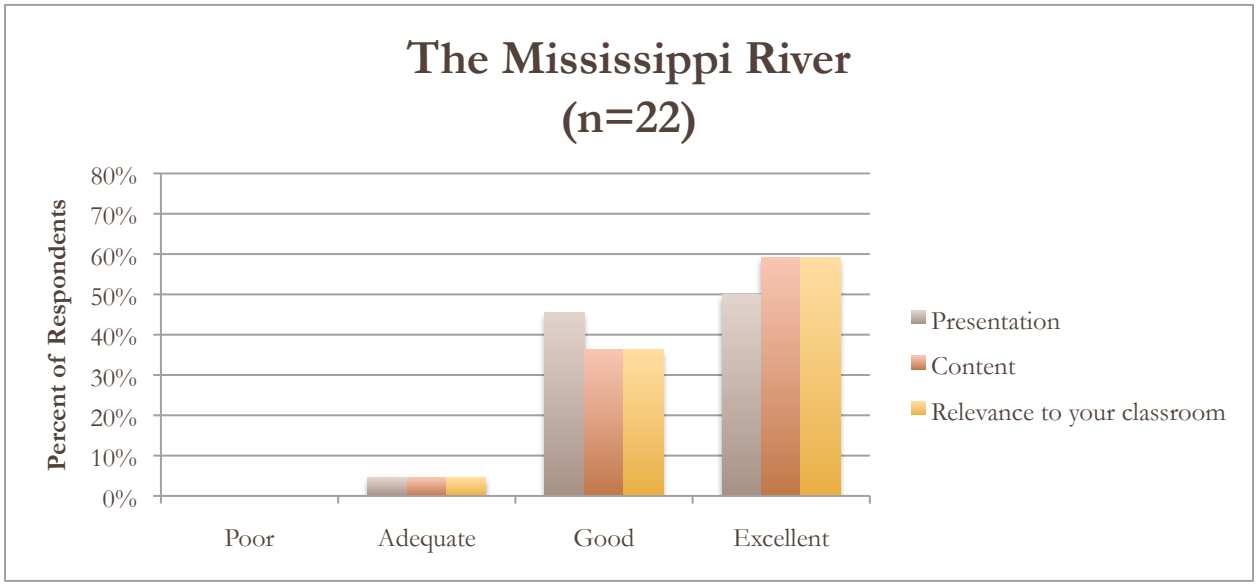

Figure 12: Mississippi River Breakout Session

The Mississippi River session was well received by the 22 teachers who attended the session (Figure 12).

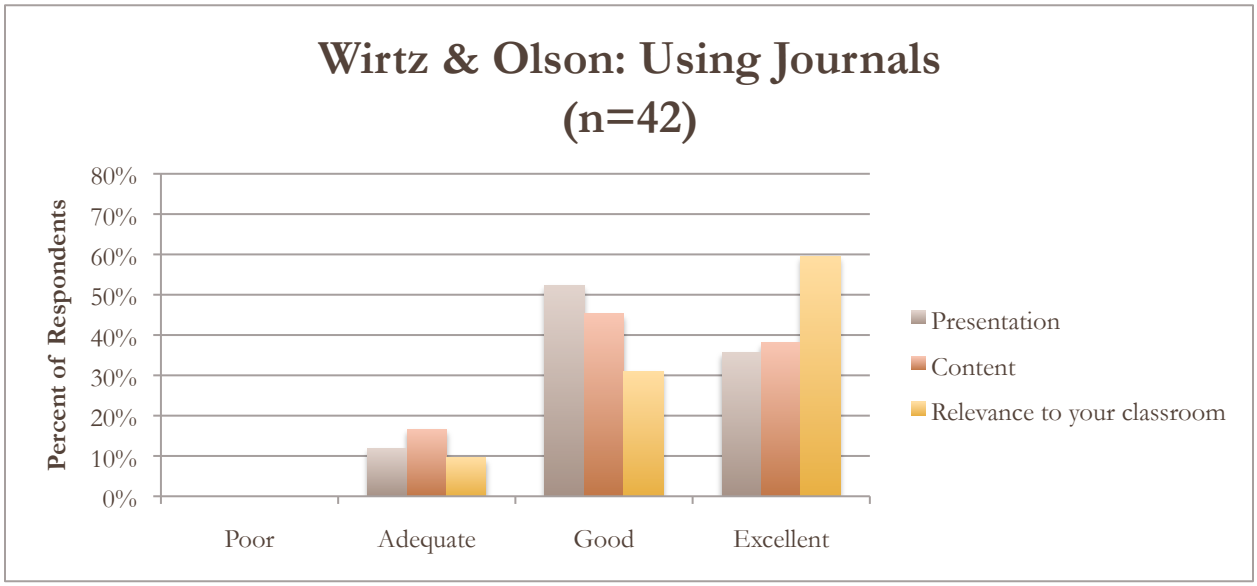

Figure 13: Mick Wirtz and John Olson's Extending Learning Using Journals Breakout Session

Most participants found Wirtz and Olson's workshop on journaling highly relevant to their classrooms, but 10-15% of participants found each aspect of their presentation to be only adequate (Figure 13).

Friday Morning Breakout Sessions

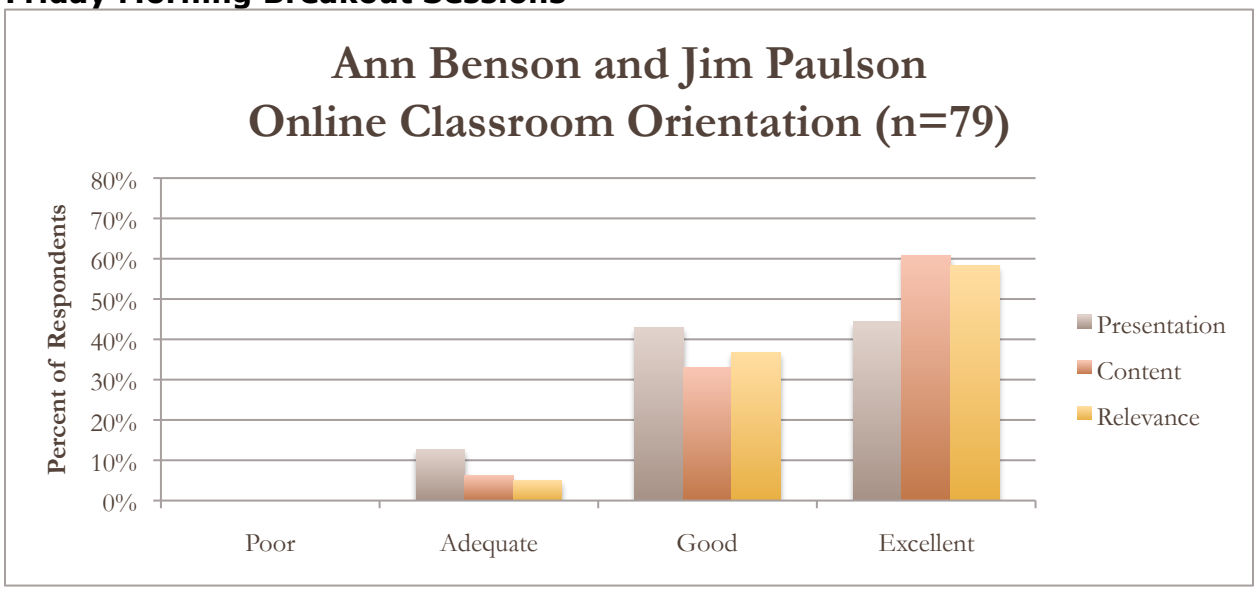

Figure 14: Ann Benson and Jim Paulson's Orientation to the Online Classroom Breakout session. This session was required of all Summer Institute Participants

Ann Benson and Jim Paulson's sessions on the online classroom was a mandatory session for participants. The sessions were stronger in content and classroom relevance than they were on the presentation itself.

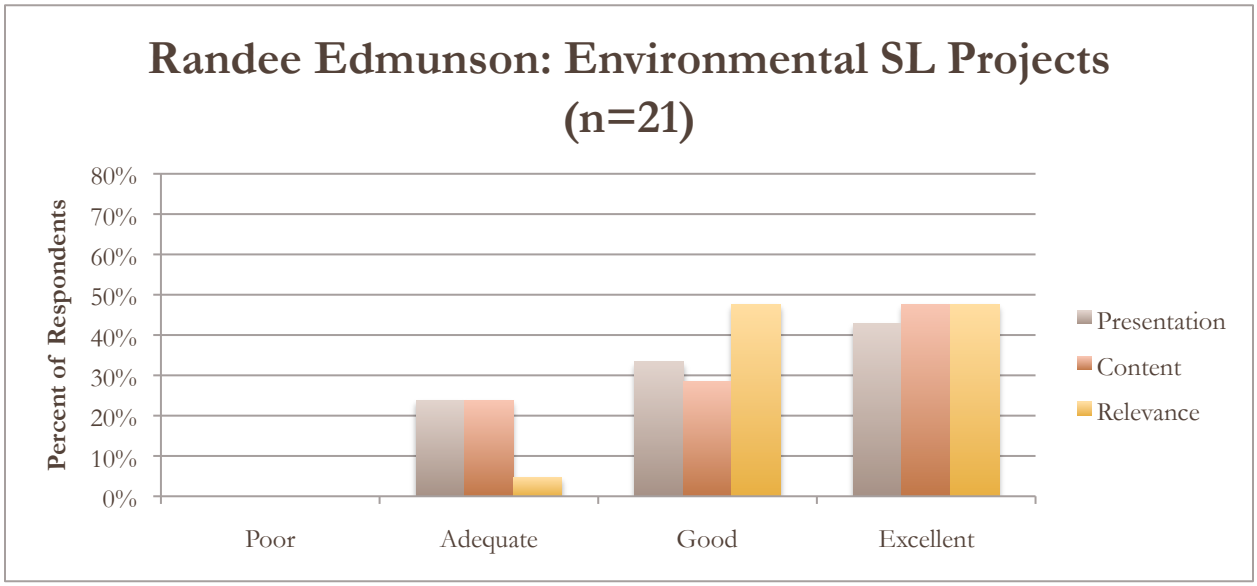

Figure 15: Randee Edmonson's Environmental Service Learning Projects Breakout Session

Randee Edmunson's session on environmental service learning projects was attended by 21 participants. She received excellent marks by a plurality of teachers, but about one fifth of teachers found the presentation and content only adequate (Figure 15).

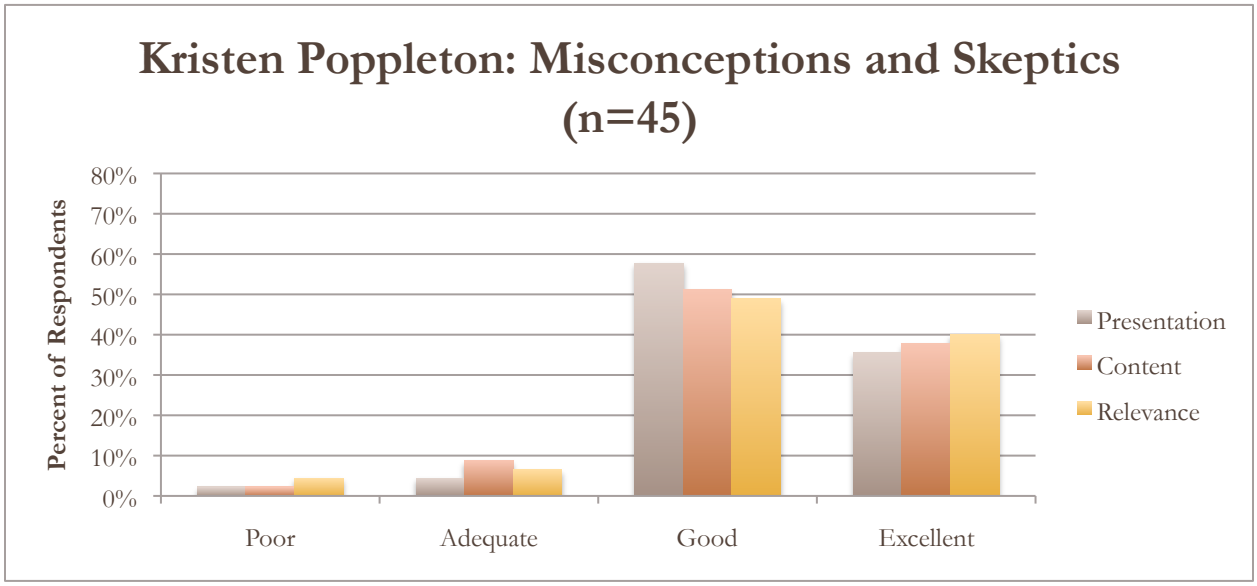

Figure 16: Kristen Poppleton's Misconceptions and Skeptics Breakout Session

Forty-five participants attended Kristen Poppleton's breakout session on dealing with climate change misconceptions and skeptics; the vast majority of participants thought the session was either good or excellent on all three measures (Figure 16).

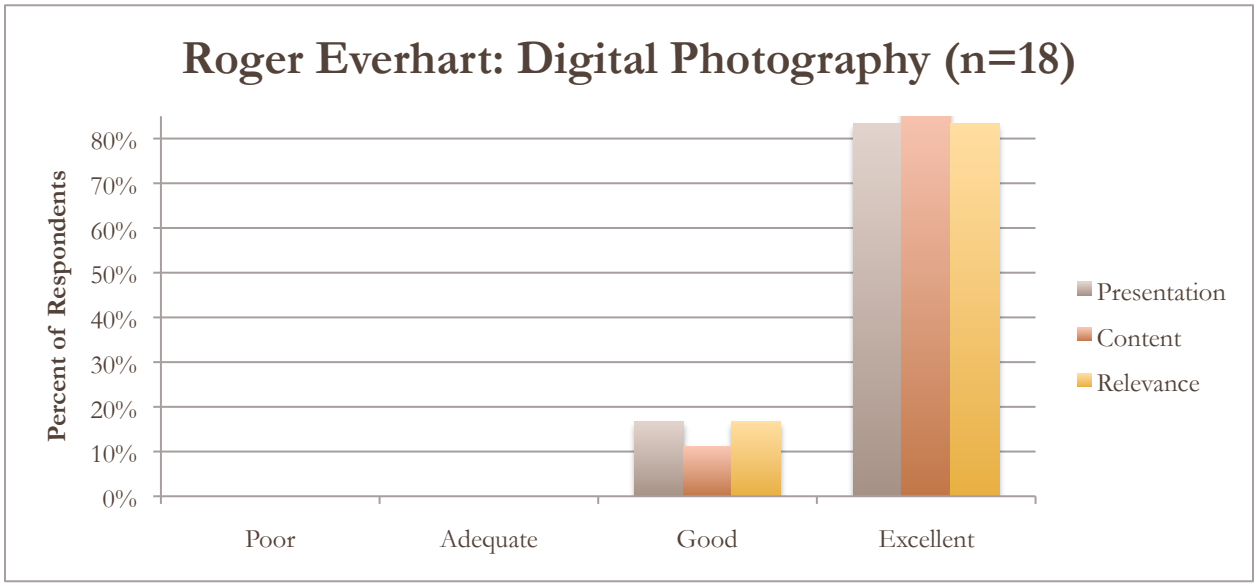

Figure 17: Roger Everhart's Sessions on Digital Photography: Bridge to Nature Breakout Session. (This breakout session was offered as one or two sessions.)

Roger Everhart presented "Digital Photography: Bridge to Nature" in a one or two session format. Eighteen participants attended the workshop and 83% of attendees attended both sessions. This session was sparsely attended, but very well received by those who did attend with the greatest number of excellent responses (Figure 17).

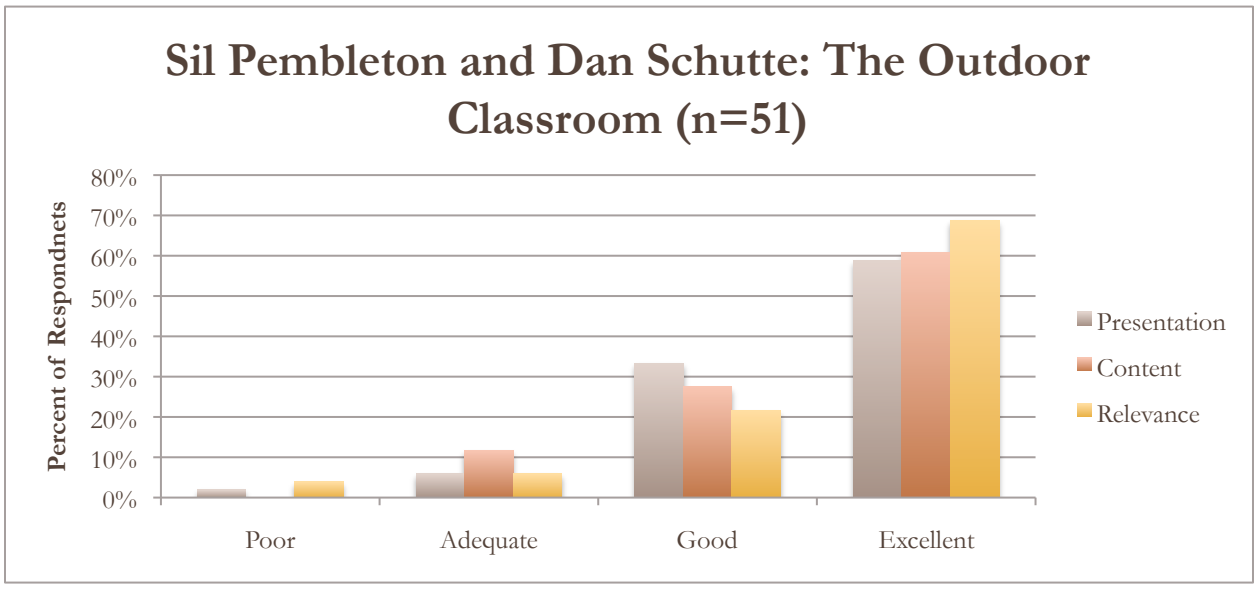

Figure 18: Sil Pembleton and Dan Schutte's The Outdoor Classroom: Team Teaching with Mother Nature Breakout Session. (This session was offered in a two-session version and a one-session version.

Sil Pemberton and Dan Schutte, from the Jeffers Foundation, presented on the outdoor classroom offering a one and two-session format. Pemberton and Schutte distributed materials from the Jeffers Foundation (notebook, pencil, hand lens, and measuring tape) to participants.

Most participants gave their workshop high marks (Figure 18), and most participants attended the abbreviated session (Table 8).

Table 8: Which Outdoor Classroom Sessions Participants Attended

	%
I attended Part 1 ONLY	8%
I attended Part 2 ONLY	4%
I attended both Parts 1&2	24%
I attended the abbreviated session	65%

Thursday Evening Session

In addition to the workshop in Apple Valley, Summer Institute participants had the opportunity to attend an off-site evening lecture Thursday evening called Sense of Place in Minnesota's Climate. Will Steger, J. Drake Hamilton, and Don Shelby were panelists at this open-to-the-public event in Saint Paul, MN; teachers attending the Summer Institute for graduate credit were required to attend this event. About half (55%) of the participants attended the panel discussion; most rated the event highly on all measures (Figure 19).

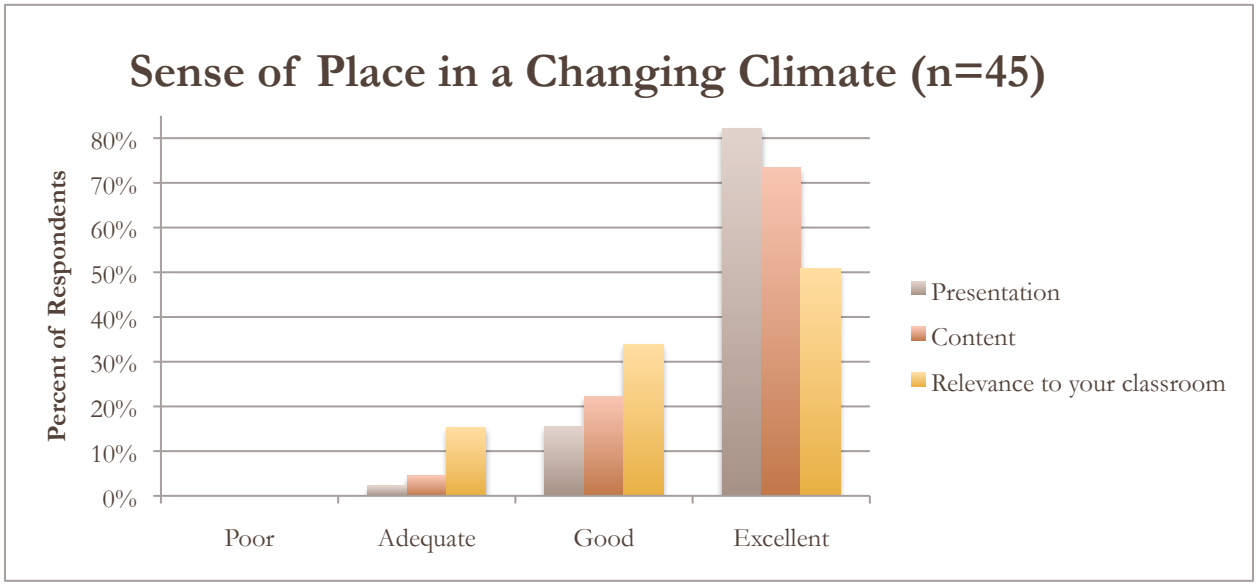

Figure 19: Sense of Place in Minnesota's Changing Climate Off-Site Evening Event

Recommendations

Incorporate more hands-on activities into the next Summer Institute. Perhaps ensuring each breakout session time slot has a hands-on activity would be advisable at the next institute or including a nature hike for all participants where Summer Institute leaders could model strategies for teaching in nature. A post-lunch walk could serve as an invigorating break for participants just as a nature walk is beneficial for students in the classroom.

There were several issues that could be addressed by making relatively small changes to the institute or supplemental information for the curriculum. Participants expressed interest in having information tailored for particular grade levels in both the institute and the curriculum. Several suggested ways that participants could be grouped by grade levels (and, perhaps, different biomes) to work together at the institute and to provide support for each other throughout the year. Although providing distinct curricula for each grade level is not feasible, it may be possible to address this concern and support teachers by providing a few guidelines about adapting the curriculum for different grades and ability levels. Teachers of younger children expressed concerns that they might need to prepare their students to deal with the curriculum issues, and teachers of older students were concerned about making the curriculum challenging. Teachers from all grade levels wanted help fitting the curriculum into their existing program, and guidelines about connecting the MCC curriculum to standards within and outside of science, and to other disciplines, would go a long way to alleviating these concerns.

Appendix: 2011 Summer Institute Evaluation

PCC Results

	Not Enough	Just Right	Too much
Mix of session types - Breakout	25%	75%	0%
Mix of session types - Keynote Presentations	5%	95%	0%
Mix of session types - Lecture	0%	75%	25%
Length of Institute (2 days)	5%	95%	0%
Number of breaks	15%	75%	10%
Length of breaks	25%	65%	10%
Time devoted to new curriculum	30%	70%	0%
Time devoted to science	50%	50%	0%

	Strongly disagree	Disagree	Agree	Strongly agree
On-line registration was smooth	5%	5%	25%	65%
The meeting facility was comfortable	5%	0	25%	70%
The location in Apple Valley was convenient	5%	15%	35%	45%
I valued the networking opportunity	5%	5%	35%	55%
Lunches were adequate	5%	0%	20%	75%
Snacks were adequate	5%	5%	30%	60%
Planning time was helpful	5%	15%	35%	45%
My students will find the curriculum engaging	5%	0%	55%	40%
It is clearly organized and easy to use	5%	5%	35%	55%
The curriculum will be useful in my teaching	5%	0%	40%	55%
It matches my curricular goals	5%	10%	55%	35%

The curriculum is comprehensive	5%	10%	50%	35%
I am confident in my ability to implement the curriculum	10%	0%	50%	40%
The curriculum meets a need for which I have inadequate resources	5%	15%	35%	45%
I received good ideas on how to implement the curriculum	5%	10%	45%	40%
I know how to get additional info and questions answered	0%	5%	55%	40%

	Not at all likely	Not too likely	Likely	Definitely
How likely are you to use the curriculum	0	0	25%	75%
How likely are you to use the on-line classroom	0	5%	45%	50%

100% think curriculum will be useful for teaching about climate change and environmental stewardship

	Poor	Adequate	Good	Excellent
Full Group Speakers				
Kristen Poppleton (n=12)				
Presentation	0	8%	33%	58%
Content	0	8%	33%	58%
Relevance	0	8%	58%	33%
Will Steger (n=20)				
Presentation* (n=19)	0	5%	16%	79%
Content	0	5%	20%	75%
Relevance	0	10%	20%	75%
Abby Fenton (n=12)				
Presentation	0	0	42%	58%
Content	0	0	33%	67%
Relevance	0	8%	33%	58%
Sense of Place in a Changing Climate (n=12)				
Presentation	0	0	0	100%
Content	0	0	0	100%

Relevance	0	17%	33%	50%
Karen Campbell (n=19)				
Presentation	0	5%	32%	68%
Content	0	5%	16%	84%
Relevance	0	16%	42%	47%

Breakout Sessions	Poor	Adequate	Good	Excellent
Thursday				
Intro to MN's Changing Climate (KP) (n=19)				
Presentation	0	5%	47%	47%
Content	0	11%	42%	47%
Relevance	0	11%	42%	47%
Climate Change and MN's Biomes (MS) (n=0)				
Clean Energy Projects (JH) (n=6)				
Presentation	1	1	1	3
Content	2	0	2	3
Relevance	2	0	1	3
The Mississippi River (n=19)				
Presentation	0	0	53%	47%
Content	0	0	42%	58%
Relevance	0	0	42%	58%
Journals (MW & JO) (n=6)				
Presentation	0	0	50%	50%
Content	0	0	67%	33%
Relevance	0	0	50%	50%

Friday Morning	Poor	Adequate	Good	Excellent
Online Classroom (AB & JP) (n=19)				

Presentation	0	16%	42%	42%
Content	0	0	47%	53%
Relevance	0	0	47%	53%
Env't Service Learning (RE) (n=18)				
Presentation	0	22%	28%	50%
Content	0	22%	22%	56%
Relevance	0	6%	39%	56%
Misconceptions and Skeptics (KP) (n=9)				
Presentation	0	0	67%	33%
Content	0	11	67%	22%
Relevance	0	0	22%	78%
Digital Photography (RE) (n=3)				
Presentation	0	0	0	2
Content	0	0	1	2
Relevance	0	0	1	2
The Outdoor Classroom Abbrev. Sess. (SP&DS) (8)				
Presentation	0	0	38%	63%
Content	0	0	13%	88%
Relevance	0	0	0	100%

1 parks climate challenge teacher attended part 1 of Roger Everhart's workshop and 2 teachers took parts one and two.

Minnesota's Changing Climate Curriculum Implementation Evaluation

Background

The Will Steger Foundation (WSF) launched its *Minnesota's Changing Climate Curriculum (MCCC)* in the 2011-2012 school year. The MCCC was funded by an Environment and Natural Resources Trust Fund (ENRTF) 2010 Work Program from the State of Minnesota. Comprised of six units, the MCCC was created to incorporate reflective writing and phenology into a learning unit on climate change and environmental stewardship for students in grades 3-12. MCCC includes yearly professional development workshops, a grade band specific curriculum manual, and an online classroom; this report details teachers' feedback on the curriculum manual and the online classroom in the first year of implementation (see Guberman & Phipps, 2011 for an overview of the 2011 professional development workshop.)

Method

We sent an invitation to complete an online survey to 91 email addresses representing the teachers who had registered for, and attended, the WSF 2011 Summer Institute (the professional development workshop). Of these 91 email addresses, five were invalid addresses, so the effective sample was 86 teachers. In the email we provided two links to online surveys — one for participants who had implemented all or part of the MCC Curriculum in their classroom in the past year, and one for participants who had not implemented any of the MCC Curriculum. We received 26 completed surveys from participants who had implemented the curriculum and 8 from participants who had not. Our return rate was 40%, high for an internet survey.

Results

PART I: LESSONS TAUGHT AND COMMENTS ABOUT THEM

We present results about teachers' use of the six lessons that comprise the curriculum in two ways. First, we present the results for each lesson looking across survey questions. This provides a snapshot of each lesson. Next, we present results for all six lessons by survey questions. This format facilitates comparisons between lessons. The distribution of teachers' responses for these questions is presented in Table 1.

Results By Lesson

Table 1:Teachers' Responses About the Six Curriculum Lessons

Survey Item	Lesson					
	1	2	3	4	5	6
Lesson Implementation (%)						
Taught as is or with minor modifications	73	58	50	38	35	23

Taught with major modifications	15	23	8	31	27	31
Did not teach	12	19	42	31	38	46
Student Enjoyment (%)						
Enjoyed a lot	25	19	33	17	20	36
Enjoyed	63	71	67	67	73	64
Didn't enjoy it much	13	10	0	17	7	0
Disliked	0	0	0	0	0	0
Number of Concepts Learned (%)						
Many	33	33	40	33	20	43
One or Two	58	67	60	67	73	57
None	2	0	0	0	7	0
Number of Skills Learned (%)						
Many	17	33	36	11	19	43
One or Two	79	48	64	89	69	57
None	4	19	0	0	13	0
Likelihood of Teaching the Lesson Again (%)						
Definitely will	58	62	73	47	29	67
Probably will	38	29	20	42	59	27
Probably not	0	5	0	5	6	0
Definitely not	4	5	0	5	6	7

Lesson 1: What Is Journaling For?

Of the 26 respondents, almost all (n=24; 88%) reported that they had taught lesson 1, with most indicating that they taught it "as is or with minor modifications." Of those who taught the lesson, almost two thirds of the teachers responded that their students had "enjoyed" it, and one fourth indicated that their students had "enjoyed it a lot." Only a few teachers indicated that their students "didn't enjoy the lesson much" and no teachers reported that students "disliked" the lesson. Almost all teachers reported that their students had learned at least one or two important concepts and skills, with several teachers indicating that students had learned "many" important concepts and skills. (Teachers were twice as likely to report that students learned "many" important concepts compared to "many" important skills.) All but one teacher indicated that they would "definitely" or "probably" teach Lesson 1 again.

Lesson 2: What Defines Minnesota's Biomes

Of the 26 respondents, 21 (81%) reported having taught lesson 2, with a majority indicating that they had taught the lesson "as is or with minor modifications." Almost three fourths of the teachers reported that their students "enjoyed" the lesson, and one fifth indicated that their students had "enjoyed it a lot." Only a few teachers indicated that their students "didn't enjoy it much" and no teachers reported that students "disliked" the lesson. All teachers reported that their students learned at least one or two important concepts, with one third reporting that their

students had learned "many" important concepts. Almost all teachers also reported that their students had learned important skills from Lesson 2: Almost half reported that students learned "one or two" important skills, and one third indicated that students learned "many" important skills. In contrast, a few teachers reported that their students had learned no important skills from the lesson. Almost two thirds of the teachers indicated that they would "definitely" teach Lesson 2 again, and another one-third would "probably" teach it again. Only one teacher reported "probably" not teaching the lesson again, and one reported "definitely" not teaching it again.

Lesson 3: Defining Minnesota's Climate

Of the 26 respondents, 15 (58%) reported having taught lesson 3, and almost all of them had taught it "as is or with minor modifications." All reported that their students either "enjoyed it" (two thirds of respondents) or "enjoyed it a lot" (one third). All reported that their students had learned at least "one or two" important concepts and skills, with slightly more than one third indicating that students had learned "many" important concepts and skills. Almost three fourths of the teachers indicated that they would definitely" teach Lesson 3 again, and all but one of the other teachers indicated that they would "probably" teach it again.

Lesson 4: What Is Climate Change and What Does It Mean for Minnesota?

Of the 26 respondents, 18 (69%) reported having taught Lesson 4, with about half of them indicating that they had taught the lesson "as is" or with minor modifications" and half indicating they had taught it with "major modifications." Two thirds of the teachers responded that their students "enjoyed" the lesson with the remainder of responses evenly split between "enjoyed it a lot" and "didn't enjoy it much." All teachers responded that their students learned at least "one or two" concepts and skills, with the rest of the teachers indicating that students had learned "many" concepts and skills. (Three times as many teachers chose "many" for concepts compared to "skills.") Almost all of the teachers reported that they would likely teach Lesson 4 again, with almost half indicating they would "definitely" teach the lesson again and almost half indicating they would "probably" do so.

Lesson 5: What Does the Data Show?

Of the 26 respondents, 16 (62%) indicated that they had taught Lesson 5, with a little more than half of them teaching it "as is or with minor modifications" and a little less than half teaching it with "major modifications." Of those who taught the lesson, half reported that their students "enjoyed it" with the other half evenly split between "enjoyed it a lot" and "didn't enjoy it much." None reported that their students "disliked" the lesson. A majority of teachers also reported that their students learned "one or two" important concepts and skills; several teachers reported that students learned "many" important concepts and skills, and a few teachers reported that students learned no important concepts and skills. A majority of teachers reported that they would "probably" teach Lesson 5 again, and one third said they would "definitely" do so. One teacher "probably" will not and one teacher "definitely" will not teach the lesson again.

Lesson 6: What Can I Do?

Of the 26 respondents, 14 (54%) indicated that they had taught Lesson 6, and a majority of them had made "major modifications" when doing so. All teachers reported that students had wither "enjoyed" the lesson (two thirds of teachers) or "enjoyed it a lot" (one third). All teachers also reported that their students had learned important concepts and skills from the lesson, with more than two fifths of them indicating that students had learned "many" important concepts and skills. Two thirds of the teachers who taught this lesson would "definitely" teach it again, and almost all of the other teachers would "probably" do so. One teacher reported that he or she will not teach the Lesson 6 again.

Overall Curriculum

Overall, these results indicate that teachers had good things to say about their experiences teaching each of the MCC lessons. Most were able to use the lessons in their classes as is or with only minor modifications. They reported that their students overwhelmingly enjoyed the lessons and learned several important concepts and skills from them. Almost all teachers reported that they will teach the lesson again. In light of these very positive results, it is worth noting that there is room for improvement. For instance, although a majority of teachers reported that their students "enjoyed" each of the lessons and almost none indicated that students "disliked" any of the lessons, relatively few teachers indicated that their students enjoyed the lessons "a lot." Similarly, whereas most teachers indicated that students learned "one or two" concepts and skills from each of the lessons, relatively few indicated that students learned "many" concepts or skills. It is an ambitious, but not unreasonable goal, to move teachers from providing very good to excellent responses. The results reported here, including the responses to open-ended questions, provide information to facilitate that transition.[1]

B. Results By Question Type

Lesson Implementation

We asked teachers which of the six lessons they had taught. As shown in Table 2, respondents were most likely to teach the first lesson, and the number of respondents teaching each of the subsequent lessons steadily decreased. This does not indicate that all teachers started with the first lesson and progressed lesson-by-lesson until they completed using the curriculum. Rather, some teachers reported skipping lessons or selecting just one or two lessons. For instance, more teachers taught Lesson 4 than taught Lessons 3, 5, or 6.

Table 2:Percent of All Respondents Teaching Each Lesson (N = 26)

Lesson	I taught this lesson as is or with minor modifications	I taught with major modifications	I did not teach this lesson
Lesson 1: What Is Journaling For?	73	15	12
Lesson 2: What Defines Minnesota's Biomes	58	23	19
Lesson 3: Defining Minnesota's Climate	50	8	42
Lesson 4: What Is Climate Change and What Does It Mean for Minnesota?	38	31	31
Lesson 5: What Does the Data Show?	35	27	38
Lesson 6: What Can I Do?	23	31	46

[1] Of course, each teachers' presentation of the lessons has an influence on students' enjoyment and learning, and presentations are likely to improve as teachers become more familiar with the lessons and ways to adapt them to meet curriculum goals for particular groups of students.

For each lesson, we also asked teachers who taught the lesson to indicate whether they had done so "as is or with minor modifications" or "with major modifications." As shown in Table 3, how much modification teachers did varied by lesson. Most of the teachers reported that when they taught the lower numbered-lessons — Lessons 1, 2, and 3 — they taught them as is or with only minor modifications. In contrast, teachers were more likely to report that they made major modifications to the lessons later in the unit. Close to half of the teachers indicated that they made major modifications to Lessons 4 and 5 was modified, and a majority reported making major modifications to Lesson 6 (WSF had already made major modifications to Lesson 5 in response to personal feedback).

Table 3: Of the Teachers Who Taught Each Lesson, Percent Who Taught It "As Is or With Minor Modification" and "With Major Modifications"

Lesson	No. Who Taught The Lesson	Teacher Responses (%)	
		Taught as is or with minor modifications	Taught with major modifications
Lesson 1: What Is Journaling For?	23	83	17
Lesson 2: What Defines Minnesota's Biomes	21	71	29
Lesson 3: Defining Minnesota's Climate	15	87	13
Lesson 4: What Is Climate Change and What Does It Mean for Minnesota?	18	56	44
Lesson 5: What Does the Data Show?	16	56	44
Lesson 6: What Can I Do?	14	43	57

Student Enjoyment

We asked teachers to rate how much their students enjoyed each lesson. As shown in Table 4, teachers rated student enjoyment high for each lesson, with three fourths of teachers indicating that their students "enjoyed" it or "enjoyed it a lot." Lessons 3 and 6 received especially high ratings, with one third or more of the teachers responding that their students liked those lessons "a lot" and no teachers indicating that their students didn't enjoy the lessons. Lesson 5 was rated the lowest of the six lessons, although 75% of the teachers reported that students "enjoyed it" or "enjoyed it a lot."

Table 4: Teacher Ratings of How Much Students Enjoyed or Disliked Each Lesson

Lesson	*n*	Teacher Ratings (%)			
		Enjoyed it a lot	Enjoyed it	Didn't enjoy it much	Disliked it
Lesson 1: What Is Journaling For?	24	25	63	13	0
Lesson 2: What Defines Minnesota's Biomes	21	19	71	10	0
Lesson 3: Defining Minnesota's Climate	15	33	67	0	0
Lesson 4: What Is Climate Change and What Does It Mean for Minnesota?	18	17	67	17	0
Lesson 5: What Does the Data Show?	16	25	50	25	0
Lesson 6: What Can I Do?	14	36	64	0	0

Learning Important Concepts and Skills

For each less that they taught, we asked teachers if students learned important concepts and important skills and, if so, we asked if students learned "one or two" or "many" important concepts and skills. As shown in Table 5, almost all teachers responded that students learned "one or two" important concepts and skills in each lesson, and many teachers indicated that students learned "many" important concepts and skills. More teachers rated Lessons 3 and 6 as teaching "many" concepts compared to other lessons, and Lesson 5 received relatively few "many" ratings for concepts. Teachers were less likely to indicate that students learned "many" skills than "many" concepts, although overall learning (one or more concepts or skills) was similar.

Table 5: Teachers Ratings of the Degree to Which Students Learned Important Concepts and Skills in Each Lesson

Lesson	*n*	Teacher Ratings (%)					
		Concepts			Skills		
		Many	One or two	None	Many	One or two	None
Lesson 1: What Is Journaling For?	24	33	58	2	17	79	4
Lesson 2: What Defines Minnesota's Biomes	21	33	67	0	33	48	19
Lesson 3: Defining Minnesota's Climate	15/14	40	60	0	36	64	0
Lesson 4: What Is Climate Change and What Does It Mean for Minnesota?	18	33	67	0	11	89	0

Lesson 5: What Does the Data Show?	15/16	20	73	7	19	69	13
Lesson 6: What Can I Do?	14	43	57	0	43	57	0

Likelihood That Teachers Will Teach Each Lesson Again

For each lesson that teachers taught, we asked them to rate how likely they were to teach it again. As shown in Table 6, almost all teachers (88-96%) reported that they would "definitely" or "probably" teach each lesson again. Lesson 5, and to a lesser extent Lesson 4, stand out as receiving relatively low ratings of "definite." Nonetheless, very few teachers (4-12%) reported that they were unlikely to teach any of the lessons again.

Table 6: Teacher Ratings of How Likely or Unlikely They Are to Teach Each Lesson Again in the Future

Lesson	*n*	Teacher Ratings (%)			
		Definitely will	Probably will	Probably will not	Will not
Lesson 1: What Is Journaling For?	24	58	38	0	4
Lesson 2: What Defines Minnesota's Biomes	21	62	29	5	5
Lesson 3: Defining Minnesota's Climate	15	73	20	0	7
Lesson 4: What Is Climate Change and What Does It Mean for Minnesota?	19	47	42	5	5
Lesson 5: What Does the Data Show?	17	29	59	6	6
Lesson 6: What Can I Do?	15	67	27	0	7

Strengths and Weaknesses of the Curriculum

We asked teachers to tell us what they thought were the strengths and weaknesses of the lessons they had taught. These were open-ended questions and teachers could write as much as they liked in response. Several themes emerged from the results. We present the primary themes and excerpts to illustrate them here. The complete list of response is provided in the Appendix.

Strengths of the curriculum.

Based on teachers' responses, we identified five primary strengths of the curriculum:

***Strength 1**: The local focus on Minnesota and connections to students' experiences and the world*

> *The curriculum focused on Minnesota rather than more global concerns. I felt that it was very easy to connect climate change to the students because of this relationship.*

I especially liked how the lessons used Minnesota data. I felt that this made a much bigger impact on my students - they could see that it is happening here in Minnesota

I loved that they were able to make some type of connections throughout all the lessons.

***Strength 2**: The active, hands-on, inquiry-based nature of the curriculum*

There [were] plenty of hands-on activities to keep [students'] interest. It was based on good science.

They loved taking action and making posters.

***Strength 3**: The clarity of the lessons and teacher guide, including specific content and materials*

Each lesson was easy to follow and clear.

Did not have to do a lot of research to teach this curriculum.

The online features are engaging for students.

The graphs and data that were available. I also thought the colored maps were wonderful.

***Strength 4**: The ability to adapt the lessons to fit their students and curriculum*

The curriculum gives me a framework to develop my lesson plans from. The lesson plans are tied to the state standards!

Basically, I took the overall concepts and adapted them by using additional videos, texts and websites that were a bit more relevant to my high school students.

My students keep science journals anyway, so nature journals were a good supplement to those. Lesson 6 fits right into my Earth Day curriculum nicely.

***Strength 5**: There was a lot of support for implementing the curriculum*

I also appreciated the fact that I could email the staff and could get a response. That support is something that is not often found.

Weaknesses of the curriculum.

Unlike when they were asked for the strengths of the curriculum, when asked about its weaknesses few common themes emerged. Mostly, teachers would like the curriculum to address their particular concerns, such as activities for older students, greater focus on social justice, and adaptations for students with disabilities. Others suggested minor improvements to the curriculum. (See the full set of responses in the Appendix.) Based on teachers' responses, we identified two concerns that were shared by several of the respondents. Although they present teachers with challenges to implement the curriculum, they are not weaknesses per se:

***Challenge 1:** Greater differentiation of the curriculum*

I understand that the curriculum is 3-8 grades, which is a very, very large developmental span. Some of the lessons for the 8th graders (biome cards) needed to be

modified. So, specifically, I'd like to see a curriculum that is more developmentally appropriate. Perhaps something along the lines of 3-5 and 6-8 (or something along these lines).

The biggest weakness for me was that most of the curriculum does not meet grade 6 science standards, so I was unable to use most of it.

Challenge 2: *Lack of time and other resources*

Because we are in Frogtown and a low-income school getting to nature was difficult. There are very few green spaces here by school. We went to one place by bus, but then just stayed on our school grounds which did not excite the students for the journaling part. I tried my best, but without a better immersion in nature, the journaling part does not go as well as it should.

Computers are VERY limited in my school so my students never had a chance to post on the website.

I was not able to continue teaching the curriculum because time consuming and my principal directed me not to spend time teaching this curriculum.

Part II: The Curriculum As A Whole And Teachers' Preparation To Implement It

A set of survey questions asked teachers to provide information about the curriculum as a whole, rather than about particular lessons. We asked teachers to rate their confidence in their ability to implement the lesson and how helpful the curriculum was for teaching about climate change and environmental stewardship.

Teachers' Confidence for Teaching the Curriculum

As shown in Table 7, a majority of teachers reported feeling "confident" about their ability to teach the curriculum, and about one fifth reported feeling "very confident." A little more than one fifth of the teachers responded that they felt "a little unsure," and no teachers reported feeling "totally unsure."

Table 7: Teachers' Ratings of How Confident or Unsure They Were In Their Ability to Implement the Curriculum (N = 26)

Teacher Ratings (%)			
Very confident	Confident	A little unsure	Totally unsure
19	58	23	0

Teaching About Climate Change and Environmental Stewardship

Almost all teachers indicated that the curriculum was "helpful" (58-67%) or "very helpful" (29-33%) for teaching about climate change and environmental stewardship (see Table 8). Ratings were a bit higher for environmental stewardship than for climate change.

Table 8: Teachers' Ratings of How Helpful or Unhelpful the Curriculum Was for Teaching About Climate Change and Environmental Stewardship (N = 24)

Topic	Teacher Ratings (%)			
	Very helpful	Helpful	A bit helpful	Very unhelpful
Climate Change	29	67	0	4
Environmental stewardship	33	58	8	0

Reflecting on the 2011 Summer Institute

We were also interested in gathering information that would be helpful for preparing the next Summer Institute. Although we had gathered evaluation data at the end of the 2011 Summer Institute — which participants indicated was very helpful — we thought that after they had taught the lessons they may be able to provide additional information, such as things that should be added to the institute to prevent problems that arose in their implementation. Therefore, we asked teachers to rate how well the institute prepared them to teach the curriculum, and provided an opportunity for them suggest how the institute could have better prepared them.

As shown in Table 9, although almost three fourths of the teachers indicated that the institute was "helpful" or "very helpful," one fifth reported that the institute was "very unhelpful." In light of the very positive results from the Summer Institute and about the curriculum implementation (above), this result warrants concern and is addressed by respondents open-ended comments.[2]

Table 9: Teachers' Ratings of How Helpful the 2011 Summer Institute Was in Preparing Participants to Teach the Curriculum (N = 25)

Teacher Ratings (%)			
Very helpful	Helpful	A bit helpful	Very unhelpful
44	28	8	20

When asked how the 2011 Summer Institute could have better prepared them for implementing the curriculum, several teachers replied that they had no suggestions:

> *I can't think of any [suggestions]. It was a great experience.*
>
> *No real suggestions. It met my needs.*
>
> *I thought the Summer Institute was very helpful. It gave me ideas on what would work for my students, and many things that I did not think of.*

Several teachers asked for more hands-on instruction in how to implement the curriculum and to adapt for their instructional needs:

[2] We are aware that, in response to evaluation results and informal feedback, the 2012 Summer Institute has implemented several changes.

Maybe time where someone could lead us into implementing parts or all of the curriculum into our classes. We did get time ourselves, but it was hard for me to make the connections of where it could fit into my existing curriculum as well as the standards.

How to bridge the gap between different grades.

I know it was the first year, but having teachers that have taught it leading some small group classes on implementation. Also, showing instructors how and when to implement the biomes kit even above and beyond the MCC curriculum.

The complete set of teachers' responses is in the Appendix.

PART III: QUESTIONS ABOUT THE ONLINE CLASSROOM (*N* = 26)

As part of the evaluation, we included survey questions about whether and how teachers used the Online Classroom. Teachers who used the Online Classroom were asked to rate how helpful various aspects of it were and how it could be improved.

How Teachers Used the On Line Classroom

Of the 26 survey respondents, 21 (81%) replied that they had used the Online Classroom. As shown in Table 10, all teachers who used the Online Classroom used it to help prepare their lessons. Most of these teachers also showed or asked students to look at the videos available in the Online Classroom and two thirds of them made use of the still images with students. Relatively fewer teachers had students view observations that other students had posted or asked their students to post their own observation.

Table 10: How Teachers Used the Online Classroom (N = 21)*

Ways of Using the Online Classroom	%
I used it myself when preparing lessons	100
I showed or asked my students to look at some of the videos	81
I showed or asked my students to look at some of the images	66
My students viewed observations that others had posted	33
My students shared their observations	24

*Five additional respondents reported not using any aspect of the online classroom.

We also asked teachers if they had used the Online Classroom in a way we had not anticipated. Two teachers described their use:

I showed some of the videos, images, and virtual tour of biomes to the whole class.

To give the students more resources in identifying the different biomes and what kinds of plants and animals were unique or common in them.

Two teachers responded that they planned to use it more the next time they taught the curriculum:

I will use it more this coming school year!

I hope to use the on line classroom more this coming year.

Teachers' Ratings of Features of the Online Classroom

Table 11 contains teachers' ratings of how helpful teachers found various features of the Online Classroom. Teachers who used a feature tended to find it "very helpful." Teachers indicated that the image gallery and handouts were especially helpful. Information about climate change basics and the ability for students to see what other students had posted in the Online Classroom received the lowest ratings, although almost all teachers rated them helpful.

Table 11: Teachers' Ratings of How Helpful Features of the Online Classroom Were

	n	Teacher Ratings (%)		
		Very helpful	Somewhat helpful	Unhelpful
The curriculum	20	75	25	0
The video gallery	19	74	21	5
The image gallery	18	83	17	0
Information about climate change basics	18	67	22	11
The handouts	17	88	12	0
The students could see what the other students had posted there	12	50	50	0
The students could post their observations	9	78	22	0

Improving the Online Classroom

Several of the teachers who had used the Online Classroom offered suggestions about how to improve it.

Some teachers responded that there was no need for any improvements:

I thought that it was great. No changes needed.

Teachers' most common concern with the Online Classroom concerned their lack of access to computers and related issues:

One of our biggest issues was access to the Internet. The kids were testing online so much this year that when I wanted to use computers they were in use for testing. We hope to get more iPads this next year.

It was a little slow to load at times.

It was hard to search for some observations.

Other teachers suggested that aspects of the Online Classroom needed improvement:

The videos are somewhat long and dry. They are not really usable in the classroom due to the lack of attention getting material in them. In order to inspire kids to start nature journals there needs to be a reason for them to do so that is age appropriate and somewhat attention grabbing - make it relate to kids, not adults. Short and sweet videos would be great. The image gallery is useful - kids enjoy it.

I chose not to use the class time for students to post observations. My understanding of the potential value of that aspect of the program may be incomplete. I did not expect that my students would build knowledge and skills that way. And students showed no interest when I offered the activity as an option.

The complete set of teachers' responses is in the Appendix.

PART IV: QUESTIONS ABOUT SUPPORT FOR IMPLEMENTING THE CURRICULUM

As noted above, teachers indicated that one of the strengths of the curriculum is the support provided for implementing it, including the ability to call WSF staff members when needed. When asked if they had sought support for implementing the MCC curriculum, 15% (4) of the teachers said that they had. (Eighteen teachers replied that they did not seek support and four did not respond.)

Five teachers described the support they received. Several mentioned that they sought help from people to write a mini-grant application, worked with the National Park Service, and contacted WSF staff for assistance. The full set of responses is in the Appendix.

PART V: ADDITIONAL COMMENTS

Near the end of the survey, we provided the opportunity for respondents to include any other comments they wanted to share about their experience implementing the curriculum.

Most of the respondents used the opportunity to praise the curriculum and its developers:

The MN CC curriculum is a great way to start off the year and I plan to do so again this coming school year.

In implementing this curriculum into my classroom, I could tell that a lot of time, effort and energy went into developing the curriculum. Thank you for all of your hard work. I was so happy to have the curriculum to teach.

Thank you for a wonderful curriculum. My students learned so much and are tuned in to the climate change issue, ready to make a difference.

That it was regarding Minnesota was perfect for my high school students who care more about things that seem pertinent to their lives.

The full set of responses is in the Appendix.

PART VI: PARTICIPANTS WHO DID NOT IMPLEMENT THE CURRICULUM

Eight teachers responded to the survey for teachers who did not implement the MCC Curriculum in the 2011-2012 academic year. All indicated that they had planned to. Because there were fewer than 10 participants, all responses will be included in the body of the text.

Reasons Teachers Did Not Implement the Curriculum

Teachers provided a variety of idiosyncratic explanations for why they had not implemented the curriculum:

> *Another teacher borrowed the binder; he used it and never returned it.*
>
> *This year brought me the challenges of a new school, grade, team, and curriculum. I had every intention of using the curriculum but could barely keep up with the basic standards and expectations of my grade level. I have used portions in my grad school planning and intend on using aspects of the curriculum next year. I did use examples of Will's Journal to introduce my students to their science journals.*
>
> *After getting home and really studying the material, I believe the curriculum is just too advanced for 3 - 5 graders. Since the size and number of the classes increased for me this year, I didn't have time to really break the coursework down. I incorporated what I could from Lesson 2 and Lesson 3 into the sessions I already do with the students.*
>
> *Due to the school's state test scores, we changed the schedule to give the students more practice before the tests. Because of this, our schedules changed and I ran out of time to teach with the curriculum.*
>
> *Too busy.*
>
> *In 2011-2012, I was not teaching the course (Environmental Science) where using the MCC curriculum would have been a natural fit. I do plan to implement the curriculum the next time I teach Environmental Science, hopefully in 2012-2013 (during the second semester).*
>
> *Didn't have a full time teaching position this last school year. I'm still looking!!*
>
> *I did not teach environmental science last year as I had planned.*

What Can WSF Do To Help Teachers Implement the Curriculum?

We asked the teachers who had not implemented the curriculum if there was anything the Will Steger Foundation could do to help them implement it in the future. With one exception — to provide another copy of the curriculum — teachers responded that the issues that kept them from implementing it in 2011-2012 were not solvable by the Foundation:

> *I will need another copy of curriculum or if you put it on your website and gave us an access code or something.*

There is nothing that you could have done to help out this year. It was just part of the challenges I faced as a "new teacher" even though I have been teaching for about 10 years.

There is nothing the foundation could do. Hopefully there won't be any surprise schedule changes next year.

Find me a teaching position?

Nothing. I plan to implement some of the lessons I planned this year as I am teaching environmental science this year.

Finally, we provided teachers who did not implement the curriculum with an opportunity to tell us anything else they wanted to share about the curriculum. Three teachers responded:

I meant to have my students log while at service week. I will still try to get some of them to do it.

I love it and look forward to implementing it.

I like it and I'm anxious to implement it!

Conclusions and Recommendations

The Will Steger Foundation's Minnesota's Changing Climate Curriculum and Online Classroom were successful in its first year of implementation. Participants reported using all or some of the curricular materials in their classroom, students having positive experiences, and finding the support system excellent. Teachers expressed their views on the strengths and challenges of the MCCC and the Online Classroom. Survey results indicated five strengths and two challenges in implementing the MCCC:

Strength 1: The local focus on Minnesota and connections to students' experiences and the world

Strength 2: The active, hands-on, inquiry-based nature of the curriculum

Strength 3: The clarity of the lessons and teacher guide, including specific content and materials

Strength 4: The ability to adapt the lessons to fit their students and curriculum

Strength 5: There was a lot of support for implementing the curriculum

Challenge 1: Greater differentiation of the curriculum

Challenge 2: Lack of time and other resources

These strengths show that teachers' perception of the strengths of MCCC align with the WSF's goals for the project – strengths 1, 2, and 5 directly tie to the project's goals. The first challenge has been recognized by the WSF and they now recommend the MCCC for a narrower range of grade levels; the second challenge is a perennial issue for teachers. Similarly, the Online

Classroom was well received by teachers and their students. Teachers used the Online Classroom in a variety of ways and most felt nothing should change; the major complaint was about lack of computer access (beyond the control of the WSF).

In the evaluation of the 2011 Summer Institute, Guberman and Phipps (2011) asked teachers which lessons they planned on implementing. We compared these values to the pattern of which lessons teachers reported actually implementing in Table 12.

Table 12: Teachers' Intent to Teach MCCC Compared to Teachers' Actual Implementation*

Lesson	% intended	% actual
Lesson 1: What is journaling for?	79	88
Lesson 2: What defines Minnesota's biomes?	76	81
Lesson 3: What defines Minnesota's climate?	77	58
Lesson 4: What is climate change and what does it mean for Minnesota?	80	69
Lesson 5: What does the data show?	77	62
Lesson 6: What can I do?	91	54

*Implementation includes teachers who reported teaching the lesson as is or with minor modification, and those who reported teaching the lesson with major modifications.

More teachers implemented the first two lessons than they intended and fewer teachers implemented the remaining lessons; the biggest disparity was for Lesson 6. Lesson 6 is arguably the most involved of the lessons to plan for and to implement, it was also the lesson the staff at the WSF 2011 Summer Institute emphasized heavily in the 2011 Summer Institute. We believe these factors lead to this great discrepancy between intention and action with this lesson. To combat this challenge, the WSF asked teachers who had completed Lesson 6 share their experiences at the 2012 Summer Institute.

Overall, the WSF should keep doing what it's doing: maintaining its Online Classroom, making its Minnesota's Changing Climate Curriculum, holding Summer Institutes, and supporting its teachers with personalized support. The Foundation's close contact and good relationship with its teachers allows it to understand on and improve teachers' and students' experience with the MCCC. As grant funding draws to a close, the WSF should look for ways to sustain close contact with teachers and codify some of the lessons learned. For example, the WSF could take common areas of support and create webinars and other more permanent scaffolds for teachers. Although these resources would not wholly replace personalized just in time supports, they could provide support for a larger number of teachers.

Interview with Returning Teachers to Will Steger Foundation's 2012 Summer Institute

By Molly Phipps and Steven Guberman

The Will Steger Foundation (WSF) was interested in understanding more about the motivations of the 17 teachers who participated in the 2011 Summer Institute (SI) and chose to attend the 2012 SI. The 2012 Summer Institute (SI) was very similar to the SI from 2011 (same content, same curriculum), and the WSF staff wanted to get insight on why these 17 teachers chose to attend both SIs. Evaluators Steven Guberman and Molly Phipps interviewed a sample of these participants to better understand their reasons for attending the 2012 SI. Six participants were interviewed; five who implemented the curriculum in the 2011 school year and one who did not.

Methods

Guberman and Phipps interviewed participants during the lunch hour and planning period of the second day of the 2012 SI. Interviews were audio recorded and evaluators took notes during the conversations. None of the participants were part of the Parks Climate Challenge group since that group had a session planned during the planning period. The remaining 11 repeat attendees were part of the Parks Climate Challenge who were required to attend the 2012 SI.

We developed two separate interview protocols one for participants who had taught some of the curriculum and one for those who had not. All participants were asked their reason for attending the 2012 SI. For those who had taught any part of the (Minnesota's Changing Climate)MCC curriculum, we asked which lessons they taught, what grade levels, about any modifications they made, if they would keep the changes next time they taught the lessons, and any recommendations they had for WSF to change the curriculum. For those who did not teach any part of the curriculum, we asked why not, what barriers they faced, if they would teach it during the next school year, and what else the WSF could do to help them teach about environmental stewardship and climate change.

Results

Due to the small sample size, overall results are summarized and then a brief description of each participant follows.

Implementers

Participants who implemented all or part of the MCC returned for a number of reasons including to learn more about MCC, to network and collaborate with like-minded teachers, to learn more about how to deal with skeptics, to get ideas, and to attend breakout sessions. One teacher noted that she always attended the WSF SI, so she did this year. One participant reported feeling overwhelmed after the 2011 SI, so she came back to feel more comfortable with the MCC. Another teacher was looking for ideas and advice on starting a school garden and felt the teachers who attend WSF SIs would be a good resource. These teachers see the SI as a place to collaborate with and learn from like-minded colleagues, to renew old connections and to forge new ones. Participants from schools or areas where there are many climate change deniers see it as a 'support group' for those who recognize the importance of climate change.

Participants' ability to teach the MCC lessons varied from taking bits and pieces as possible to teaching the majority of the lessons. Two teachers taught Lessons One through Four, one teacher taught Lessons One and Two, and two teachers incorporated bits and pieces of the MCC Curriculum into existing lessons as they could. Teachers who could only use pieces of the lessons cited external pressures (i.e., state testing priorities), and courses taught (i.e., economics) as barriers to implementing the MCC. Both teachers planned on implementing larger parts of the MCC next year. The participant who taught Lessons One and Two worked at a nature center where students came for field trips. She used the tree identification, biome game, and weather observations. One of the teachers who taught the first four lessons teaches 10th through 12th grade biology and environmental sciences and did not make modifications to the curriculum. The other teacher who taught the first four lessons teaches 7-12th grade special education; most of her minor modifications were to make the lessons developmentally appropriate for her students.

At the nature center, the participant developed a successful one-hour lesson on phenology, climate, and weather based on materials from the MCC Curriculum. She felt this was a successful modification and will continue to use it. She hopes to add more lessons to her repertoire in the coming year. She suggested adding modifications to the curriculum focused on nature centers.

The 10th-12th grade biology and environmental science teacher appreciated the review of Lesson Five (What does the data show?) at the SI because she felt that lesson was a bit overwhelming the first time she learned about it. Some barriers she sees to fully implementing the MCC are state standards and testing. She sees science as more important than test preparation, but is forced to do test preparation.

The special education teacher also appreciated the review of Lesson Five (What does the data show?). She feels that her students would need much more direction on the group project than they were given.

The 7th and 8th grade teacher was planning to teach the lesson around state testing time, but was told to focus more on math and reading and lost six weeks of science teaching to test preparation. She plans to teach the MCC earlier in the school year to avoid conflicts with test preparation. She teaches mainly ESL students and was successful using a modified version of the journaling lesson.

Non-implementer

The one participant who did not implement any part of the curriculum attended the SI because he feels that climate change is the biggest concern right now and wants to be able to share this kind of information with his students. He sees climate change as a serious problem that can be addressed if people were better educated. He also expressed his admiration of Will Steger and wants to support the work of the WSF. He did not teach the curriculum because he teaches ESL to adults, but uses articles about climate change in his classroom when possible. His main barrier was time, but thought he might be able to teach some of the MCC lessons in the coming school year.

Discussion

The six returning teachers chose to return to the 2012 SI, after having attended the 2011 SI, for a number of reasons. Some of these teachers look forward to the WSF SI every year and attend each institute regardless of topic. They cited social reasons as in camaraderie with like-minded

teachers as reasons to attend as well as intellectual reason as in the breakout sessions and getting a review of the curriculum.

The teachers implemented the curriculum in a range of ways from not at all to most lessons as well as from heavily modified to mostly intact. Teachers who modified lessons worked in nature centers, in special education classrooms, and had limited time to implement the curriculum.

Teachers also appreciated learning more about the MCC and the lessons, especially Lesson Five (What does the data show?). Lesson Five was significantly modified from 2011 to 2012 based on teacher feedback, so it is not surprising that teachers mentioned this lesson most frequently.

2012
EDITION

Minnesota's Changing Climate

Grades 3–8

WILL STEGER FOUNDATION

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For additional information on the Will Steger Foundation please visit:
http://www.willstegerfoundation.org

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Minnesota's Changing Climate - Curriculum Introduction

Dear Educator:

The Will Steger Foundation created *Minnesota's Changing Climate* because we believe that environmental stewardship and action begins with a local connection and sense of appreciation, or *environmental sensitivity*, towards the natural environment. As educators, you have the unique opportunity to lead your students through the environmental education continuum of knowledge, awareness, and skills that lead to an informed and active environmental citizenry. *Minnesota's Changing Climate* is a great place to start because it follows this model of inspiring an appreciation and understanding of Minnesota's natural environment and empowering action.

Climate change is one of the most critical issues of our time. The overwhelming consensus of the scientific community for the past two decades has been that the planetary warming we are now experiencing, and the resulting climate change, is largely a human-induced phenomenon. This was reconfirmed with overwhelming consensus in 2007 with the release of the fourth report by the Intergovernmental Panel on Climate Change (IPCC). Climate change is largely driven by human activities, primarily the burning of fossil fuels to produce electricity and drive our cars, which in turn emit gases—principally carbon dioxide—that blanket the planet and trap heat, raising the earth's surface temperature.

Minnesota is at risk from climate change. From the Boundary Waters Canoe Area Wilderness and the great northern boreal forests, to the northern tall grass prairie, water is a critical element of Minnesota's rich ecological character. Lake Superior borders the state to the northeast, the Mississippi and Red Rivers define large portions of the eastern and western borders respectively, and there are thousands of inland lakes throughout the state. Minnesotans benefit from the many recreational, inspirational, and economic opportunities provided by this diversity of biomes. It is precisely these ecological and natural resources that are at risk from climate change.

Will Steger 's compelling life story of adventure has motivated thousands of Minnesotan's to care about our state and has generated real concern over the threat of climate change to our economy, natural resources, and way of life. Using Will's archives, starting when he was a young boy growing up in the suburbs of Minneapolis, to his Mississippi River adventures, to his homestead on the edge of the Boundary Waters wilderness, and the inspiration these experiences gave him to explore the Arctic, we share his story to inspire others. It was Will's early observation of the natural world and his curiosity of weather and climate that eventually enabled him to explore and survive in the Arctic. It is these critical skills that we focus on in *Minnesota's Changing Climate*.

In this set of lessons, we explore and learn about Minnesota's unique biomes and what a changing climate will mean for the state. Specifically, we examine how Minnesota's climate has already changed and how it is projected to change; how these changes may impact agriculture, forests and wildlife, aquatic ecosystems, our economy, and tourism and recreation; and how you can help reduce these potential impacts and help your biome adapt to a changing climate.

The following section gives suggestions of how to integrate this curriculum into your educational setting. We welcome and appreciate feedback and stories from all of you. Please share them with us at education@willstegerfoundation.org and don't forget to visit our online classroom developed in conjunction with this written curriculum http://classroom.willstegerfoundation.org

Thank you for your commitment to climate change education!

Kristen Poppleton

Kristen Iverson Poppleton
Director of Education
Will Steger Foundation

Will Steger Foundation Education Program

Will Steger Foundation

Established in January 2006 by polar explorer Will Steger, the Will Steger Foundation (WSF), located in Minneapolis, Minn, is dedicated to creating programs that foster international cooperation and leadership through environmental education and policy. The Will Steger Foundation has seen firsthand the dramatic effects of climate change on both the environment and the human condition through the efforts of its founder, Will Steger, who has explored the polar regions for 45 years. With that knowledge, WSF is leading humanity to slow the pace of climate change.

The Will Steger Foundation educates, inspires and empowers people to engage in solutions to climate change. The strategic goal of our education program is:

> To support educators, students and the public with science-based interdisciplinary educational resources on climate change, its implications and solutions to achieve climate literacy.

K-12 Education Program Overview

WSF's education program offers thought-provoking and practical solutions for educators and students by developing, supporting and connecting them with:

- Climate Change Curriculum
- Professional Development Opportunities
- Online Resources

Climate Change Curriculum

WSF offers a suite of curriculum resources via our two online learning portals, as well as our Educator Resources Binder and *Minnesota's Changing Climate* lesson plans. All lesson plans are available for free online and include lessons appropriate for grades 3-12. Aligned with the national and Minnesota state standards, the curriculum has been reviewed by the National Education Association, and the Union of Concerned Scientists. It can be purchased or downloaded for free at http://www.willstegerfoundation.org.

Educator Resources Binder

The Educator Resource binder was developed to support educators looking for innovative and engaging ways to integrate climate change into their classroom. In addition to the three sets of lesson plans for Grades 3-12 in the binder, each lesson is linked to archived video and audio footage of past expeditions, as well as other online resources.

Minnesota's Changing Climate Curriculum

WSF created *Minnesota's Changing Climate* because we believe that environmental stewardship and action begins with a local connection and sense of appreciation, or *environmental sensitivity*, towards the natural environment. This set of lesson plans for Grades 3-8 and 9-12 explores Minnesota's unique biomes and what a changing climate will mean for the state.

Online Curriculum

- Arctic Community Online Curriculum: This curriculum features the Arctic community as seen by animals, native peoples, explorers and scientists; all with diverse perspectives and ways of knowing, and all contributing to knowledge and action to slow climate change. The focus is on solutions and positive messages of hope and action.
- *Minnesota's Changing Climate* Online Classroom: This online classroom was developed in conjunction with the *Minnesota's Changing Climate* lessons. Through the classroom, students have the opportunity to learn about Minnesota's unique biomes and the impacts of climate change. Students also have the opportunity to contribute their own observations and action projects, in photo or written format, and see what other students from around the state have observed.

Professional Development Opportunities

Summer Institute for Climate Change Education: WSF has provided professional development to educators for six years through annual summer institutes. The institutes provide educators with tools to communicate climate change in the classroom. Past keynote speakers have included Bill McKibben, Dr. James Hansen, Andrew Revkin, and Dr. Naomi Oreskes.

Graduate Course on Communicating Climate Change in the Classroom (2 credits): WSF staff teach an annual graduate level course in the fall at Hamline University on "Teaching Climate Change in the Classroom."

Online Resources

Climate Lessons Blog for Educators: WSF maintains a weekly blog dedicated to providing tools and references for educators and communicators of climate change.

Video Gallery: WSF's video gallery contains 100s of videos featuring past expedition footage in the polar regions, as well as presentations by leading climate scientists and other climate educators.

Adventure Learning: WSF is a leader in adventure learning, a hybrid distance education approach that provides students with opportunities to explore real-world issues through authentic learning experiences. WSF harnesses the power of adventure learning by providing the organization's website and its virtual library of multi-media resources, classroom visits, and real-time web conferences to classrooms during WSF expeditions.

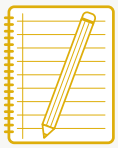
Using Minnesota's Changing Climate in your educational setting

Minnesota's Changing Climate was created with the following goals in mind:

1. To build awareness and interest in
   - Minnesota's natural environment
   - The impact of climate change
2. To provide educators and students with the tools necessary for active and lifelong stewardship.

Recognizing the time constraints and standards-based school environment that exists today, WSF developed these six lessons to make them as useful as possible to educators. They are aligned to Minnesota State Science and Literacy Standards, as well as the Climate Literacy Principles. It is not meant to provide students with an in-depth introduction to the science of climate change, but rather as a review if they have studied it before, or an introduction if it is a new issue. For educators interested in providing students with a more in-depth study of climate change, our Grades 3-5 and Grades 6-12 Global Warming 101 Lessons provide this opportunity and can be downloaded for free at http://www.willstegerfoundation.org.

This set of lessons will be most effective when used in their entirety, including the "Journal Connection" and "Take It Outside-Connecting With Your Place" sections, in conjunction with the online classroom. That said, these lessons could be used in a variety of educational settings. It can also follow a variety of different timelines such as over an intense week of study or once a week over the course of a month and a half. The following suggestions might be helpful when developing your plan of implementation for *Minnesota's Changing Climate*, but we also trust that as an educator you are the experts and will change and adapt lessons best for your situation. We would love to hear how you are using the curriculum in your classroom or school. Please share your stories and photos or videos with us at education@willstegerfoundation.org or upload them to our online classroom at http://classroom.willstegerfoundation.org



Document, document, document

The first lesson of this curriculum is about starting a journal and includes examples of different ways of documenting and reflecting. This lesson was deliberately developed with the idea that a journal, science notebook or blog can provide students with an excellent means to practice reflection, observation and synthesis of information. In addition, if used throughout the implementation of this curriculum, the final product can provide educators with a great assessment of student learning.

Teach Across the Curriculum

Some schools work in team settings with different educators taking on different subject areas. While this is the norm in middle and high school, it can occur in elementary classrooms as well. If possible, break apart the lessons between educators or subject area teaching time, and emphasize the relevant content.

For example:

Lesson 1: What is a journal for?
This lesson is obviously well aligned with any English/language arts course; however, many science classes have begun using science notebooks, and an art class could work on creating the stylistic/graphic design. In addition, it could be possible to set up a blog for each or your students, putting an emphasis on technology skills.

Lesson 2: What defines Minnesota's biomes?
This lesson could fit well with life science, environmental science, earth science and physical geography, depending on what content you wanted to emphasize.

Lesson 3: What defines Minnesota's climate?
Earth science, life science and math could address this lesson.

Lesson 4: What is climate change and what does it mean for Minnesota?
Although this lesson presents students with climate science information, there is a big emphasis on communicating the information that would work well in any English or public speaking course or unit.

Lesson 5: What does the data show?
This lesson is very data- and graph-focused and therefore would work well with any earth science or life science unit focused on interpretation of information. It could also be used and extended in a math course.

Lesson 6: What can I do?
Some schools have volunteer or service learning staff that might be able or interested in facilitating this lesson. Bringing together all the staff that participated, and making this the assessment for students that have completed this unit would also be an exciting possibility. Finally, students may be able to take on this part in an after-school setting through an environmental club.

Using Minnesota's Changing Climate in your educational setting

We really mean it when we say "Take It Outside!"

The "Take It Outside—Connecting with Your Place" section of each lesson is not meant to be an extension, but rather an integral part of each lesson. Connecting students with the biome in which they live and providing them with the skills to be eyewitnesses to the changing climate we live in is an important goal of this project. Not only do we think this is important, but research shows that getting students outside daily is beneficial not only to their health, but their ability to perform in school. (See http://www.childrenandnature.org/research/) Suggestions of how to "Take it Outside" with your classroom include:

- Make an outing to your schoolyard once a week throughout the entire year to observe the same area and record changes in a journal or science notebook.
- Select a weather reporter each day that records the temperature, precipitation, etc. as well as researches weather history via the Internet or an almanac. Record in the classroom and use data for different graphing exercises and compare year to year.
- Ask students to select an area to observe near their home and make weekly observations in a journal or science notebook.

Use the Online Classroom

The Online Classroom designed in conjunction with this curriculum is a fantastic way to bring some of the content alive in the classroom or in an educator-facilitated setting. Ideally, students will be introduced to the classroom and given time to explore it at school. Additional opportunities for assessment are available through the classroom, and if your students have the Internet available at home, exploring pieces of the classroom could be integrated as homework. We highly encourage educators and students to share what they have learned through this curriculum, and the online classroom is a place where students and educators can upload photos of their biome, journal entries and other observations, as well as see what other schools around the state are doing.

Do an Action Project

Climate change can be overwhelming and frightening. Students should understand the consequences and impacts of climate change in Minnesota, but then be offered the opportunity to discuss and learn about potential solutions. Facilitating a discussion of possible action projects, rather than selecting one for students to do, will make students feel more involved and empowered, as well as provide educators with a good assessment of what the students have learned and how much they have connected the causes of climate change with possible actions.

Science							
Grade - 3 Strand - 1. The Nature of Science and Substrand - 1. The Practice of Science Standard - 1. Scientists work as individuals and in groups; emphasizing evidence, open communication and skepticism.							
Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
3.1.1.1.1	Provide evidence to support claims, other than saying "Everyone knows that," or "I just know," and question such reasons when given by others.			•	•	•	•
Grade - 3 Strand - 1. The Nature of Science and Engineering Substrand - 3. Interactions Among Science, Engineering, Technology and Society Standard - 2. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.							
3.1.1.2.1	Generate questions that can be answered when scientific knowledge is combined with knowledge gained from one's own observations or investigations. For example: Investigate the sounds produced by striking various objects.		•		•	•	•
3.1.1.2.3	Maintain a record of observations, procedures and explanations, being careful to distinguish between actual observations and ideas about what was observed. For example: Make a chart comparing observations about the structures of plants and animals.		•	•	•		
3.1.1.2.4	Construct reasonable explanations based on evidence collected from observations or experiments.		•	•	•	•	•
Grade - 3 Strand - 1. The Nature of Science and Engineering Substrand - 1. The Practice of Science Standard - 2. Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.							
3.1.3.2.1	Understand that everybody can use evidence to learn about the natural world, identify patterns in nature, and develop tools. For example: Ojibwe and Dakota knowledge and use of patterns in the stars to predict and plan.	•	•	•	•	•	•
3.1.3.2.2	Recognize that the practice of science and/or engineering involves many different kinds of work and engages men and women of all ages and backgrounds.		•	•	•	•	•
Grade - 3 Strand - 1. The Nature of Science and Engineering Substrand - 1. The Practice of Science Standard - 4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.							
3.1.3.4.1	Use tools, including rulers, thermometers, magnifiers and simple balance, to improve observations and keep a record of the observations made.			•			
Grade - 3 Strand - 4. Life Science Substrand - 3. Evolution in Living Systems Standard - 2. Offspring are generally similar to their parents, but may have variations that can be advantageous or disadvantageous in a particular environment.							
3.4.3.2.2	Identify common groups of plants and animals using observable physical characteristics, structures and behaviors. For example: Sort animals into groups such as mammals and amphibians based on physical characteristics. Another example: Sort and identify common Minnesota trees based on leaf/needle characteristics.		•				

Science (continued)							
Grade - 4 Strand - 1. The Nature of Science and Engineering Substrand - 2. The Practice of Engineering Standard - 1. Engineers design, create, and develop structures, processes, and systems that are intended to improve society and may make humans more productive							
Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
4.1.2.1.1	Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used.				•		•
Grade - 4 Strand - 2. Physical Science Substrand - 1. Matter Standard - 1. Objects have observable properties that can be measured.							
4.2.1.1.1	Measure temperature, volume, weight and length using appropriate tools and units.			•			
Grade - 4 Strand - 3. Earth Science Substrand - 2. Interdependence within the Earth system Standard - 3. Water circulates through the Earth's crust, oceans and atmosphere in what is known as the water cycle.							
4.3.2.3.1	Identify where water collects on Earth, including atmosphere, ground, and surface water, and describe how water moves through the Earth system using the processes of evaporation, condensation and precipitation.			•			
Grade - 5 Strand - 1. The Nature of Science and Engineering Substrand - 1. The Practice of Science Standard - 1. Science is a way of knowing about the natural world, is done by individuals and groups, and is characterized by empirical criteria, logical argument and skeptical review.							
5.1.1.1.1	Explain why evidence, clear communication, accurate record keeping, replication by others, and openness to scrutiny are essential parts of doing science.	•			•		
5.1.1.1.4	Understand that different models can be used to represent natural phenomena and these models have limitations about what they can explain. For example: Different kinds of maps of a region provide different information about the land surface.		•			•	
Grade - 5 Strand - 1. The Nature of Science and Engineering Substrand - 1. The Practice of Science Standard - 2. Scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.							
5.1.1.2.1	Generate a scientific question and plan an appropriate scientific investigation, such as systematic observations, field studies, open-ended exploration or controlled experiments to answer the question.	•	•			•	
5.1.1.2.2	Identify and collect relevant evidence, make systematic observations and accurate measurements, and identify variables in a scientific investigation.			•			
Grade - 5 Strand - 1. The Nature of Science and Engineering Substrand - 3. Interactions Among Science, Engineering, Technology and Society Standard - 4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish							
5.1.3.4.1	Use appropriate tools and techniques in gathering, analyzing and interpreting data. For example: Spring scale, metric measurements, tables, mean/median/range, spreadsheets, and appropriate graphs			•		•	

Science (continued)							
Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
5.1.3.4.2	Create and analyze different kinds of maps of the student's community and of Minnesota. For example: Weather maps, city maps, aerial photos, regional maps, or online map resources.		•	•		•	
Grade - 5 Strand - 3. Earth Science Substrand - 4. Human Interactions with Earth Systems Standard - 1. In order to maintain and improve their existence, humans interact with and influence Earth systems.							
5.3.4.1.1	Identify renewable and nonrenewable energy and material resources that are found in Minnesota and describe how they are used. For example: Water, iron ore, granite, sand and gravel, wind, and forests.				•		
5.3.4.1.3	Compare the impact of individual decisions on natural systems. For example: Choosing paper or plastic bags impacts landfills as well as ocean life cycles.						•
Grade - 5 Strand - 4. Life Science Substrand - 1. Structure and Function of Living Systems Standard - 1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.							
5.4.1.1.1	Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system. For example: Compare the physical characteristics of plants or animals from widely different environments, such as desert versus tropical, and explore how each has adapted to its environment.		•				
Grade - 5 Strand - 4. Life Science Substrand - 2. Interdependence Among Living Systems Standard - 1. Natural systems have many components that interact to maintain the living system							
5.4.2.1.1	Describe a natural system in Minnesota, such as a wetland, prairie, or garden, in terms of the relationships among its living and nonliving parts, as well as inputs and outputs. For example: Design and construct a habitat for a living organism that meets its need for food, air and water.		•				
5.4.2.1.2	Explain what would happen to a system such as a wetland, prairie or garden if one of its parts were changed. For example: Investigate how road salt runoff affects plants, insects and other parts of an ecosystem. Another example: Investigate how an invasive species changes an ecosystem.			•	•	•	
Grade - 5 Strand - 4. Life Science Substrand - 4. Human Interactions with Living Systems Standard - 1. Humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.							
5.4.4.1.1	Give examples of beneficial and harmful human interaction with natural systems. For example: Recreation, pollution, wildlife management.				•		•

Scivence (continued)							
Grade - 6 Strand - 1. The Nature of Science and Engineering Substrand - 3. Interactions Among Science, Technology, Engineering, Mathematics and Society Standard - 4. Current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.							
Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
6.1.3.4.1	Determine and use appropriate safe procedures, tools, measurements, graphs, and mathematical analyses to describe and investigate natural and designed systems in a physical science context.					•	
6.1.3.4.2	Demonstrate the conversion of units within the International System of Units (SI, or metric) and estimate the magnitude of common objects and quantities using metric units.		•				
Grade - 7 Strand - 1. The Nature of Science and Engineering Substrand - 1. The Practice of Science Standard - 2. Scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.							
7.1.1.2.1	Generate and refine a variety of scientific questions and match them with appropriate methods of investigation, such as field studies, controlled experiments, review of existing work, and development of models.		•				
7.1.1.2.3	Generate a scientific conclusion from an investigation, clearly distinguishing between results (evidence) and conclusions (explanation).			•	•	•	
Grade - 7 Strand - 1. The Nature of Science and Engineering Substrand - 3. Interactions Among Science, Technology, Engineering, Mathematics and Society Standard - 3. Current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.							
7.1.3.4.1	Use maps, satellite images and other data sets to describe patterns and make predictions about natural systems in a life science context. For example: Use online data sets to compare wildlife populations or water quality in regions of Minnesota.		•	•		•	
7.1.3.4.2	Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in a life science context.		•				
Grade - 7 Strand - 4. Life Science Substrand - 2. Interdependence Among Living Systems Standard - 1. Natural systems include a variety of organisms that interact with one another in several ways.							
7.4.2.1.1	Identify a variety of populations and communities in an ecosystem and describe the relationships among the populations and communities in a stable ecosystem.		•				
7.4.2.1.3	Explain how the number of populations an ecosystem can support depends on the biotic resources available as well as abiotic factors such as amount of light and water, temperature range and soil composition.		•	•			

Science (continued)							
Grade - 7 Strand - 4. Life Science Substrand - 3. Evolution in Living Systems Standard - 2. Individual organisms with certain traits in particular environments are more likely than others to survive and have offspring.							
Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
7.4.3.2.4	Recognize that extinction is a common event and it can occur when the environment changes and a population's ability to adapt is insufficient to allow its survival.		•		•		
Grade - 7 Strand - 4. Life Science Substrand - 4. Human Interactions with Living Systems Standard - 1. Human ativity can change living organisms and ecosystems.							
7.4.4.1.2	Describe ways that human activities can change the populations and communities in an ecosystem.		•		•	•	•
Grade - 8 Strand - 1. The Nature of Science and Engineering Substrand - 1. The Practice of Science Standard - 2. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural and engineered world and investigate phenomena.							
8.1.1.2.1	Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.					•	
Grade - 8 Strand - 1. The Nature of Science and Engineering Substrand - 3. Interactions Among Science, Technology, Engineering, Mathematics and Society Standard - 3. Science and engineering operate in the context of society and both influence and are influenced by this context.							
8.1.3.3.3	Provide examples of how advances in technology have impacted how people live, work and interact.			•	•	•	
Grade - 8 Strand - 1. The Nature of Science and Engineering Substrand - 3. Interactions Among Science, Technology, Engineering, Mathematics and Society Standard - 4. Current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.							
8.1.3.4.1	Use maps, satellite images and other data sets to describe patterns and make predictions about local and global systems in earth science contexts. For example: Use data or satellite images to identify locations of earthquakes and volcanoes, ocean surface temperatures, or weather patterns.			•	•	•	
8.1.3.4.2	Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in earth and physical science contexts.		•				

Science (continued)							
Grade - 8 Strand - 3. Earth Science Substrand - 2. Interdependence Within the Earth system Standard - 2. Patterns of atmospheric movement influence global climate and local weather.							
Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
8.3.2.2.1	Describe how the composition and structure of the Earth's atmosphere affects energy absorption, climate, and the distribution of particulates and gases. For example: Certain gases contribute to the greenhouse effect.				•	•	
8.3.2.2.3	Relate global weather patterns to patterns in regional and local weather.				•	•	
Grade - 8 Strand - 3. Earth Science Substrand - 4. Human Interactions with Earth Systems Standard - 1. In order to maintain and improve their existence humans interact with and influence Earth systems.							
8.3.4.1.2	Recognize that land and water use practices affect natural processes and that natural processes interfere and interact with human systems. For example: Levees change the natural flooding process of a river. Another example: Agricultural runoff influences natural systems far from the source.						•
Social Studies - Geography							
Grades - K-3 Substrand - B. Maps and Globes Standard - The student will use and create maps and globes to locate people, places and things.							
	1. Students will locate places by using simple maps, and understand that maps are drawings of locations and places as viewed from above. 2. Students will recognize and locate the outline shape of the state of Minnesota on a map/globe. 3. Students will create and interpret simple maps using the map elements of title, direction, symbols, and a map key or legend.		•				
Grades - K-3 Substrand - C. Physical Features and Processes Standard - The student will distinguish between physical and human-made features of places on the Earth's surface.							
	1. Students will name and locate physical features of the United States, including places about which they have read. 2. Students will name and locate major human-made features of the United States, including features about which they have read.		•				
Grades - 4-8 Substrand - A. Concepts of Location Standard - The student will identify and locate major physical and cultural features that played an important role in the history of Minnesota.							
	1. Students will locate major Minnesota ecosystems, topographic features, continental divides, river valleys, and cities.		•				
Grades - 4-8 Substrand - A. Concepts of Location Standard - The student will use maps and globes to demonstrate specific and increasingly complex geographic knowledge.							
	1. Students will use political and thematic maps to locate major physical and cultural regions of the world and ancient civilizations studied. 4. Students will distinguish differences among uses of, and limitations of, different kinds of thematic maps to describe the development of Minnesota.		•				

Geography (continued)							
Grades - 4-8 Substrand - A. Concepts of Location Standard - The student will make and use maps to acquire, process, and report on the spatial organization of people and places on earth.							
	1. Students will create a variety of maps to scale. 2. Students will compare and contrast the differences among a variety of maps and explain the appropriate use of projections, symbols, coloring and shading, and select maps appropriate for answering questions they have.		•				
Grades - 4-8 Substrand - A. Concepts of Location Standard - The student will use basic terminology describing basic physical and cultural features of continents studied.							
	1. Students will locate and describe major physical features and analyze how they influenced cultures/civilizations studied. 2. Students will describe and locate major physical features in their local community and analyze their impact on the community.		•				
Grades - 4-8 Substrand - C. Physical Features and Processes Standard - The student will identify and locate geographic features associated with the development of Minnesota.							
	1. Students will identify and compare and contrast the landforms, natural vegetation, climate, and systems of rivers and lakes of Minnesota with those of other parts of the United States. 2. Students will identify physical features that shaped settlement and life-ways of the Dakota and the Ojibwe and analyze their impact. 3. Students will identify physical features that either hindered or promoted the development of the fur trade and the rapid settlement in the early 19th Century. 4. Students will identify physical features that either hindered or promoted the industrialization of the state.		•				
Grades - 4-8 Substrand - D. Interconnections Standard - The student will give examples that demonstrate how people are connected to each other and the environment.							
	2. Students will analyze how the physical environment influences human activities.		•	•	•	•	
Grades - 4-8 Substrand - D. Interconnections Standard - The student will identify examples of the changing relationships between the patterns of settlement and land use in Minnesota.							
	1. Students will give examples of how changes in technology made some locations in Minnesota more suitable for urbanization than others. 7. Students will use regions to analyze modern agriculture in MN.		•	•	•	•	
Grades - 4-8 Substrand - E. Essential Skills Standard - The student will use maps, globes, geographic information systems and other sources of information to analyze the natures of places at a variety of scales.							
Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
	1. Students will demonstrate the ability to obtain geographic information from a variety of print and electronic sources. 2. Students will make inferences and draw conclusions about the character of places based on analysis and comparison of maps, aerial photos, and other images.		•				

English Language Arts - K–12

Please note: Due to the extensive number of standards aligned there is not as much detail provided below. More information on Minnesota Language Arts Standards can be found at:
http://education.state.mn.us/MDE/EdExc/StanCurri/K-12AcademicStandards/index.htm

English Language Arts							
Grade - 3 READING Informational Text							
Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
		3.2.1.1 3.2.4.4 3.2.9.9 3.6.6.6 3.6.7.7	3.2.1.1 3.2.4.4 3.2.5.5 3.2.7.7 3.2.8.8 3.2.9.9	3.2.1.1 3.2.3.3 3.2.4.4 3.2.5.5 3.2.7.7 3.2.8.8 3.2.9.9	3.2.1.1 3.2.3.3 3.2.4.4 3.2.5.5 3.2.7.7 3.2.8.8 3.2.9.9	3.2.1.1 3.2.3.3 3.2.4.4 3.2.5.5 3.2.7.7 3.2.8.8 3.2.9.9	3.2.4.4 3.2.8.8
Grade - 3 WRITING							
		3.6.6.6 3.6.10.10	3.6.6.6 3.6.7.7 3.6.8.8 3.6.9.9 3.6.10.10	3.6.6.6 3.6.8.8 3.6.9.9 3.6.10.10	3.6.6.6 3.6.8.8 3.6.9.9 3.6.10.10	3.6.6.6 3.6.8.8 3.6.9.9 3.6.10.10	3.6.1.1 3.6.4.4 3.6.6.6 3.6.9.9 3.6.10.10 3.6.10.10
Grade - 3 SPEAKING, VIEWING, LISTENING, AND MEDIA LITERACY							
		3.8.2.2	3.8.1.1 3.8.2.2 3.8.4.4	3.8.1.1 3.8.2.2	3.8.1.1 3.8.2.2	3.8.1.1 3.8.2.2	3.8.1.1 3.8.5.5 3.8.8.8
Grade - 4 READING Informational Text							
		4.2.5.5	4.2.5.5 4.2.7.7	4.2.5.5 4.2.7.7	4.2.5.5 4.2.7.7	4.2.5.5 4.2.7.7 4.2.9.9	
Grade - 4 WRITING							
		4.6.2.2 4.6.10.10	4.6.2.2 4.6.6.6 4.6.7.7 4.6.8.8 4.6.10.10	4.6.2.2 4.6.6.6 4.6.8.8 4.6.10.10	4.6.2.2 4.6.6.6 4.6.8.8 4.6.10.10	4.6.2.2 4.6.6.6 4.6.8.8 4.6.10.10	4.6.1.1 4.6.10.10
		5.6.6.6 5.6.10.10	5.6.2.2 5.6.6.6 5.6.7.7 5.6.10.10	5.6.2.2 5.6.6.6 5.6.10.10	5.6.2.2 5.6.6.6 5.6.10.10	5.6.2.2 5.6.6.6 5.6.10.10	5.6.10.10

Grade - 4 SPEAKING, VIEWING, LISTENING, AND MEDIA LITERACY							
Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
		4.8.1.1	4.8.1.1 4.8.2.2	4.8.1.1 4.8.2.2	4.8.1.1 4.8.2.2	4.8.1.1 4.8.2.2	4.8.1.1 4.8.8.8
Grade - 5 READING Informational Text							
		5.2.1.1	5.2.1.1 5.2.3.3 5.2.7.7 5.2.9.9	5.2.1.1 5.2.3.3 5.2.7.7 5.2.9.9	5.2.1.1 5.2.3.3 5.2.7.7 5.2.9.9	5.2.1.1 5.2.3.3 5.2.5.5 5.2.7.7 5.2.9.9	
Grade - 5 WRITING							
		5.6.6.6 5.6.10.10	5.6.2.2 5.6.6.6 5.6.7.7 5.6.10.10	5.6.2.2 5.6.6.6 5.6.10.10	5.6.2.2 5.6.6.6 5.6.10.10	5.6.2.2 5.6.6.6 5.6.10.10	5.6.10.10
Grade - 5 SPEAKING, VIEWING, LISTENING, AND MEDIA LITERACY							
			5.8.2.2	5.8.2.2	5.8.2.2	5.8.2.2	5.8.5.5 5.8.5.5 5.8.8.8
English Language Arts							
Grades - 6–8 READING in Science and Technical Subjects							
Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
		12.1.1 12.2.2 13.6.6		12.1.1 12.2.2 13.4.4 13.6.6 13.7.7 13.10.10	12.1.1 12.2.2 13.6.6 13.7.7 13.8.8 13.10.10	12.1.1 12.2.2 13.3.3 13.4.4 13.6.6 13.7.7 13.8.8 13.9.9 13.10.10	12.1.1 12.2.2 13.3.3
Grades - 6–8 WRITING in History/Social Studies, Science and Technical Subjects							
		14.3.3 14.4.4 14.10.10	14.2.2 14.3.3 14.4.4 14.7.7 14.8.8 14.10.10	14.2.2 14.3.3 14.4.4 14.6.6 14.8.8 14.10.10	14.2.2 14.3.3 14.4.4 14.6.6 14.8.8 14.10.10	14.1.1 14.2.2 14.3.3 14.4.4 14.6.6 14.8.8 14.10.10	14.2.2 14.3.3 14.4.4 14.5.5 14.6.6 14.10.10

Minnesota Environmental Literacy Scope and Sequence Benchmarks							
Grades - 3–5							
Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
	In social and natural systems that consist of many parts, the parts usually influence one another.		•	•	•	•	
	Social and natural systems may not function as well if parts are missing, damaged, mismatched or misconnected.		•	•	•	•	
Grades - 6–8							
	Social and natural systems can include processes as well as things.		•	•	•	•	
	The output from a social or natural system can become the input to other parts of social and natural systems.		•	•	•	•	
	Social and natural systems are connected to each other and to other larger or smaller systems.		•	•	•	•	•

The Essential Principles of Climate Literacy

Developed through a cooperative effort of numerous US federal agency scientists, formal and informal educators, interested individuals, and representatives from nongovernmental organizations and other institutions involved in climate research, education, and outreach, the Essential Principles of Climate Science summarizes the most important principles and concepts of climate science. It presents important information for individuals and communities to understand Earth's climate, impacts of climate change, and approaches for adapting and mitigating change. Principles can serve as discussion starters or launching points for scientific inquiry. They can also serve educators who teach climate science as part of their science curricula. More information can be found at: http://cleanet.org/cln/climateliteracy.html

A climate literate person will

- understand the essential principles of Earth's climate system;
- knows how to assess scientifically credible information about climate;
- communicates about climate and climate change in a meaningful way;
- is able to make informed and responsible decisions with regard to actions that may affect climate.

The Essential Principles of Climate Literacy The Guiding Principle for Informed Climate Decisions Principle: Humans can take actions to reduce climate change and its impacts.							
	Supporting concepts	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
	A. Climate information can be used to reduce vulnerabilities or enhance the resilience of communities and ecosystems affected by climate change. Continuing to improve scientific understanding of the climate system and the quality of reports to policy and decision makers is crucial.				•	•	•
	B. Reducing human vulnerability to the impacts of climate change depends not only upon our ability to understand climate science, but also upon our ability to integrate that knowledge into human society. Decisions that involve Earth's climate must be made with an understanding of the complex interconnections among the physical and biological components of the Earth system as well as the consequences of such decisions on social, economic, and cultural systems.				•	•	•
	C. The impacts of climate change may affect the security of nations. Reduced availability of water, food, and land can lead to competition and conflict among humans, potentially resulting in large groups of climate refugees.						
	D. Humans may be able to mitigate climate change or lessen its severity by reducing greenhouse gas concentrations through processes that move carbon out of the atmosphere or reduce greenhouse gas emissions.						•
	E. A combination of strategies is needed to reduce greenhouse gas emissions. The most immediate strategy is conservation of oil, gas, and coal, which we rely on as fuels for most of our transportation, heating, cooling, agriculture, and electricity. Short-term strategies involve switching from carbon-intensive to renewable energy sources, which also requires building new infrastructure for alternative energy sources. Long-term strategies involve innovative research and a fundamental change in the way humans use energy.						•
	F. Humans can adapt to climate change by reducing their vulnerability to its impacts. Actions such as moving to higher ground to avoid rising sea levels, planting new crops that will thrive under new climate conditions, or using new building technologies represent adaptation strategies. Adaptation often requires financial investment in new or enhanced research, technology, and infrastructure.						•
	G. Actions taken by individuals, communities, states, and countries all influence climate. Practices and policies followed in homes, schools, businesses, and governments can affect climate. Climate-related decisions made by one generation can provide opportunities as well as limit the range of possibilities open to the next generation. Steps toward reducing the impact of climate change may influence the present generation by providing other benefits such as improved public health infrastructure and sustainable built environments.						•

The Essential Principles of Climate Literacy (continued)							
The Essential Principles of Climate Science 1. The sun is the primary source of energy for Earth's climate system.							
	Supporting concepts	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
	Sunlight reaching the Earth can heat the land, ocean, and atmosphere. Some of that sunlight is reflected back to space by the surface, clouds, or ice. Much of the sunlight that reaches Earth is absorbed and warms the planet.						
	When Earth emits the same amount of energy as it absorbs, its energy budget is in balance, and its average temperature remains stable.						
	The tilt of Earth's axis relative to its orbit around the sun results in predictable changes in the duration of daylight and the amount of sunlight received at any latitude throughout a year. These changes cause the annual cycle of seasons and associated temperature changes.						
	Gradual changes in Earth's rotation and orbit around the sun change the intensity of sunlight received in our planet's polar and equatorial regions. For at least the last 1 million years, these changes occurred in 100,000-year cycles that produced ice ages and the shorter warm periods between them.						
	A significant increase or decrease in the sun's energy output would cause Earth to warm or cool. Satellite measurements taken over the past 30 years show that the sun's energy output has changed only slightly and in both directions. These changes in the sun's energy are thought to be too small to be the cause of the recent warming observed on Earth.						
The Essential Principles of Climate Science 2. Climate is regulated by complex interactions among components of the Earth system.							
	Earth's climate is influenced by interactions involving the sun, ocean, atmosphere, clouds, ice, land, and life. Climate varies by region as a result of local differences in these interactions.			•			
	Covering 70% of Earth's surface, the ocean exerts a major control on climate by dominating Earth's energy and water cycles. It has the capacity to absorb large amounts of solar energy. Heat and water vapor are redistributed globally through density-driven ocean currents and atmospheric circulation. Changes in ocean circulation caused by tectonic movements or large influxes of fresh water from melting polar ice can lead to significant and even abrupt changes in climate, both locally and on global scales.						
	The amount of solar energy absorbed or radiated by Earth is modulated by the atmosphere and depends on its composition. Greenhouse gases—such as water vapor, carbon dioxide, and methane—occur naturally in small amounts and absorb and release heat energy more efficiently than abundant atmospheric gases like nitrogen and oxygen. Small increases in carbon dioxide concentration have a large effect on the climate system.				•		
	The abundance of greenhouse gases in the atmosphere is controlled by biogeochemical cycles that continually move these components between their ocean, land, life, and atmosphere reservoirs. The abundance of carbon in the atmosphere is reduced through seafloor accumulation of marine sediments and accumulation of plant biomass, and is increased through deforestation and the burning of fossil fuels as well as through other processes.						
	Airborne particulates, called "aerosols," have a complex effect on Earth's energy balance: they can cause both cooling, by reflecting incoming sunlight back out to space, and warming, by absorbing and releasing heat energy in the atmosphere. Small solid and liquid particles can be lofted into the atmosphere through a variety of natural and manmade processes, including volcanic eruptions, sea spray, forest fires, and emissions generated through human activities.						
	The interconnectedness of Earth's systems means that a significant change in any one component of the climate system can influence the equilibrium of the entire Earth system. Positive feedback loops can amplify these effects and trigger abrupt changes in the climate system. These complex interactions may result in climate change that is more rapid and on a larger scale than projected by current climate models.				•	•	

The Essential Principles of Climate Literacy (continued)							
The Essential Principles of Climate Science 3. Life on Earth depends on, is shaped by, and affects climate.							
	Supporting concepts	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
	Individual organisms survive within specific ranges of temperature, precipitation, humidity, and sunlight. Organisms exposed to climate conditions outside their normal range must adapt or migrate, or they will perish.		•	•			
	The presence of small amounts of heat-trapping greenhouse gases in the atmosphere warms Earth's surface, resulting in a planet that sustains liquid water and life.				•		
	Changes in climate conditions can affect the health and function of ecosystems and the survival of entire species. The distribution patterns of fossils show evidence of gradual as well as abrupt extinctions related to climate change in the past.						
	A range of natural records shows that the last 10,000 years have been an unusually stable period in Earth's climate history. Modern human societies developed during this time. The agricultural, economic, and transportation systems we rely upon are vulnerable if the climate changes significantly.						
	Life—including microbes, plants, and animals and humans—is a major driver of the global carbon cycle and can influence global climate by modifying the chemical makeup of the atmosphere. The geologic record shows that life has significantly altered the atmosphere during Earth's history.						
The Essential Principles of Climate Science 4. Climate varies over space and time through both natural and man-made processes.							
	Climate is determined by the long-term pattern of temperature and precipitation averages and extremes at a location. Climate descriptions can refer to areas that are local, regional, or global in extent. Climate can be described for different time intervals, such as decades, years, seasons, months, or specific dates of the year.			•	•	•	
	Climate is not the same thing as weather. Weather is the minute-by-minute variable condition of the atmosphere on a local scale. Climate is a conceptual description of an area's average weather conditions and the extent to which those conditions vary over long time intervals.			•			
	Climate change is a significant and persistent change in an area's average climate conditions or their extremes. Seasonal variations and multi-year cycles (for example, the El Niño southern oscillation) that produce warm, cool, wet, or dry periods across different regions are a natural part of climate variability. They do not represent climate change.			•	•		
	Scientific observations indicate that global climate has changed in the past, is changing now, and will change in the future. The magnitude and direction of this change is not the same at all locations on Earth.				•	•	
	Based on evidence from tree rings, other natural records, and scientific observations made around the world, Earth's average temperature is now warmer than it has been for at least the past 1,300 years. Average temperatures have increased markedly in the past 50 years, especially in the North Polar region.				•	•	
	Natural processes driving Earth's long-term climate variability do not explain the rapid climate change observed in recent decades. The only explanation that is consistent with all available evidence is that human activity is playing an increasing role in climate change. Future changes in climate may be rapid compared to historical changes.				•	•	
	Natural processes that remove carbon dioxide from the atmosphere operate slowly when compared to the processes that are now adding it to the atmosphere. Thus, carbon dioxide introduced into the atmosphere today may remain there for a century or more. Other greenhouse gases, including some created by humans, may remain in the atmosphere for thousands of years.						

The Essential Principles of Climate Literacy (continued)							
The Essential Principles of Climate Science 5. Our understanding of the climate system is improved through observations, theoretical studies, and modeling.							
	Supporting concepts	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
	The components and processes of Earth's climate system are subject to the same physical laws as the rest of the Universe. Therefore, the behavior of the climate system can be understood and predicted through careful, systematic study.					•	
	Environmental observations are the foundation for understanding the climate system. From the bottom of the ocean to the surface of the sun, instruments on weather stations, buoys, satellites, and other platforms collect climate data. To learn about past climates, scientists use natural records, such as tree rings, ice cores, and sedimentary layers. Historical observations, such as native knowledge and personal journals, also document past climate change.	•	•	•	•	•	
	Observations, experiments, and theory are used to construct and refine computer models that represent the climate system and make predictions about its future behavior. Results from these models lead to better understanding of the linkages between the atmosphere-ocean system and climate conditions and inspire more observations and experiments. Over time, this iterative process will result in more reliable projections of future climate conditions.					•	
	Our understanding of climate differs in important ways from our understanding of weather. Climate scientists' ability to predict climate patterns months, years, or decades into the future is constrained by different limitations than those faced by meteorologists in forecasting weather days to weeks into the future.			•			
	Scientists have conducted extensive research on the fundamental characteristics of the climate system and their understanding will continue to improve. Current climate change projections are reliable enough to help humans evaluate potential decisions and actions in response to climate change.				•	•	
The Essential Principles of Climate Science 6. Human activities are impacting the climate system.							
	The overwhelming consensus of scientific studies on climate indicates that most of the observed increase in global average temperatures since the latter part of the 20th century is very likely due to human activities, primarily from increases in greenhouse gas concentrations resulting from the burning of fossil fuels.				•	•	
	Emissions from the widespread burning of fossil fuels since the start of the Industrial Revolution have increased the concentration of greenhouse gases in the atmosphere. Because these gases can remain in the atmosphere for hundreds of years before being removed by natural processes, their warming influence is projected to persist into the next century.				•	•	
	Human activities have affected the land, oceans, and atmosphere, and these changes have altered global climate patterns. Burning fossil fuels, releasing chemicals into the atmosphere, reducing the amount of forest cover, and rapid expansion of farming, development, and industrial activities are releasing carbon dioxide into the atmosphere and changing the balance of the climate system.				•	•	
	Growing evidence shows that changes in many physical and biological systems are linked to human-caused global warming. Some changes resulting from human activities have decreased the capacity of the environment to support various species and have substantially reduced ecosystem biodiversity and ecological resilience.			•	•	•	
	Scientists and economists predict that there will be both positive and negative impacts from global climate change. If warming exceeds 2–3°C (3.6–5.4°F) over the next century, the consequences of the negative impacts are likely to be much greater than the consequences of the positive impacts.				•		

The Essential Principles of Climate Literacy (continued)							
The Essential Principles of Climate Science 7. Climate change will have consequences for the Earth system and human lives.							
	Supporting concepts	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
	Melting of ice sheets and glaciers, combined with the thermal expansion of seawater as the oceans warm, is causing sea levels to rise. Seawater is beginning to move onto low-lying land and to contaminate coastal fresh water sources, and beginning to submerge coastal facilities and barrier islands. Sea-level rise increases the risk of damage to homes and buildings from storm surges such as those that accompany hurricanes.						
	Climate plays an important role in the global distribution of freshwater resources. Changing precipitation patterns and temperature conditions will alter the distribution and availability of freshwater resources, reducing reliable access to water for many people and their crops. Winter snowpack and mountain glaciers that provide water for human use are declining as a result of global warming.				•	•	
	Incidents of extreme weather are projected to increase as a result of climate change. Many locations will see a substantial increase in the number of heat waves they experience per year and a likely decrease in episodes of severe cold. Precipitation events are expected to become less frequent but more intense in many areas, and droughts will be more frequent and severe in areas where average precipitation is projected to decrease.				•	•	
	The chemistry of ocean water is changed by absorption of carbon dioxide from the atmosphere. Increasing carbon dioxide levels in the atmosphere is causing ocean water to become more acidic, threatening the survival of shell-building marine species and the entire food web of which they are a part.						
	Ecosystems on land and in the ocean have been and will continue to be disturbed by climate change. Animals, plants, bacteria, and viruses will migrate to new areas with favorable climate conditions. Infectious diseases and certain species will be able to invade areas that they did not previously inhabit.				•		
	Human health and mortality rates will be affected to different degrees in specific regions of the world as a result of climate change. Although cold-related deaths are predicted to decrease, other risks are predicted to rise. The incidence and geographical range of climate-sensitive infectious diseases—such as malaria, dengue fever, and tick-borne diseases—will increase. Drought-reduced crop yields, degraded air and water quality, and increased hazards in coastal and low-lying areas will contribute to unhealthy conditions, particularly for the most vulnerable populations.				•	•	

Grades 3–8 Lesson Organizer

Lesson Outcomes	*Lesson Materials*
Lesson 1: What is a journal for?	
• Students will identify key features of a journal • Students will identify journal entry themes • Students will compare journal entries from different time periods and in different styles • Students will create their own journal to be used for outdoor observation and documenting their exploration of *Minnesota's Changing Climate*	Three Will Steger Journal Entries Three Excerpts from *Eden Summer Collages* (David Coggins) Four Historical Biome Journal Exerpts
Lesson 2: What defines Minnesota's biomes?	
• Students will identify Minnesota's four main biomes. • Students will identify characteristic vegetation and animals found in each biome. • Students will describe and compare factors that define each biome.	Will Steger Journal Entry Handout 1: Biome Cards Handout 2: Minnesota Biomes Table Handout 3: Minnesota Biomes Map
Lesson 3: What defines Minnesota's Climate?	
• Students will define climate and weather • Students will define climate change • Students will define phenology • Students will gather their own weather data from their school site and record it in their journal • Students will graphically represent authentic data from Minnesota's Climatology site • Students will make three predictions of how a change in climate might affect Minnesota's biomes	Three Will Steger Journal Entries Handout 1: Normal Mean Temperature Annual Map Handout 2: Normal Annual Precipitation Map Handout 3: What Defines Minnesota's climate? Student Worksheet
Lesson 4: What is climate change and what does it mean for Minnesota?	
• Students will explain the causes of climate change • Students will explain the implications of climate change • Students will predict how climate change might impact or is impacting the area where they live • Students will describe five key climate change implications for Minnesotans	Will Steger Journal Entry Handout 1: Key Implications for Minnesotans Facing Climate Change Cards Handout 2: Climate Change Fact Cards
Lesson 5: What does the data show?	
• Students will make their own interpretations of figures of data that represent different impacts of climate change on Minnesota. • Students will make the connection between 3-D objects and what the data represents. • Students will divide 3 statements about each graph into true or false categories. • Students will share their results. • Students will brainstorm how climate change could affect their biome.	Will Steger Journal Handout 1: Twelve Activity Sheets Handout 2: Full Size Figures Handout 3: Activity Sheet Template/Gameboard
Lesson 6: What can I do?	
• Students will brainstorm appropriate solutions and select one for their group, class or school. • Students will develop a climate action plan and begin to implement it.	Handout 1: Climate Action Template Handout 2: Climate Action Plan Worksheet

Lesson 1: Minnesota's Changing Climate

What is a journal for?

Age Level:	Grades 3-12
Time Needed:	50 minutes
Materials:	Journal/notebook for each student Access to the Internet (to watch videos and view journal examples) Projector or handouts of journal examples
Student Learning Outcomes:	• Students will identify key features of a journal. • Students will identify journal entry themes. • Students will compare journal entries from different time periods and in different styles. • Students will create their own journal to be used for documenting their outdoor observations and exploration of *Minnesota's Changing Climate*.

Background Information

Journals are a tool for exploring the natural world and can be used to develop many different skills. In this lesson, students will have the opportunity to look at journal excerpts written at different points in Will Steger's life. They show different styles of journaling and ways of observing and documenting the natural world. In addition to excerpts from Will's journals, there are examples from individuals who have kept journals about Minnesota's natural world throughout history. Finally, David Coggins, a Minnesota writer and artist, provided us with beautiful examples of art/collage journals. Journal excerpts are found on pages 6-13.

> There is something to journaling that is extremely important. It's a way of learning where you absorb yourself... you put your mind and your attention and your focus on one observation. It's a mechanism of where you are going through your curiosity and your thought, and you're documenting and you're writing it down....It's a learning process. The idea [is] to see [nature] in a different way.
>
> —Will Steger, Interview, July, 2010

Journal Assignment

Each lesson in *Minnesota's Changing Climate* includes journaling activities, and assessments that should be kept together in a journal or notebook. Students will conclude this lesson by designing their own journal. Students should paste their work from this lesson in the journal to look back on in later lessons.

Activity Description

Introduction

Click on the "Journal Basics" category of the "Journals" section in any biome in the learning module of the online classroom at http://classroom.willstegerfoundation.org. Afterwards, have a short discussion about journaling and journals.

There are many different types of journals. Nature journals, personal journals, travel journals, scrapbooks, sketchbooks and blogs are just a few examples. Will shows examples of some of his journal entries in the video and talks about why he thinks it is important.

1. What has Will used his journals for and why were they important?
2. What does he mean when he says the point of journaling is "to see nature in a different way?"
3. Has anyone used a journal before or does anyone have a journal, or a diary?
4. What do you use it for?
5. What sorts of things do you put in it?
6. Is it just writing or do you sketch or put other objects (newspaper clippings, programs, stickers, pressed flowers, etc.)?
7. Why do you think journals might be useful?

Activity: Explore different styles of journals

1. Hand out copies of the different journal excerpts found on pages 6-13, or access them online at http://classroom.willstegerfoundation.org/handouts. If you have Internet access, also show the examples listed below under Internet Journal Examples. These journal examples show a number of different styles of journals focused on nature observation, and provide a broad array of examples from the early exploration of Minnesota's natural resources to more contemporary and artistic enjoyment of nature.

Journal excerpts include:

- Weather Journal, 1956, Will Steger (12 years old)
- Astronomy Journal-when Sputnik was launched, 1957, Will Steger (13 years old)
- Phenology Journal, 1978, Will Steger
- Art/Collage Journal, 2004, David Coggins (3 entries)
- Historical Minnesota Biome Journal Excerpts (4 entries)

Internet Journal Examples

- Botany Journal, 1836, Charles Geyer found at: http://www.stolaf.edu/academics/nicollet/geyerjournalintro.html
- Selection of Natural History blogs found at: http://neurophilosophy.wordpress.com/2007/03/03/natural-history-blogs/

2. Ask the students to answer the following questions independently on a sheet of paper:
    1. What journal entry did you think was the most interesting? Why?
    2. What journal entry do you think was the most useful? Why?
    3. How were the journal entries similar?
    4. How were the journal entries different?
    5. What topics were covered in the journal entries?
    6. If you were to start a journal what would you use it to record? What would be important to include in each entry? Ask them to answer the questions.
3. Bring the students back together as a class. On the board make a list of
    - Things they found interesting;
    - Things that were common between the examples;
    - Things that are different between the examples;
    - Topics or themes that the different journal entries covered.
4. Ask the students to choose one of the journal entries. Hand out pieces of paper and ask them to write their own journal entry in the same style as the journal entry they chose. Before they start they should identify key elements that define the journal entry. This could include date, sketches, observations of weather, or lists of birds or plants seen.

Concluding Activity

The students will have investigated different styles of journaling through the excerpts provided. Students should now create or be provided with a notebook that will be their own journal to use during their exploration of *Minnesota's Changing Climate*. Students should personalize their journal and integrate the exploration of Minnesota's biomes, the impacts of climate change, and solutions that can happen at schools and be led by students.

Descriptions of different styles of journals are provided in the following pages. If you have time, take a few class periods or portions of class periods to explore the different styles of journaling described in the following pages. Discuss when each type of journal might be used and how most journals don't just use one style, but depending on the person's mood or what information they would like to record, may have many different styles.

Science Notebooks

Materials:

- Notebook
- Colored pencils
- Graphing paper
- Items for investigations

Klentschy writes, "A science notebook is a central place where language, data, and experience work together to form meaning for the student."(2005) Creating and using a science notebook helps develop skills such as student organization, data recording and interpretation, question development, reasonable predictions, and reflection.

Each entry in a science notebook should begin with a question that is investigable. Developing good questions that don't have yes or no answers can be difficult. Taking the students outside a few times observing and exploring will often elicit curiosity around a particular subject. Developing a question about something that is real and tangible and interesting to them will lead to a much richer project.

Once the student has developed a question, they should also come up with a prediction of what they will discover through their investigation.

After the student develops the question, they will need to determine how they can go about answering it through an investigation. Planning for their investigation should include the steps involved, material needs and how they will organize the data they collect. It will be important to have a discussion about charts, tables, graphs, Venn diagrams, and labeled sketches or diagrams as possible data organizers.

Once students have determined their question, prediction, and how they will organize their observations they may begin their investigation. Investigations can last an hour to an entire school year depending on the questions they ask.

Once students have finished their investigation they will need to review their science notebook and data. Their observations should help them develop some sort of claims related to their question and help them develop a statement of what they learned. This step of interpreting and explaining what they learned is an important skill in science and can involve oral presentations, PowerPoints, graphing and other multimedia. The science notebook will be integral to development of any presentation.

Finally, the students should be asked to think about what new questions they have as a result of their investigation. If they could do another investigation, what would they do?

Art or Collage Journals

Materials:

- Notebook
- Colored pencils
- Flower/plant press
- Glue
- Photos

Some students may be interested in making their observations through sketching, poetry or creative writing, or collages of objects associated with their observations. Pressed flowers, photos, maps are just a few examples of what can go into this type of journal.

Blogging

Materials:

- Internet access
- Digital camera
- Computer

If you are interested in sharing and collaborating with students or others anywhere in the world, a blog is an easy and fun way to do this. A blog, or web log, is an online shared journal. In addition to written material, it is possible to embed videos, photos and audio in a blog. Blogs can generally be made as publicly accessible as you want them to be and after each blog post it is possible to leave comments for the writer. This function makes it possible for peer interaction around a particular topic both locally and globally. Some good places to start a blog include posterous.com or blogspot.com.

Take it Outside—Connecting With Your Place

Phenology Journals

Materials:

- Notebook
- Colored pencils
- Thermometer
- Rain gauge
- Barometer
- Cloud charts
- Historic weather data
- Camera

Phenology is the study of the cyclical nature of biological events as they relate to climate and season. Phenology journals often include observations of the natural world, sketches, photographs and other data that relate. Because phenology is the study of how the natural world responds to climate and season, there are a few elements that are important to include in a journal entry. Date, time, location, temperature, and precipitation type or amount are basic things that should be included. Barometric readings, cloud cover and type, as well as historic highs and lows of temperature can also be included.

Phenology journals are ideally done outside, but can be done looking out the window of a classroom as well. Spending five minutes at the start of every day asking students to record certain weather elements and what observations they made of the natural world on their way to school is another method. Observations might include what color the trees were turning, if they saw birds flying south or north, what birds or other animals they saw and what the observed animals were doing. Asking the students good questions about what they saw will help them remember to look more closely the next day.

Observations of the natural world can be made in writing, sketches or photos. It can be interesting for students to choose a spot that they follow throughout the school year, observing and recording the changes with the seasons.

Temperatures and other numeric data recorded over time can be used to make graphs directly in the student journals, or on graph paper and then pasted in. Consider keeping your own phenology journals year to year, and making them available for students to view, to use for comparing the timing of seasonal events.

Extensions

Take time to try out the different styles of journaling as described above.

Online Classroom Connection

Visit http://classroom.willstegerfoundation.org

1. There are a variety of journal examples provided for each biome. Read through each journal entry and discuss them as a class, or ask students to try and write their own journal entry in the style of one of those shared.
2. Upload journal entries from your classroom! Upload them at: http://classroom.willstegerfoundation.org/get-social/share-your-observations
   Read and comment on entries from other students.

Monday October 8 1956

Partly cloudy

temperature 58 degrees

high 58

Low 49

Humidity at 6:30 p.m 38 per cent

Precipitation 24 hours ending at 6:30 p.m.: none. Total since Jan. 1 to date 23.27 inches.

Sun rises 6:21 a.m., set 5:39 p.m.

Moon phase new, Rises 12:06 p.m., sets 9:22 p.m.

Wind at 4:05 p.m. 15 miles per hour and at 4:30 p.m. miles per hour coming from the North west

Year ago high 67 Low 38

all-time record high for the date 80, in 1905.

all-time record Low for this date 28, in 1917

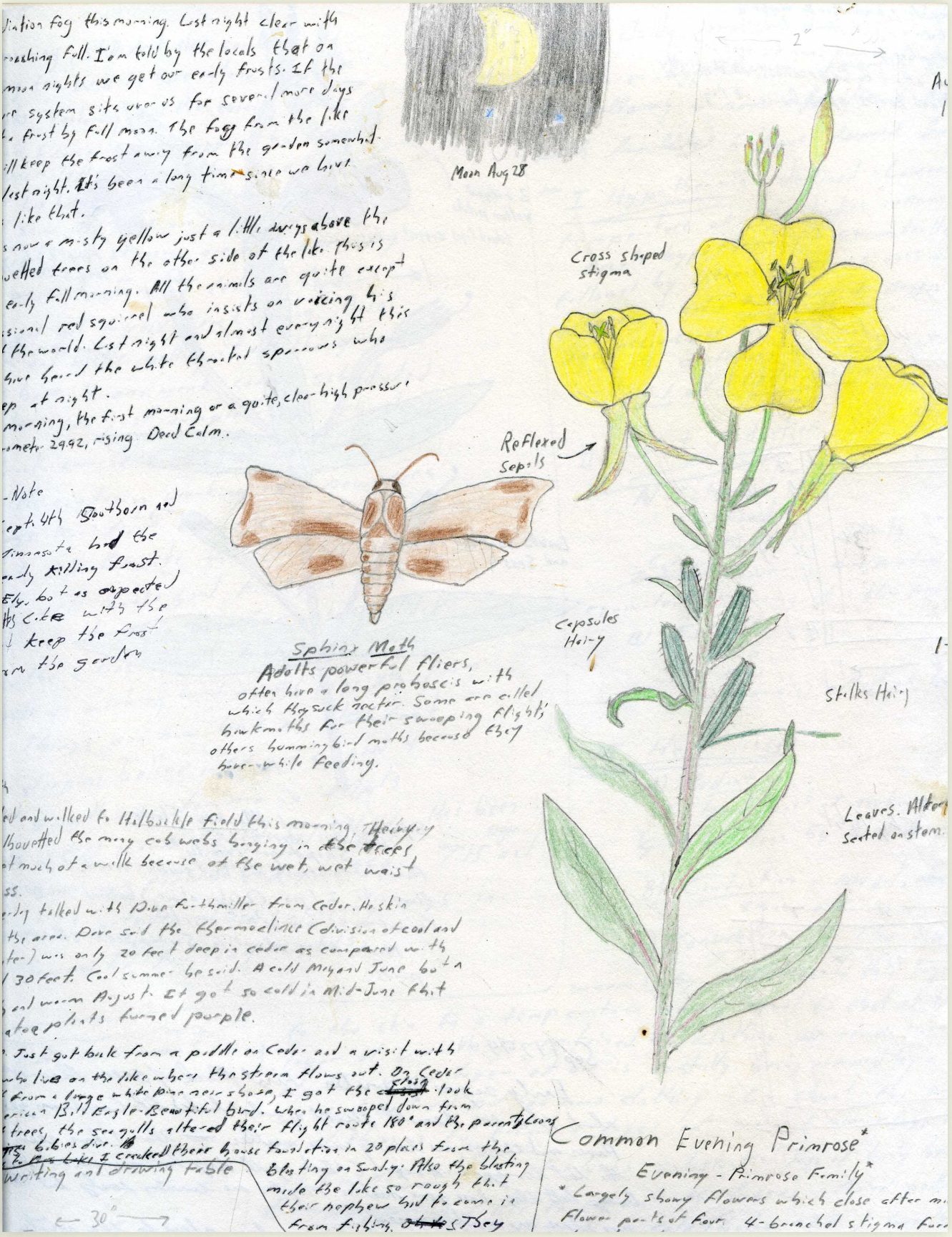
Seattle, cloudy

San Francisco, clear

Los Angeles, clear

Billings, Partly cloudy

Weather Journal, 1956, Will Steger (12 years old)



Phenology Journal, 1978, Will Steger

at 4:00 a.m.

October 4 1957

Russia launched the first Earth Satellite today. The Satellite can be picked up by a ham radio at 20.005 and 40,002 megacycles. It is estimated to be 23 inches in diameter, 187 pounds, going at 18,000 miles per hour, a stude 560 miles, circles the earth once every one hour and 31 minutes and estimated life not more than three weeks.

October 5 1957

Russia misplaced the decimal place. It Weights 18.7 pounds and goes around the earth every 93 minutes

October 20 1957

The Orionide meteor shower will reach it peak at the 21st at 20 meteor per hour. 2:20 - 4:00 I saw 15 meteors. The Orionide are swift in flight.

2:15 - 400

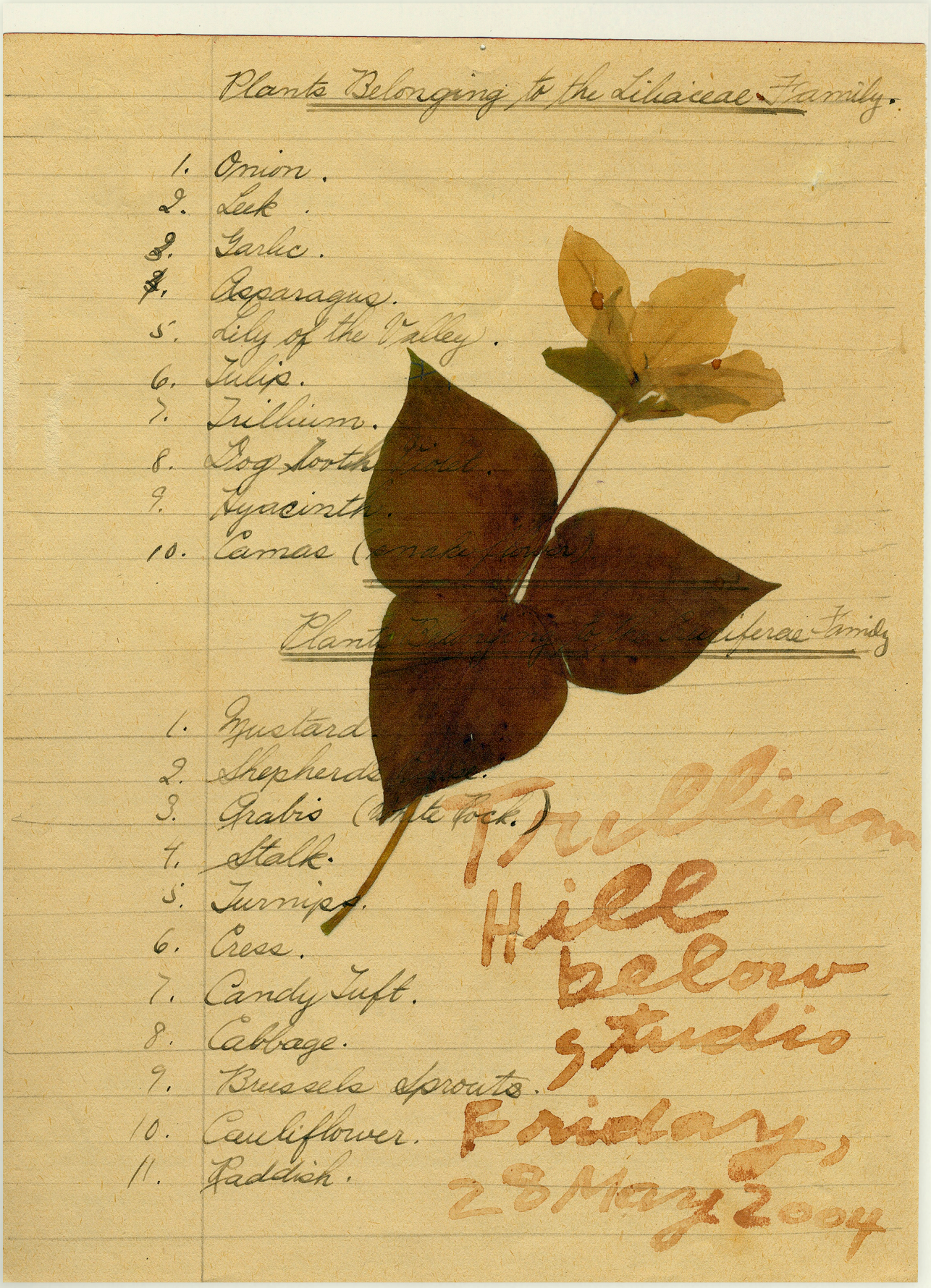
1 2:31, swift, Red, Magnitude 3d
2 2:34, swift, Red, long, Magnitude 1st
3 2:40, swift, Red, Magnitude 2d
4 2:42, swift, Red, train leaving meteor, Magnitude 1st
5 2:48, swift, Red, short, Magnitude 2d
6 2:51, swift, Red, long, train, Magnitude 2d
7 2:57, swift, Red, the only one going toward Orion, Magnitude 2d
8 3:01, swift, Red, long, train leaving meteor, Magnitude 1st
9 3:20, swift, Red, long, Magnitude
10 3:25, swift, Red, very faint, Magnitude 4th
11 3:28, swift, Red, short, faint, Magnitude 3d
12 3.32, swift, Red, train lasting 3 seconds, Magnitude 2d
13 3.46, swift, Red, magnitude 3d

Astronomy Journal-when Sputnik was launched, 1957, Will Steger (13 years old)

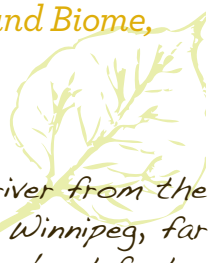
moon sets in ethereal pale blue across the lake
quarter of it luminous white, the rest faint orange
low and big above trees and close
it's magnetic, supernatural as it drops
by the time it's gone sky is a navy blanket of stars
in front of me as I grill
flying squirrels, small with dark bulging eyes,
glide serenely to and from trees around bird feeder
they land on silent feet chase each other up and down
like children in impossibly fast race cars
this is the first year I've seen them
they come out only when it gets dark

21 august 2004

Used with permission from the author (Copyright 2008 David Coggins)



Historical Journal Excerpt Describing Minnesota's Tallgrass Aspen Parkland Biome, from Henry Hind (1823-1908)



The ancient Lake Ridge...extends in an unbroken line, except where the river from the higher level in the rear has cut channels through it, from near Lake Winnipeg, far beyond the international boundary. At the crossing-place on the Roseau, about forty-six miles from the Red River, its height is estimated to be the same as at the Middle Settlement; it forms a beautiful dry gravel road wherever traversed, and suffers only from the drawback of being the favorite haunt of numerous badgers, whose holes in the flank, and sometimes also on the summit, are dangerous to horses; it is, apparently, perfectly level for a hundred miles, and everywhere, as far as my observation enabled me to judge, shows the same even rounded summit; it may yet form an admirable means of communication through the country, and it marks the limit of the good land on the east of Red River. This ridge is a favourite resort of the prairie hen (Tetro cupido), when they perform their curious dances in the early spring months.

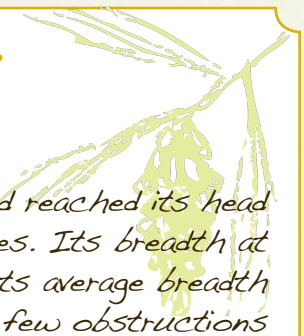
from: Narrative of the Canadian Red River Exploring Expedition of 1857 and Reports of Progress on the Assiniboine and Saskatchewan Exploring Expedition

Historical Journal Excerpt Describing Minnesota's Prairie Grassland, from Joseph Nicollet (1786-1843)

Thursday, June 28, 1838
We enter the Great Oasis, which offers the only direction to take without going into water several feet deep. This beautiful grove is surrounded by large lakes [Crooked, Great Oasis, Rush, and Bear] ornamented with aquatic plants, in which live innumerable families of muskrats and water birds. These lakes are from 7 to 12 feet deep, and the soil that surrounds them is suitable for potatoes and other vegetables. The distance through the grove is about 1½ miles. The growth of the various species forming it is as beautiful as any which can be seen in the basin of the lower Missouri. I will list the principle ones: 1. The linden [basswood] - 30 to 40 feet; the white birch - 20 to 30; swamp white oak- 20 to 30; swamp ash - 20 to 30; beaver wood [aspen] - 15 to 20; prickly ash - to 15 feet. As this oasis is protected from the spring and fall fires by the lakes which surround it, one can understand why the climate has been able to develop such a richness here. It is good testimony in favor of my opinion that all the prairies watered by the Mississippi and the Missouri are the work of the Indians who destroyed by fire the rich vegetation to assure themselves of animal food. Let the vast and shorn prairies that we cross remain untouched and the forests, with time will reappear.

from: 1838 Minnesota River and Blue Earth River Expeditions, Published 1843, Joseph N. Nicollet: On the Plains and Prairies, Pages 54-55, 66-67

Historical Journal Excerpt Describing Minnesota's Coniferous Foreset, from William Keating (1799-1844)



We entered Rainy-Lake River on the morning of the 28th of August, and reached its head early on the 31st. The length of this stream is about one hundred miles. Its breadth at its mouth is about four hundred yards; it becomes narrower above; its average breadth is three hundred yards; its current is rapid and uniform; there are very few obstructions to the navigation, there being but two places at which canoes are lightened and towed up. The longest of these is about one mile.

At its mouth the banks of this stream are low and marshy; beyond this they rise somewhat, but present few hills; the river runs in many places over a pebbly bed. The country assumes a more smiling appearance, which led us to anticipate the meeting with limestone rocks; we saw none along the river, but some precipices, seen at a distrance, were supposed from their horizontal stratification to be composed of limestone. On the river the rocks seldom appear in place; where we saw them they were principally mica-slate, sometimes, however, sienite. Dr. Bigsby found staurotide in the slate of this river.

from: Narrative of an expedition to the source of St. Peter's River, Lake Winnepeck, Lake of the Woods performed in the year 1823, by order of the Hon. J.C. Calhoun, Secretary of war, under the command of Stephen H. Long, Major U.S.T.E. Volume 1. Published: 1824

Historical Journal Excerpt from Minnesota's Deciduous Forest, from Jonathon Carver (1710-1780)

June 4, 1767
Came to the great meadows or plains. Here I found excellent good land and very pleasant country. [This is the area near Lake Pepin on the Wisconsin-Minneesota border.] One might travel all day and only see now and then a small pleasant grove of oak and walnut. This country is covered with grass that affords excellent pasturage for the buffeloe which here are very plenty. Could see them at a distance under the shady oaks like cattle in a pasture and sometimes a drove of an hundred or more shading themselves in these groves at noon day which afforded a very pleasant prospect for an uninhabited countyr.

We killed several of these buffaloes, one of which we all judged would weigh fifteen hundred weight and if the same could be fed as is common to fatten our tame cattle undoubtedly would weigh three thousand, they being by far the largest creatures in bulk that I ever saw...

from: Travels through the Interior Parts of North America in the Years 1766, 1767, and 1768. Published: 1778

Find more on each of these writers and hear more of their excerpts read outloud in the Will Steger Foundation online classroom within each biome's featured journal section.

Lesson 2: Minnesota's Changing Climate

What defines Minnesota's biomes?

Age Level:	Grades 3-8
Time Needed:	50 minutes
Materials:	Animal and plant biome cards (1 for each student) Map (1 for each student to paste in journal) Biomes table (1 for each student to paste in journal)
Student Learning Outcomes:	• Students will identify Minnesota's four main biomes. • Students will identify characteristic vegetation and animals found in each biome. • Students will describe and compare factors that define each biome.

Educator Prep:

- Cut out the animal and vegetation biome cards. Laminate for longevity. Make a classroom set that has equal numbers of plants and animals from each biome. Hole punch each card and put enough string through it so that it can hang around the student's neck.
- Using masking tape, make the shape of the map of Minnesota on the floor of your classroom large enough so that all of the students in your class would fit. Using chalk outside would work as well.
- Make copies of the Minnesota Biomes Table for each student
- Make copies of the Minnesota map of biome boundaries for each student (Note: color pdfs of the biome cards can be downloaded from the website at http://classroom.willstegerfoundation.org

Background Information

The Minnesota DNR uses the word "biome" to describe a biological community. Usually, biomes occur over large areas and include many similar plant communities and the animals that live in them. (MN DNR-Biomes Sheet)

Journal Assignment

At the end of this lesson, student journals should include the names of all four biomes, what defines them, a map of Minnesota that shows approximately where each biome is, and something unique about the biome where they live.

Activity Description

Introduction

1. Read out loud a journal excerpt from the biome where your school is located. These can be found in the Journals section of each biome in the online classroom at http://classroom.willstegerfoundation.org/. Ask the students to write an excerpt in their own journal that describes the plants and animals they see every day. Compare and contrast journal excerpts, discussing why there may or may not be similarities.
2. If there is time, read an excerpt from another biome and discuss.

I have spent much time alone on the porch this summer, reading and writing and other quiet things. The local animals have taken me as just another piece of furniture for they don't pay me any attention.

—Will Steger, August 17, 1974

The key is to be comfortable in order to relax and take in actually what is happening, the raw nature that is experienced: the sting of the wind on hands and nose, the freshness of the air, the beauty of the sky and land forms in such weather.

—Will Steger, Ely Homestead, January 25-27, 1977

Activity: Biome Meet and Greet

1. Ask each student to sit with their eyes shut. Hang a card around each of their necks with it hanging on their back. Explain that they will have to figure out what kind of animal or plant is on their back using yes or no questions, one per person in the class. Allow them to walk around the room asking other students.
2. Once they determine their animal or plant, they should still participate, helping other students out.
3. Ask students to take a seat. Explain that they are all wearing a plant or animal that is native to Minnesota. Show or draw a map of Minnesota on your blackboard, wipe board or smart board. Ask them to read silently about their animal or plant on the back of the card. In what biome are they found?
4. Ask students to stand up and walk over to the map you have made on the floor. They should go and stand in the part of the state where they are found. When they get there, ask them to introduce themselves to the other plants and animals nearby. Ask them to come up with ways they think they are related. This could be that they share a habitat, eat the same thing, eat each other, etc.
5. Ask the students to share some of the connections that they made on the map.

Concluding Activity: Explore the Biomes

1. Students can return to their seats. Using the panoramic view available on the online classroom (http://classroom.willstegerfoundation.org) show examples of each biome. Ask students to raise their hands when the biome their animal or plant is found in is being shown. Ask a few of them to share information about their animal or plant and how they fit into this particular biome.
2. Hand out the Minnesota biomes table and map and ask the students to paste it in their journal. Have them mark on the map where their animal or plant is found.
3. Discuss the biome where your school is found, ask if any of the students are familiar with the plants and animals described. Why or why not? Would they describe the area they live as being uniquely different from another biome in the state? How?
4. What else defines the different biomes of Minnesota besides its plants, animals and climate? For example where is agriculture common? Winter tourism? Forestry? Urban centers? If there is time, ask students to do the extension activity about how you might split up the state based on something other than biomes.

Journaling Connection

1. In their journal, the students should paste the photo of their animal or plant.
2. Ask the students to write a story about their plant or animal including what they know about the biome where the animal or plant lives.

Take It Outside—Connecting With Your Place

Materials
Field guides for your region
Journal

1. Ask students to turn to a page in their journal and make a line down the middle of the page to make two columns, label one plants and one animals (please remind them that insects are animals).
2. Take students out into the schoolyard, or to a nearby nature area if possible. Ask them to choose a place where they are comfortable to sit and are able to look all around them. Ask them to make a list of what they see. If they don't know the name of the animal ask them to sketch it. If you have digital cameras they could also take a photo, or if they have guidebooks they could use it to identify whatever they are observing.
3. Return inside and make a list on the board of what was seen. Look back at the list of common animals and plants found in your biome. Were any of these seen? Discuss why or why not you may have seen them.

Extensions

1. Ask students to research the animal or plant they were in the biome meet and greet game. Create a classroom encyclopedia of Minnesota plants and animals.
2. Ask students to write a story from the perspective of the animal or plant they were in their biome meet and greet.
3. Use the outline map of Minnesota and ask students to create a map that shows how they might divide the state based on tourism, economy, etc.

Online Classroom Connection

Visit http://classroom.willstegerfoundation.org

1. Explore each biome virtually. Watch the intro video for each biome.
2. Connect with another classroom in another biome and use Skype (web conference) to discuss the different or similar animals and plants they see outside their window.
3. Upload photos and journal entries to http://classroom.willstegerfoundation.org/get-social/share-your-observations. Look through other photos uploaded by students around the state.

Resources

Minnesota DNR. *Biomes of Minnesota.*
http://www.dnr.state.mn.us/biomes/index.html

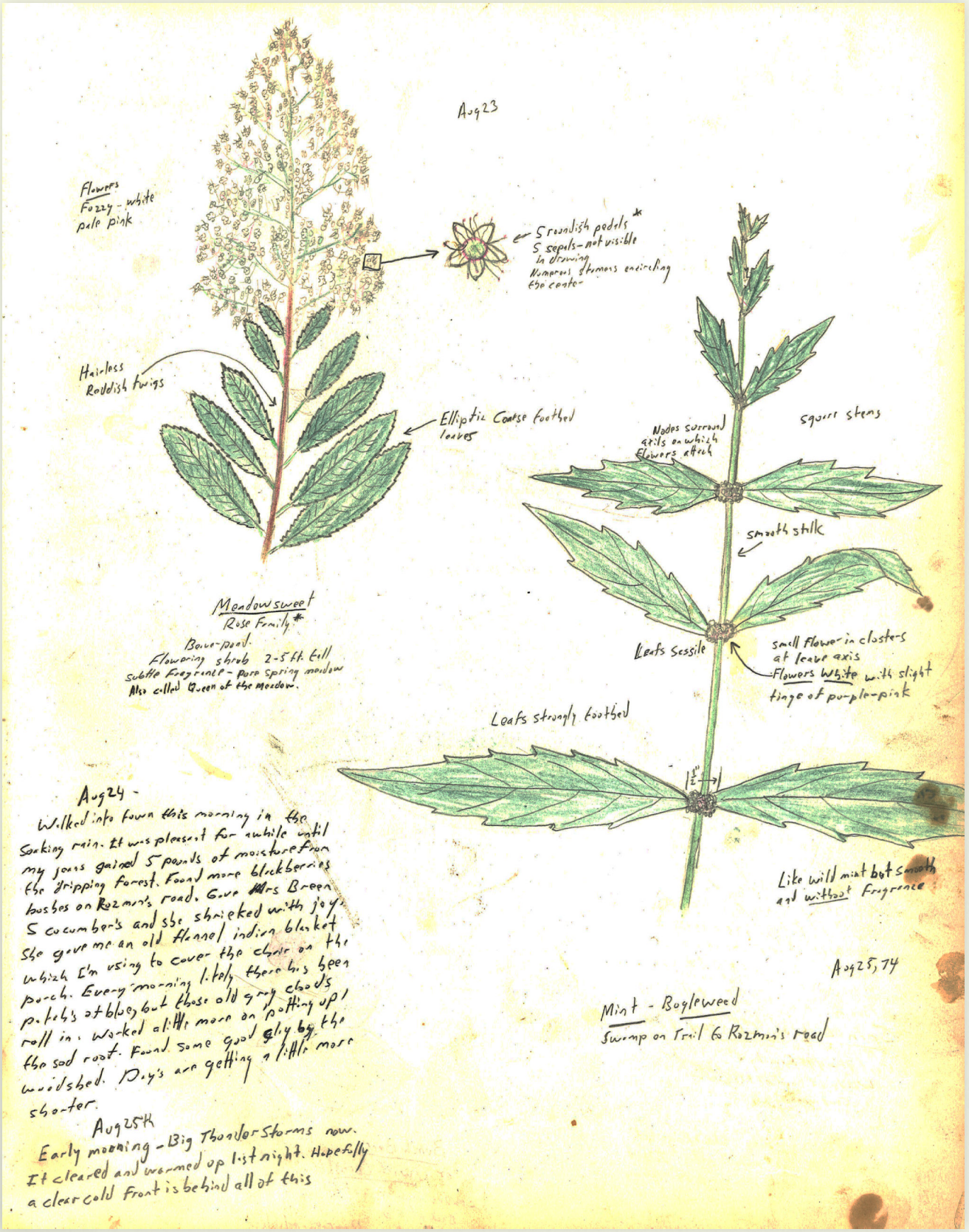
Enature (online field guide)
http://www.enature.com/home/

Feather Atlas
http://www.lab.fws.gov/featheratlas/

Ely Homestead
Aug 17th, 1974

Another clear day. It's 8:00am, 57° and barometer steady. There are also a few small patches of altocumulus and fracto-cumulus clouds. The fracto-cumulus are a sign of later thundershowers. There is a squirrel perched by the railing in his usual spot eating balsam pine cones. He is watching me and eating at the same time. Last night he sat on my lap when I was reading. I have spent much time alone on the porch this summer, reading and writing and other quiet things. The local animals have taken me as just another piece of furniture for they don't pay me any attention. I have watched a white throated sparrow family grow. Soon the young will be on their own.

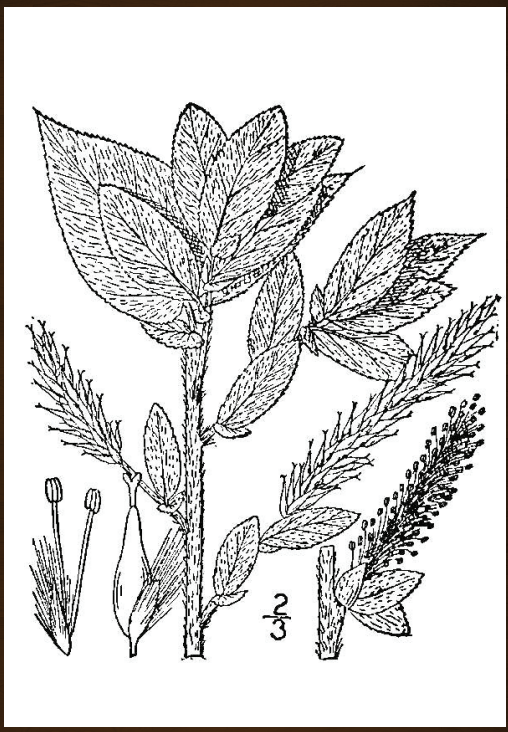
Quiet morning, the sound of a few August flies, a noisy blue jay family down the lake, pine cones falling and hitting branches as the squirrels begin to harvest and stock up for the winter, peep-peep-peep of the white throated sparrow and the wind in the poplars across the lake. A ruby-throated hummingbird was hovering around the trees this morning in front of the porch. I have seen him a score of times this summer near the cabin.



Phenology Journal, Will Steger, 1978

Phenology Journal, Will Steger, 1978

Phenology Journal, Will Steger, 1978



Heart-Leaved Willow

Salix cordata

Biome: Tallgrass Aspen Parkland

Heart-leaved willow is a perennial plant that is found in sandy soils, often on the shores of a lake.

Aspen

Populus tremuloides

Biome: Tallgrass Aspen Parkland

Aspen leaves are 1 to 4 inches long with a broad oval shape and finely toothed edges. They become yellow in the fall. Aspen trees have a white to grey-green bark that is thin and smooth. Aspen grows quickly and grows in space left by a fire or harvest. Aspen can grow well on sandy soil but grows best on a more nutrient-rich soil.

Small White Lady's Slipper

Cypripedium candidum

Biome: Tallgrass Aspen Parkland

Habitat: Prairies and grasslands

Threats: Loss of habitat, listed as Minnesota State Special Concern Species

The small white lady's slipper is a perennial plant that blooms in the spring—usually by early June. It can be 4 to 13 inches tall. The small white lady's slipper has one flower per stem that is white and shaped like a pouch, and this can have some purple spots or streaks. The flower column in the middle of the pouch is yellow. There are also two twisted side petals that are a greenish shade. This wildflower is threatened by loss of habitat due to land use change from prairie to agriculture or an urban environment, and invasion of weeds or more woody forest species.

Wiregrass Sedge

Carex lasiocarpa

Biome: Tallgrass Aspen Parkland

Wiregrass sedge is a perennial herb that grows in bogs and marshes, often in shallow water. It has very thin leaves and stems that can grow to about 3 feet. Wiregrass sedge has the characteristics that allow it to form a floating mat structure in a bog.

Sharp-Tailed Grouse

Tympanuchus phasianellus

Biome: Tallgrass Aspen Parkland

Diet: Seeds in the summer and fall; buds and twigs in the winter

Threats: Loss of open brushland and grassland, the suitable sharp-tailed grouse habitat

The range of sharp-tailed grouse in Minnesota has declined significantly due to the decline in their habitat. This brown and grey grouse is 15 to 20 inches long and weighs from 2 to 3 pounds. Its predators include great horned owls, foxes, skunks and raccoons.

Little Bluestem

Schizachyrium scoparium

Biome: Tallgrass Aspen Parkland

Little bluestem begins to grow in August with the appearance of its thin blue or blue-green stems. In can grow to be about 3 feet tall and becomes a deep red color in the fall. In the winter, little bluestem produces fuzzy white seeds that attract birds. The deep, dense root system of little bluestem allows it to be less susceptible to droughts and grow successfully in the drier prairie soils. Little bluestem also serves as habitat for many animals.

American Bittern

Botaurus lentiginosus

Biome: Tallgrass Aspen Parkland

Diet: Fish, insects, amphibians, crayfish, small mammals, snakes

Habitat: Freshwater wetlands

Threats: Habitat loss, Minnesota Species of Greatest Conservation Need

The American bittern is 23 to 34 inches long. It is well camouflaged in its wetland habitat and feeds by slowly following its prey or waiting for it to approach.

Sandhill Crane

Grus Canadensis

Biome: Tallgrass Aspen Parkland

Diet: Omnivore—grains, plants, insects, worms, mice, snakes

Habitat: Wetlands

Threats: Loss of wetland habitat

Sandhill cranes find most of their food in shallow wetlands and wetland soil, but they are also able to find seeds, such as corn, that have been planted in agricultural land. This can damage crops and cause conflicts with farmers. Sandhill cranes have a red crown on their heads and are grey, however, they often appear brown because they groom themselves with mud from their wetland area.


Family Cervidae
Cervus elaphus canadensis
E. C. Oaks
ASM - MIL


© Smithsonian Institution

American Elk

Cervus elaphus

Biome: Tallgrass Aspen Parkland

Habitat: Forests and open areas

Diet: Plants such as grasses and woody plants, including parts of aspen trees

Threats: Winter habitat loss, forests are needed and can be lost due to land use change

The American elk requires both forested habitat as well as open areas since forest offers the cover and protection while open areas offer the grasses and other plants that American elk eats. The American elk eats a wide variety of plants, so they will eat what is available. The American elk also has different summer and winter coats that have different appearances.

Canadian Toad

Bufo hemiophrys

Biome: Tallgrass Aspen Parkland

Diet: Insects, worms

Habitat: Woodlands, near water

The Canadian toad is 2 to 3.5 inches and is active at night. It digs burrows and its habitat includes more water than the habitats of other toads in Minnesota. Its main predator is the hognose snake as well as raccoons and skunks.

Northern White Cedar

Thuja occidentalis

Biome: Coniferous Forest

Threats: Structures that restrict movement of water through soil, such as roads, pipelines or beaver dams

Northern white cedar requires an area where water moves well through the soil in order to grow successfully. They can grow to be 50 to 60 feet tall. Northern white cedar will grow near black spruce on wetter soils and aspen on drier soils. This is a shade-tolerant tree. White-tailed deer and snowshoe hares feed on the seedlings, and this can damage a young, growing population.

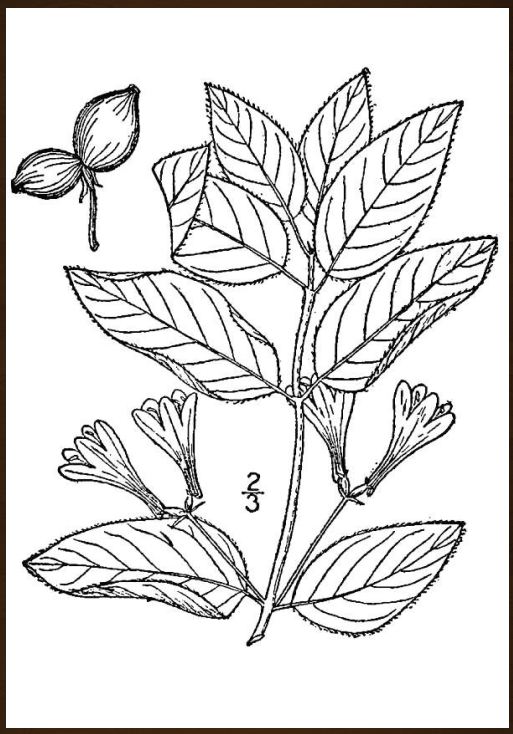
Black Spruce

Picea mariana

Biome: Coniferous Forest

Threats: Eastern dwarf-mistletoe

Black spruce trees often grow in areas after fires have occurred, and produce cones to reproduce. They grow on wet soils and can live for 200 years. Black spruce trees are harvested primarily for pulp as well as Christmas trees and lumber. The spruce grouse relies on black spruce trees for its habitat.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Red Pine

Pinus resinosa

Biome: Coniferous Forest

Red pine's bark is red-brown plates, the leaves are dark green needles and it produces light brown cones. It often grows in areas after fires and can grow to be 60 to 80 feet high. Red pine grows on dry soils, does not tolerate shade and grows well in cold environments. Red pine is a habitat for many animals as well as food for deer and snowshoe hares. Birds, mice and chipmunks eat red pine seeds. Red pine is grown for a variety of uses including pulp and lumber.

Balsam Fir

Abies balsamea

Biome: Coniferous Forest

Threats: Spruce budworm insect; needle rust and root rot disease; easily killed by fires

Balsam fir grows well in cool, damp environments. It has smooth, gray bark, narrow leaves that are ½ to 1 inch long and purple cones. It can be 60 feet high and live for 100 years. It can also grow in shady conditions, so it can grow under forests under other trees. Balsam fir serves as food and habitat for a variety of species such as moose, white-tailed deer, snowshoe hare, red squirrel and grouse. Balsam fir is also used for pulp, Christmas trees and lumber.

Wood Frog

Rana sylvatica

Biome: Coniferous Forest

Diet: Small invertebrates

Habitat: Forests, bogs

The wood frog has a dark band over its eyes that appears to be a mask. It is 2 to 2.75 inches long. The wood frog breeds in bodies of water and then often moves far from these areas, into the forest. It lives well in cold climates.

Fly Honeysuckle

Lonicera canadensis

Biome: Coniferous Forest

Fly honeysuckle is perennial shrub that is about 7.5 feet high. It has yellow and white flowers that are in bloom April to July. This plant is beneficial to hummingbirds and butterflies.


Family Canidae
Canus lupus
L. L. Master
ASM - MIL


Family Cervidae
Alces americanus
J. O. Wolff
ASM - MIL

Compton's Tortoise Shell Butterfly

Nymphalis vaualbum

Biome: Coniferous Forest

The Compton's tortoise shell caterpillars depend on aspen, cottonwood, willow, gray birch and paper birch trees. The butterfly emerges as an adult in July and has a wing span of 2.5 to 3 inches.

Boreal Chickadee

Poecile hudsonicus

Biome: Coniferous Forest

Diet: Seeds and insects

Habitat: Spruce and fir forests

Threats: Destruction of spruce and fir forests due to industry and climate change

Boreal chickadees are often omnivores that eat seeds and insects. They store seeds and insect larvae for the winter. They find food in groups, except during breeding. They construct their nests in holes in trees and do not migrate during the winter.

Moose

Alces alces

Biome: Coniferous Forest

Diet: Aspen, maple and cherry trees and aquatic plants

Habitat: Forests

Threats: Warmer climate

Moose weigh 950 to 1,000 pounds, making them Minnesota's largest wild animal. They have strong senses of smell and hearing. Moose are very stressed by warmer temperatures, which makes them more susceptible to diseases. Wolves and bears are moose predators.

Gray Wolf

Canis lupus

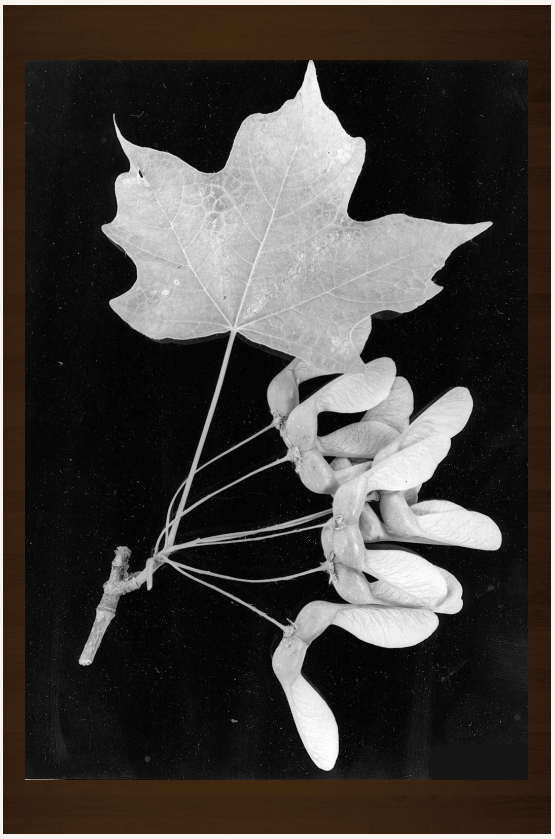
Biome: Coniferous Forest

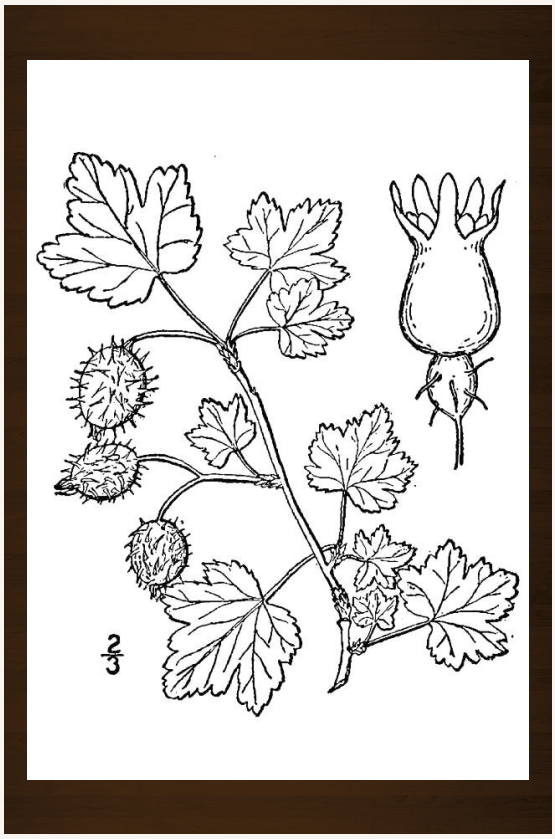
Diet: Small mammals and deer, moose and beavers

Habitat: Forests

Threats: Endangered Species

Gray wolves live in packs that are made up of 5 to 12 wolves. The pack hunts together, which allows them to catch the larger animals. Gray wolves weigh 60 to 120 pounds and their sense of smell is 100 times stronger than humans.





American Basswood

Tilia americana

Biome: Deciduous Forest

The American basswood tree has white-yellow flowers that bloom around June and are fragrant. It grows in forests with sugar maple trees as well as northern red oaks. American basswood can be 60 to 80 feet high with gray bark. Its leaves are 3 to 6 inches long and heart-shaped.

Northern Red Oak

Quercus rubra

Biome: Deciduous Forest

Threats: Oak wilt fungus and gypsy moths

Northern red oak grows quickly and can be 55 to 80 feet tall. Its leaves are 5 to 9 inches long and they turn bright red in the fall. It provides a good habitat for many animals. The northern red oak also produces acorns. These, as well as leaves and seedlings, are food for deer, elk, moose and rabbits. Northern red oak is harvested for lumber and grows well in urban areas. Oak wilt fungus has become a serious threat to northern red oak trees in Minnesota.

Prickly Gooseberry

Ribes cynosbati

Biome: Deciduous Forest

Prickly gooseberry is a perennial shrub that is about 36 inches tall. Its flowers are a green-yellow color and bloom in May or June. It also has a bristly, purple berry that birds often eat.

Sugar Maple

Acer saccharum

Biome: Deciduous Forest

Threats: Asian long-horned beetle

Sugar maple grows to a height of 80 feet or more. It grows slowly and can grow well in shady conditions. Its leaves are 3 to 5 inches long with 3 to 5 points. Sugar maple is used for lumber and it also produces maple syrup.

Eastern Hognose Snake

Heterodon platyrhinos

Biome: Deciduous Forest

Diet: Toads primarily and small mammals

Habitat: Edge of forests, on sandy soil

The eastern hognose snake is not venomous and its predators are hawks and other mammals. This snake is usually 24 to 46 inches long and can be a variety of colors: yellow, gray, brown or black

Rue Anemone

Anemonella thalictroides

Biome: Deciduous Forest

Rue anemone is a perennial flower that often grows in shady areas. Its flowers can be white or light purple and it blooms in April or May. This flower grows in areas of healthy soil.

Eastern Pipistrelle Bat

Perimyotis subflavus

Biome: Deciduous Forest

Diet: Insects such as moths, flies, beetles, ants

Habitat: Caves, primarily

Threats: Minnesota Species of Special Concern, disturbance during hibernation

The eastern pipistrelle bat is the smallest bat species in Minnesota. It is known as a tricolored bat because of the variation in color of its individual hairs. This bat hibernates from October to April in caves or tunnels.

Cerulean Warbler

Dendroica cerulean

Biome: Deciduous Forest

Diet: Insects

Habitat: Large areas of deciduous forest

Threats: Loss of forest habitat

The cerulean warbler migrates a long distance to South America for the winter, and it arrives in Minnesota around May each year. The cerulean warbler lives in forests with oak, maple and basswood trees. It lives in forest areas with older, mature trees.

Eastern Spotted Skunk

Spilogale putorius

Biome: Deciduous Forest

Diet: Insects and small rodents

Habitat: Woodlands, thickets, brush

Threats: Minnesota Threatened Species

The eastern spotted skunk is 18-22 inches long and its tail usually has a white tip. This skunk lives in dens during the winter and is an extremely rare species. They eat primarily insects and small rodents but will eat almost anything they can find.

Gray Fox

Urocyon cinereoargenteus

Biome: Deciduous Forest

Diet: Small mammals such as rabbits

Habitat: Forest

The gray fox can be identified by the dark stripe along its back and bushy tail. It is 35 to 40 inches long. The gray fox can climb trees, which is a unique characteristic for this type of animal. Its main predator is the coyote.

Blazing Star

Liatris spicata

Biome: Prairie Grassland

Blazing star is a perennial that can be 18 inches tall. Its pink-purple spike blooms in August.

Big Bluestem

Andropogon gerardii

Biome: Prairie Grassland

Big bluestem is a perennial grass that grows in moist soil. It has a blue tint and there is a purple flower cluster at the top of this grass. Big bluestem provides nesting habitat for birds and insects. Songbirds and prairie chickens also eat its seeds while white-tailed deer and bison eat the grass itself. This grass can also be grazed by livestock.

Prairie Dropseed

Sporobolus heterolepis

Biome: Prairie Grassland

Prairie dropseed is a grass that grows to about 2 feet tall and has orange flowers. These flowers are in bloom beginning in late summer.

Purple Prairie Clover

Petalostemum purpureum

Biome: Prairie Grassland

Purple prairie clover is a perennial that is 1 to 3 feet tall. Its purple flowers are in bloom from July to September. This plant attracts many butterfly species.

Great Plains Toad

Bufo cognatus

Biome: Prairie Grassland

Diet: Insects and earthworms

Habitat: Damp areas in prairies, farm fields

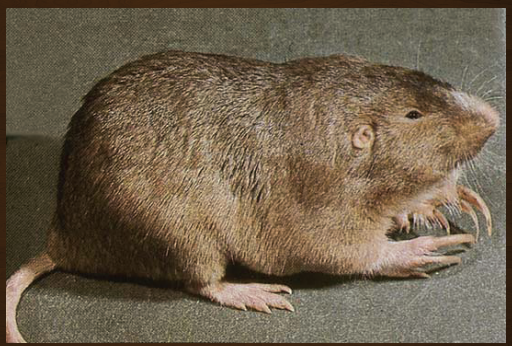
The great plains toad is 2 to 3.5 inches long, making it Minnesota's largest toad. They breed in bodies of water, so this habitat must also be nearby. This toad burrows into the ground for shelter.

Leadplant

Amorpha canescens

Biome: Prairie Grassland

Leadplant is a perennial that has blue or purple flowers. It is from 1 to 3 feet tall and its flowers are in bloom from late spring to summer.



Upland Sandpiper

Bartramia longicauda

Biome: Prairie Grassland

Diet: Insects

Habitat: Prairies

Threats: Species of Greatest Conservation Need, loss of habitat

The upland sandpiper is about 1 foot tall. Other sandpiper species live near water, but the upland sandpiper lives in a prairie habitat. Upland sandpipers migrate to South America for the winter and arrive in Minnesota in April or May.

Greater Prairie Chicken

Tympanuchus cupido

Biome: Prairie Grassland

Diet: Plants and insects

Habitat: Open prairies

Threats: Minnesota Species of Special Concern, loss of habitat

The greater prairie chicken nests in tall grass and is well known for its displays during the mating season. Its predators are red-tailed hawks and great-horned owls. The greater prairie chicken's habitat is threatened as it is being lost to agriculture or forest.

Badger

Taxidea taxus

Biome: Prairie Grassland

Diet: Insects and small mammals such as mice and gophers

Habitat: Prairies

The badger is 20 to 35 inches long and lives primarily underground. It can be identified by the white stripe from its nose to the base of its neck. The badger is a nocturnal animal.

Plains Pocket Gopher

Geomys bursarius

Biome: Prairie Grassland

Diet: Plants

Habitat: Prairies

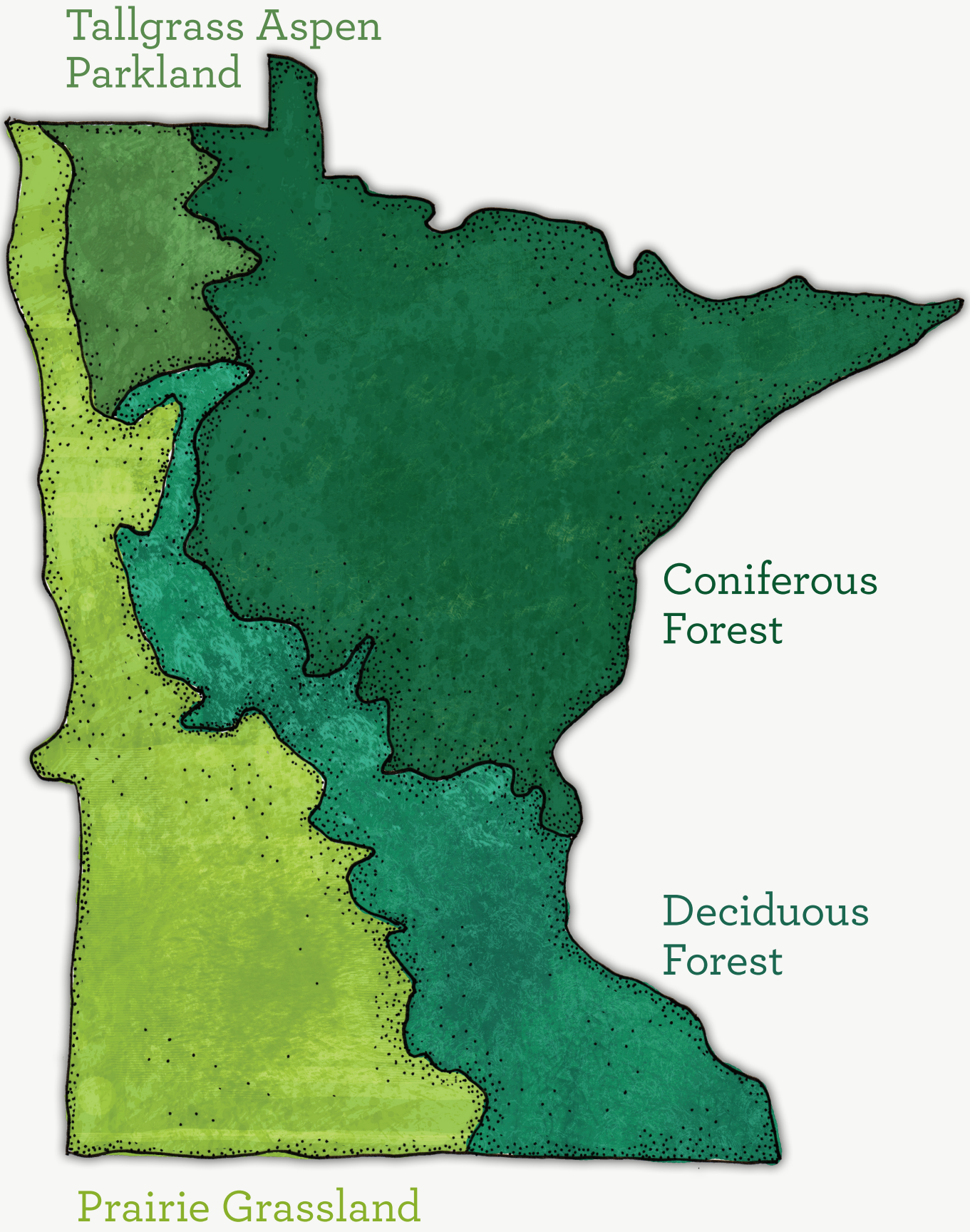
The plains pocket gopher is about 1 foot long and its tail has a white tip. It digs underground tunnels in the spring and fall and lives mostly underground. The plains pocket gopher lives in areas with sandy soil.

Minnesota Biomes Table

"Biome" is a term used to describe a biological community. Usually, biomes occur over large areas and include many similar plant communities and the animals that live in them. The table below shows examples of conditions within Minnesota's biomes.

	Average Annual Precipitation	*Average Annual Temperature*	*Vegetation Examples*	*Animal Examples*	*Average Growing Season Length*
Tallgrass Aspen Parkland Biome	20" – 22"	35° – 44° F	-Aspen -Heart-leaved Willow -Winegrass Sedge -Small White Lady's Slipper -Little Bluestem	-Sharp-tailed Grouse -Sandhill Crane -American Bittern -Canadian Toad -American Elk	90-130 days
Coniferous Forest Biome	21" – 32"	36° – 41° F	-Black Spruce -Northern White Cedar -Balsam Fir -Red Pine -Fly Honeysuckle	-Wood Frog -Boreal Chickadee -Compton's Tortoise Shell Butterfly -Gray Wolf -Moose	90 – 100 days
Deciduous Forest Biome	24" – 35"	39° – 45° F	-Northern Red Oak -American Basswood -Sugar Maple -Prickly Gooseberry -Rue Anemone	-Eastern Hognose Snake -Cerulean Warbler -Eastern Pipistrelle Bat -Gray Fox -Eastern Spotted Skunk	100 – 130 days
Prairie Grassland Biome	18" – 33"	37° – 45° F	-Big Bluestem -Blazing Star -Purple Prairie Clover -Prairie Dropseed -Leadplant	-Great Plains Toad -Greater Prairie Chicken -Upland Sandpiper -Pocket Gopher -Badger	130 – 180 days

For a fun way to learn about Minnesota's biomes, plants, and animals, check out the Junior Park Naturalist Program at a state park near you, or call the DNR's Information Center at (651) 296-6157 (metro area) or 1-999-646-6367 (toll free).


Tallgrass Aspen Parkland
Coniferous Forest
Deciduous Forest
Prairie Grassland

Lesson 3: Minnesota's Changing Climate

What defines Minnesota's Climate?

Age Level:	Grades 3-8
Time Needed:	50-75 minutes
Materials:	Normal Annual Precipitation handout (1 per student or projection) Normal Annual Mean Temperature handout (1 per student or projection) Graphing paper Colored pencils for graphing
Student Learning Outcomes:	• Students will define climate and weather. • Students will define climate change. • Students will define phenology. • Students will gather their own weather data from their school site and record it in their journals. • Students will graphically represent authentic data from Minnesota's Climatology site. • Students will make three predictions of how a change in climate might affect Minnesota's biomes.

Background Information

This lesson will introduce the terms weather, climate and phenology. These terms are essential to understanding climate change and how it is impacting and will impact biomes. As discussed in lesson 2, climate is an important and defining characteristic of the biomes of Minnesota.

The difference between weather and climate is an essential concept to understand when learning about climate change. Minnesota climatologist Mark Seeley defines climate as the "quantitative description of historical weather for a given place over a given interval of time … [climate descriptions] include the physical and biological features of Earth's surface, their interactions and atmospheric feedbacks." In other words, climate is not just one instance of snow or rain or heat, but the many weather events over long periods of time (multiple years) that define a particular geographical area as hot and dry, cold and wet, etc.

Weather, on the other hand is "… the recent, current, and near-future state of the atmosphere. The most common elements include temperature, humidity, precipitation, cloudiness, visibility and wind." Weather is what is going on outside your window right now and one instance of weather does not define a particular area or a particular climate.

According to the USA National Phenology Network; "Phenology refers to recurring plant and animal life cycle stages … such as leafing and flowering, maturation of agricultural plants, emergence of insects, and migration of birds. Many of these events are sensitive to climatic variation and change. …" (http://www.usanpn.org/) Keeping track of the phenology outside your school can be a fun way for students to make connections between the physical factors related to climate and the biotic reactions by flora and fauna. Regardless of where your school is located, students will be able to observe phenology, and it is an excellent way to draw connections between climate and living things.

I always had an incredible interest in weather. I wanted to be able to predict the weather, understand where the weather came from.

—Will Steger. Interview, August 2010

In pre-spring the weather systems really come and go. The constant sound of wind seems like continual music.

—Will Steger, Ely Homestead, March 4, 1972

As usual, the weather dictated the mood of the day.

—Will Steger, Ely Homestead, September 28, 1971

Journal Assignment

At the end of this lesson, student journals should contain a definition for weather, climate and phenology, two graphs that show average temperature and precipitation for each of the four biomes, and three predictions of possible impacts on Minnesota biomes from changes in temperature and precipitation.

Activity Description

Introduction

1. Pre-write...
   A. If you were going to describe to someone who has never been to Minnesota, what the climate of Minnesota is like, how would you describe it? Would you compare or contrast it with somewhere else so that they would be able to picture it? Where?
   B. If you were going to describe to someone what the weather is like today, how would you describe it?
   C. What is the weather like today for the animal or plant you "met" in lesson 2? Look on the map and describe what you think of when you think of the climate of the biome where that animal or plant is found.
2. Share with your neighbor what you wrote. Did you write similar things for A and B?

Activity: What are climate, weather and phenology?

1. Tell the students that climate, weather, and how climate affects living things (phenology) will be the topics of the day. Use the background information to explain weather, climate and phenology. Make sure students conclude the discussion with clear definitions of all three written in their journal.
2. On the board make four bubbles and write Fall, Winter, Spring, Summer in each bubble. Draw two lines from each bubble with a bubble on the end (see diagram below). In one bubble write weather and in one bubble write phenology. Repeat for each season. Ask the students to describe each season to them in terms of the common weather they might observe and make a concept map off of the weather bubble.
3. Explain to the students the concept of phenology, and ask them to help make a concept map of common phenology of the season you are working on as a group. See the example below.

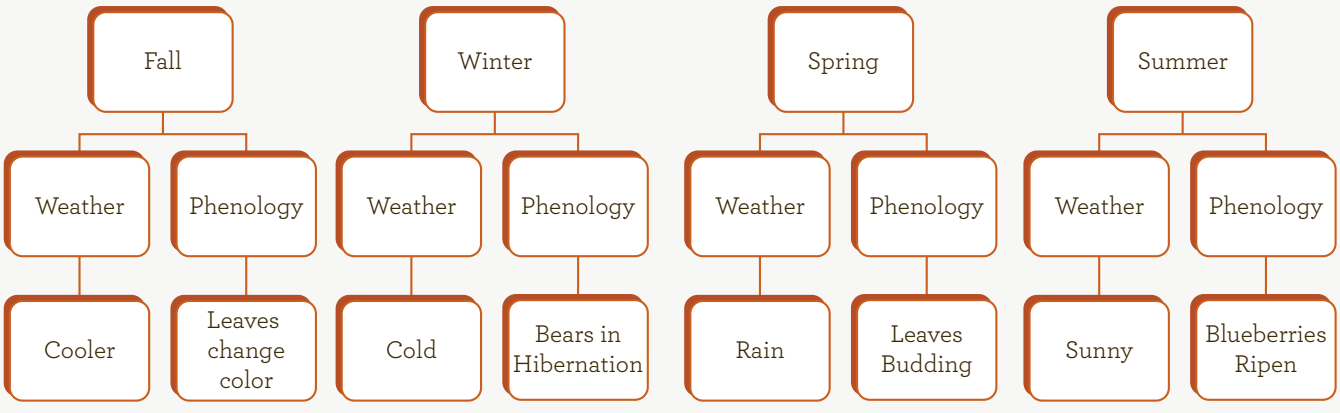


Figure 1: Common Minnesota Seasonal Weather and Phenology

4. In their journals and individually, ask the students to repeat for the other three seasons. If there is time, ask them to share.
5. At this point the students could be led outdoors to do the weather report and phenology activity in the Take It Outside section, or continue to the interpretation of data activity.

Activity: Interpretation and Representation of Data

1. Hand out or project the Minnesota map of *Normal Annual Mean Temperature* and *Normal Annual Precipitation*. Ask the students what the maps show. Point out the different colors and ask what they represent.
2. Hand out the worksheets found on page 53. You may need to guide them through the worksheet together as a group, or if your students are comfortable with graphing you could ask them to make a graph on their own without the graph "blanks." An example graph is provided below.

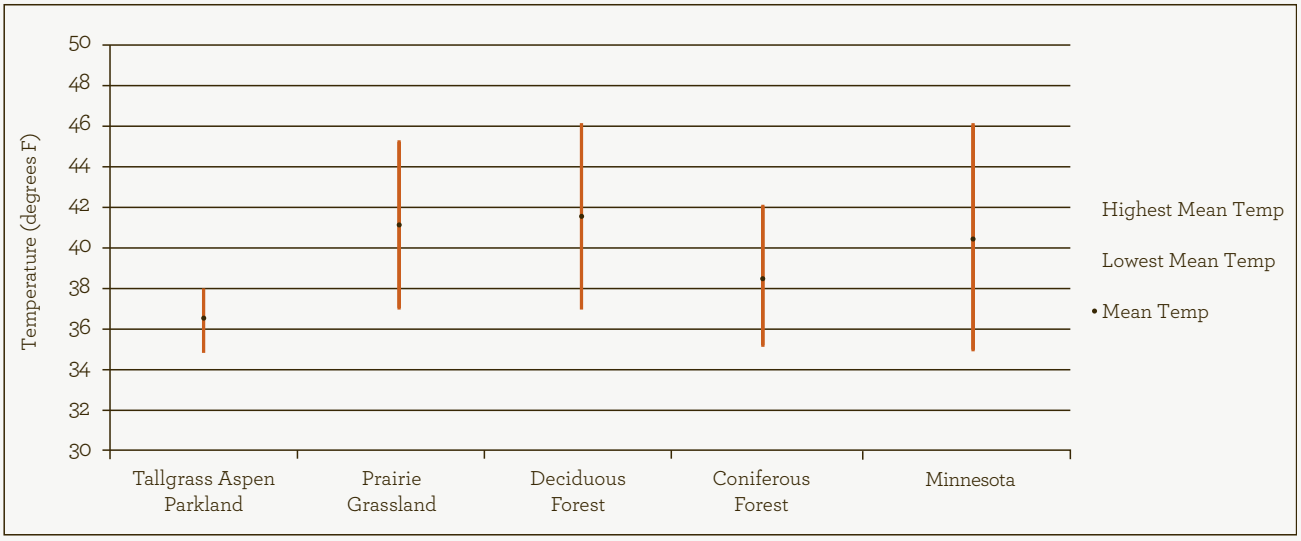
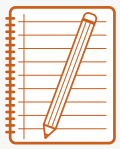


Figure 2: Mean Temperature Range of Minnesota Biomes

Concluding Activity: Climate and Biomes

1. Discuss in small groups or as a class what the graphs tell us about Minnesota's biomes and climate, individually and also when combined. Do the students prefer the maps or the graphs as ways of showing the date?
2. Is there a mean temperature and/or precipitation where all biomes could exist? If temperatures and precipitation were to change in each biome, what could that mean for the plants and animals commonly found there? Refer back to the table describing biomes (page 41).
3. Emphasize the importance of climate in defining each of the biomes. Discuss how a change in temperature or precipitation might affect the animals and plants of a biome and/or the phenology of a particular species.
4. Ask the students to make three predictions of how either more or less precipitation, warmer or colder weather or a combination of factors might affect specific plants or animals in a biome. Write the predicitons in their journal and paste in their worksheets and graphs.



Journaling Connection

Students will use their journals to record weather observations. Ask the students what information they think would be important to record every day and make a table for students to paste or create in their journal. Include research on historical weather events for the day and common phenology as a part of this.

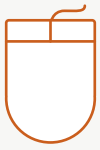
Take It Outside—Connecting With Your Place

Materials:
Journal and writing utensil
Thermometer
Rain gauge
Anemometer

1. Based on weather reports they look at online or that are clipped from the paper, brainstorm with your students a list of things that would be important to include in a weather report. This list could include precipitation, temperature, wind speed and direction, historical highs and lows, historical average and important historical events.
2. Take your students outside and ask them to make their own weather reports in their journal. Provide thermometers, rain gauge and the Beaufort scale if you do not have an anemometer to measure wind speed. Also ask them to take a photo or draw an image that they might include to represent that day's weather.
3. After students have recorded their weather data, ask them to make a phenological observation. Can they see any birds or insects? Are there leaves on the trees? What color are they?

Extensions

Continue to make weather observations and phenology every morning with your class. Keep a weather log or journal for the class and maintain it over time so that the data can be used for graphing or, if kept over a period of years, compared to past years.



Online Classroom Connection

Visit http://classroom.willstegerfoundation.org

1. In the learning module of the online classroom click on "Climate Change Basics" and then "From Ice Age to Today," to learn more about how Minnesota's climate has changed over time and to play the game.
2. Submit your weather observations and data to the online classroom via the share button.

Weather Resources

Watch Dr. Mark Seeley's talk on weather vs. climate at:
http://vimeo.com/15885303

National Weather Service Weather and Climate Data
http://www.weather.gov

Minnesota Historical Climate Data
http://climate.umn.edu/doc/historical.htm

Hey-How's the weather?
http://www.dnr.state.mn.us/young_naturalists/weather/index.html

Climate-Minnesota DNR
http://www.dnr.state.mn.us/climate/index.html

Current Conditions
http://www.dnr.state.mn.us/current_conditions/index.html

Minnesota Weather Guide Calendar. Freshwater Society

Paul Douglas Weather Column
http://pauldouglasweather.blogspot.com/

Phenology Resources

Gilbert, Jim. *Jim Gilbert's Minnesota Nature Notes*. Minneapolis: Nodin Press, 2008.

Minnesota Phenology Network
http://phenology.cfans.umn.edu/index.htm

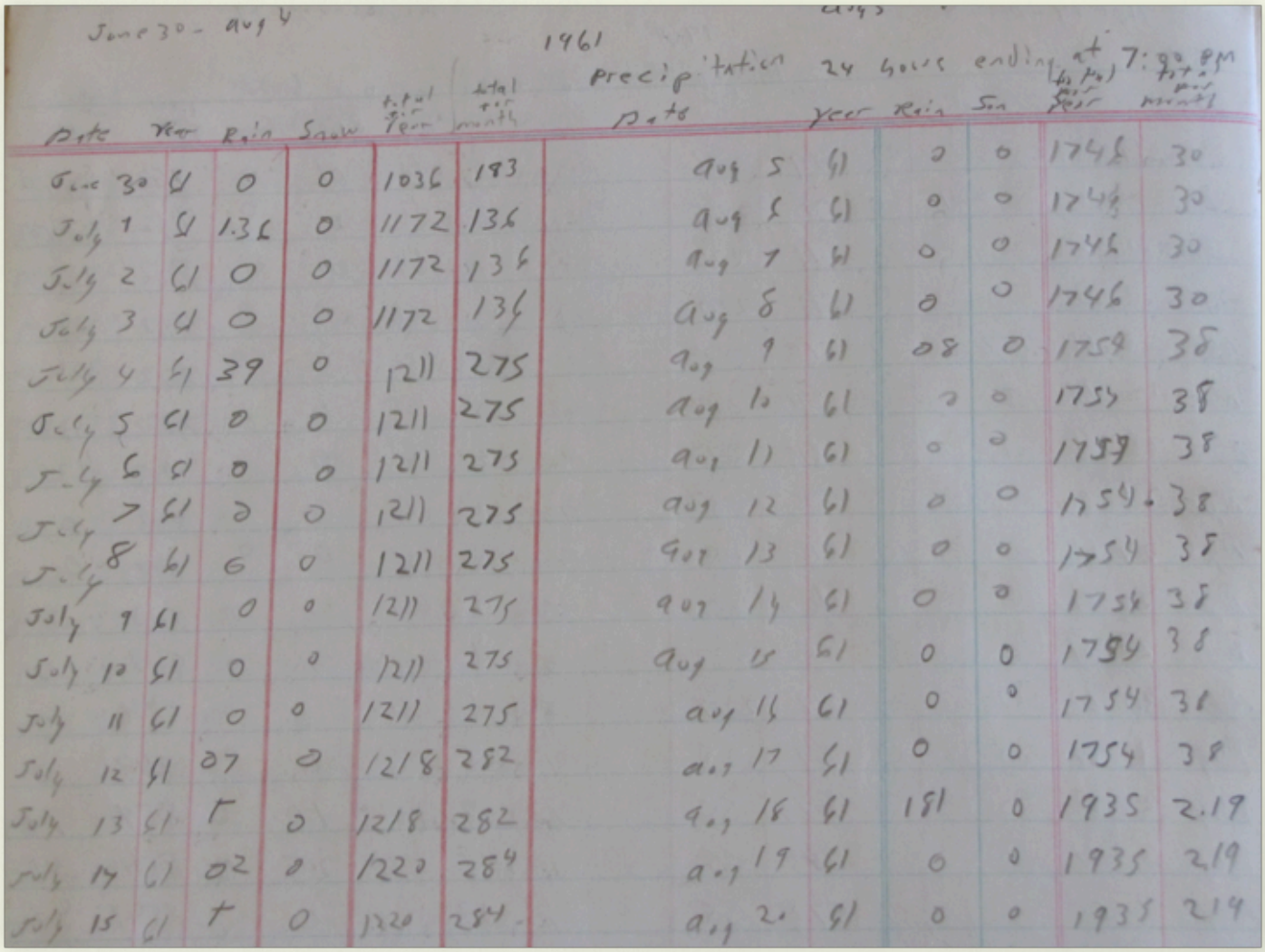
National Phenology Network
http://www.usanpn.org/

Twin Cities Naturalist Blog
http://www.twincitiesnaturalist.com

Weber, Larry. *The Backyard Almanac: A 365-day guide to the plants and critters that live in your backyard*. Pfeifer-Hamilton Publisher, 1995.

Youth:

When Will Steger was young, he kept detailed charts recording his observations. The chart seen here shows observations of clouds, precipitation and temperatures.

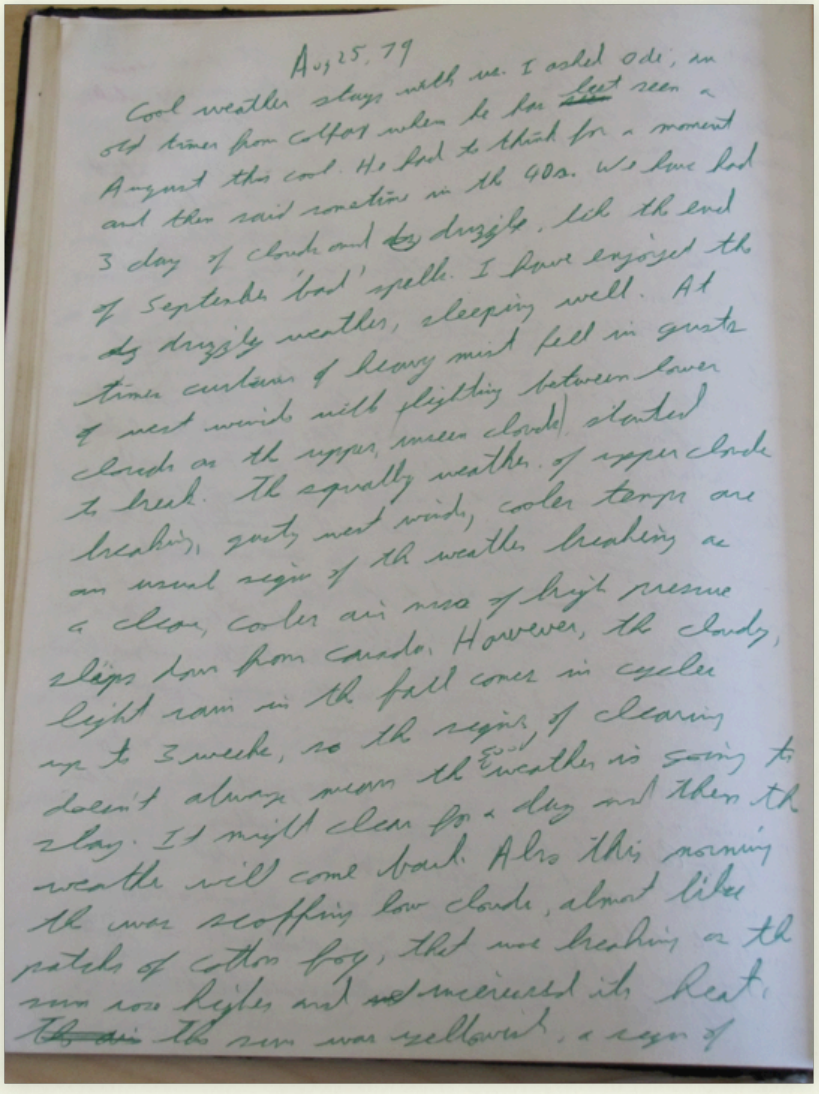


June 30 - Aug 4 1961

Date	Year	Rain	Snow	total for year	total for month	Precipitation Date	24 hours ending at 7:30 PM Year	Rain	Snow	total for year	total for month
June 30	61	0	0	1036	183	Aug 5	61	0	0	1745	30
July 1	61	1.36	0	1172	136	Aug 6	61	0	0	1745	30
July 2	61	0	0	1172	136	Aug 7	61	0	0	1745	30
July 3	61	0	0	1172	136	Aug 8	61	0	0	1746	30
July 4	61	39	0	1211	275	Aug 9	61	08	0	1754	38
July 5	61	0	0	1211	275	Aug 10	61	0	0	1754	38
July 6	61	0	0	1211	275	Aug 11	61	0	0	1754	38
July 7	61	0	0	1211	275	Aug 12	61	0	0	1754	38
July 8	61	6	0	1211	275	Aug 13	61	0	0	1754	38
July 9	61	0	0	1211	275	Aug 14	61	0	0	1754	38
July 10	61	0	0	1211	275	Aug 15	61	0	0	1754	38
July 11	61	0	0	1211	275	Aug 16	61	0	0	1754	38
July 12	61	07	0	1218	282	Aug 17	61	0	0	1754	38
July 13	61	T	0	1218	282	Aug 18	61	181	0	1935	219
July 14	61	02	0	1220	284	Aug 19	61	0	0	1935	219
July 15	61	T	0	1220	284	Aug 20	61	0	0	1935	219

Ely Homestead:
August 25, 1979

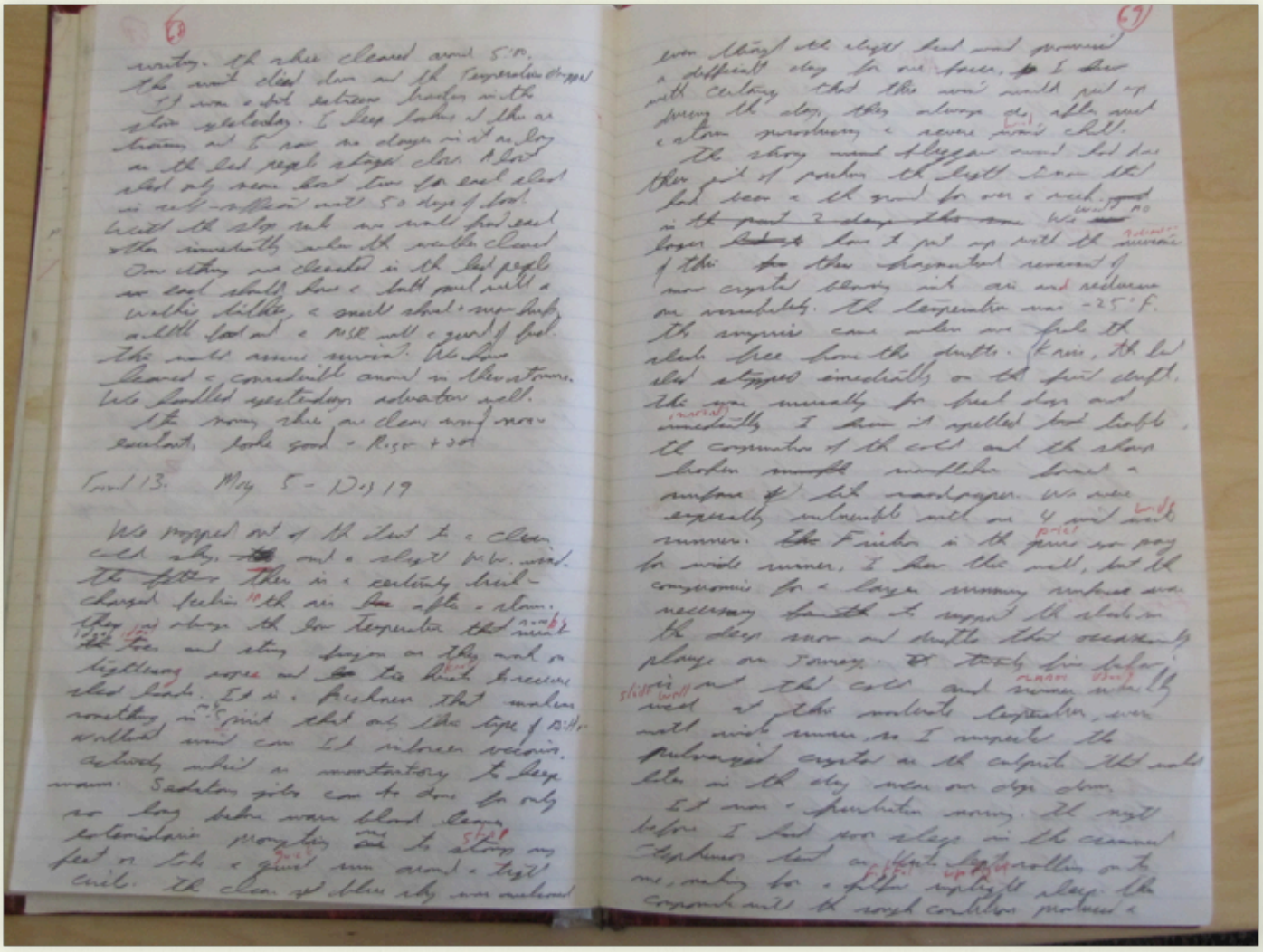
Cool weather stays with us. I asked Ode, an old timer from Colfax when he had last seen an August this cool. He had to think for a moment and then said sometime in the 40s. We have had 3 days of clouds and drizzle, like the end of September bad spells...The squally weather of upper clouds breaking, gusty west winds and cooler temperatures are a typical sign of the weather breaking as a clear, cooler air mass of high pressure slips down from Canada. However, the cloudy, light rain in the fall comes in cycles of up to 3 weeks, so the clearing doesn't always mean that the good weather is going to stay. It might clear for a day and then the weather will come back. Also this morning, there were low clouds, almost like patches of cotton. They were breaking as the sun rose higher and increased its heat. The sun was yellowish, a sign of water vapor. After a period of moisture when the sun comes out, like today, the sun's heat will evaporate the moisture to form clouds and even more rain.

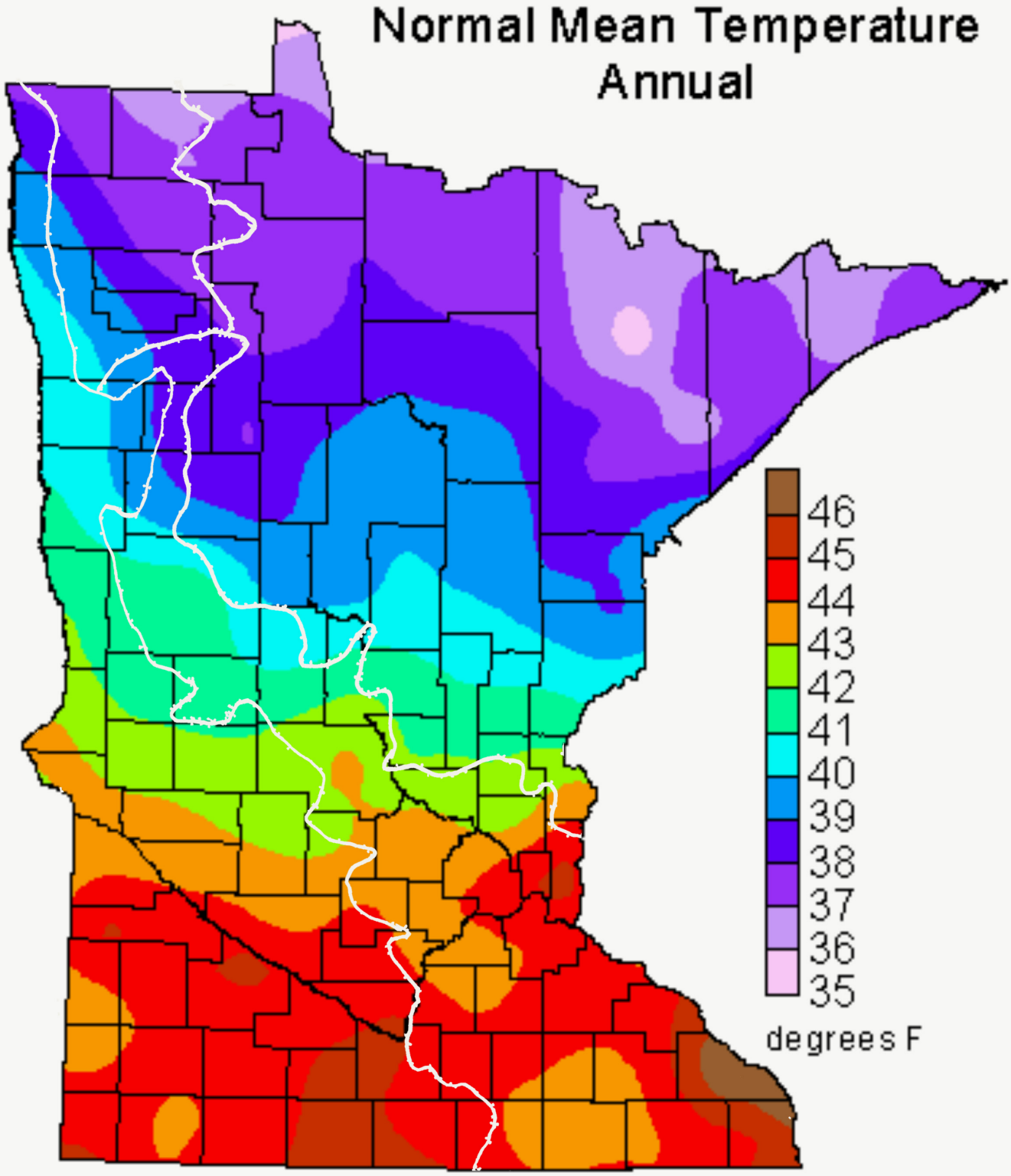

Aug 25, 79
Cool weather stays with us. I asked Ode, an old timer from Colfax when he had last seen a August this cool. He had to think for a moment and then said sometime in the 40s. We have had 3 days of clouds and drizzle, like the end of Septembe 'bad' spells. I have enjoyed the drizzly weather, sleeping well. At times curtains of heavy mist fell in gusts of west winds with flighting between lower clouds as the upper, mean clouds started to break. The squally weather of upper clouds breaking, gusty west winds, cooler temps are an usual sign of the weather breaking as a clear, cooler air mass of high presure slips down from Canada. However, the cloudy, light rain in the fall comes in cycles up to 3 weeks, so the signs of clearing doesn't always mean the good weather is going to stay. It might clear for a day and then the weather will come back. Also this morning the were scoffing low clouds, almost like patches of cotton fog, that were breaking as the sun rose higher and increased its heat. The air the sun was yellowish, a sign of

Expedition:

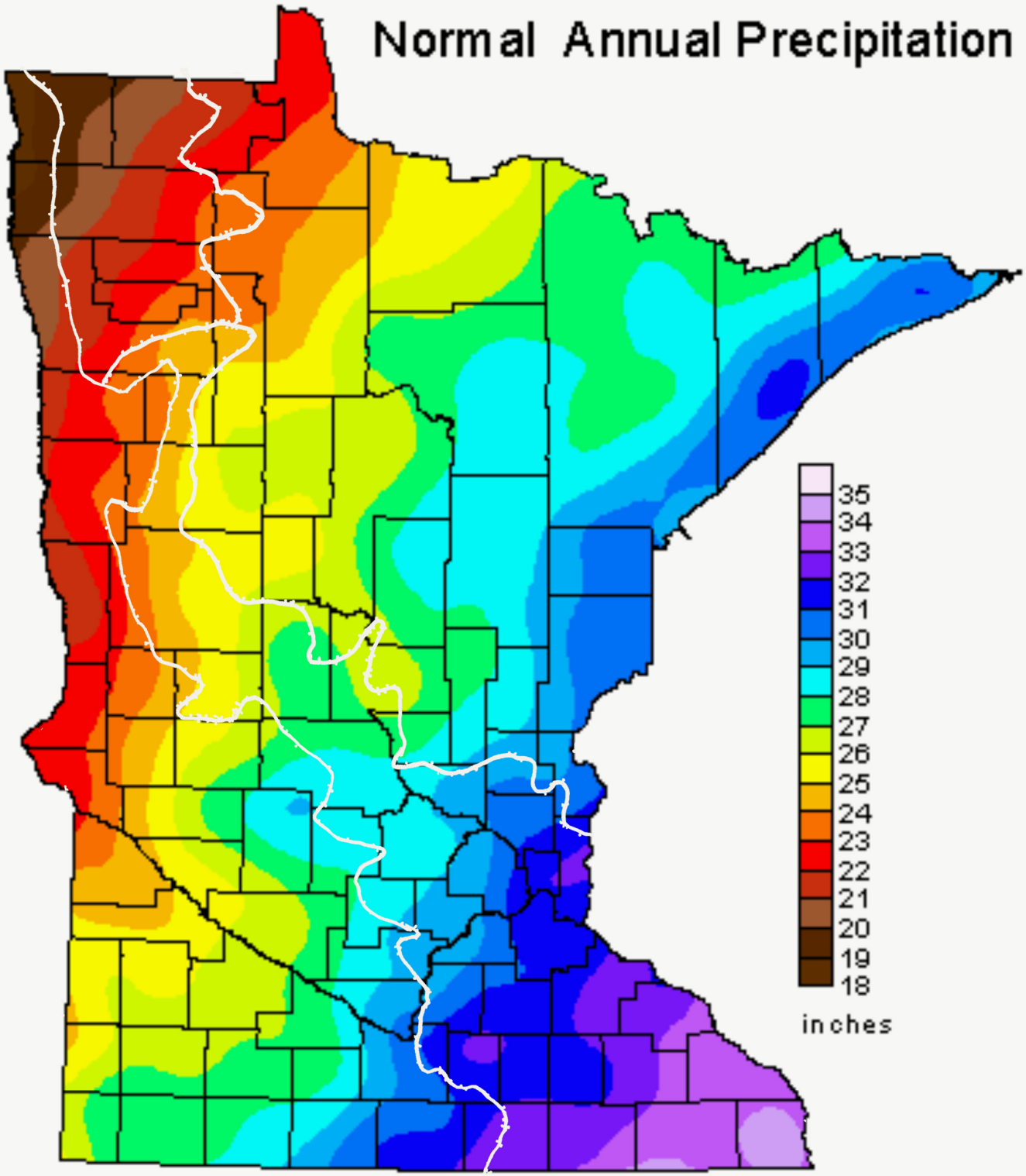
May 5, 1988

The clear, blue sky was welcome, even though I knew with certainty that these winds would pick up during the day; they always do after such a storm, producing a severe windchill. The strong blizzard winds had done their job in packing the light snow that had been on the ground for over a week. We would no longer have to put up with the nuisance of these fragmented remains of snow crystals blowing into the air and reducing our visibility. The temperature was -25F.





State Climatology Office - DNR Waters
May 2003



State Climatology Office - DNR Waters
July 2003

Name _____

Date _____

1. Look at the Normal Annual Mean Temperature Map.What does each color represent?

2. Fill in the following table with the higest and lowest mean temperatures, and mean temperature for each biome and the state as a whole.

Biome	*Highest Mean Temperature*	*Lowest Mean Temperature*	*Mean Temperature*
Tallgrass Aspen Parkland			
Coniferous Forest			
Deciduous Forest			
Prairie Grassland			
Minnesota			

3. Turn your temperature data into a graph that shows the range of mean temperatures for each biome, the mean temperature and compares the range between biomes and the state of Minnesota.
(see attached)

Explain your graph by answering the following questions:

4. What does it show?

5. What conclusions can be drawn?

6. In what ways is this type of graph useful?

7. What can be said about each biome?

a. Tallgrass Aspen Parkland

b. Coniferous Forest

c. Deciduous Forest

d. Prairie Grassland

8. Look at the Normal Annual Precipitation Map. What does each color represent?

9. Fill in the following table with the highest, lowest and mean annual precipitation for each biome and state as a whole.

Biome	*Highest Annual Precipitation*	*Lowest Annual Precipitation*	*Mean Annual Precipitation*
Tallgrass Aspen Parkland			
Coniferous Forest			
Deciduous Forest			
Prairie Grassland			
Minnesota			

10. Turn your precipitation data into a graph that shows the range of annual precipitation for each biome and compares the range between biomes and the state of Minnesota.
Explain your graph by answering the following questions:

1. What does it show?

2. What conclusions can be drawn?

3. In what ways is this type of graph useful?

4. What can be said about each biome?
   a. Tallgrass Aspen Parkland

   b. Coniferous Forest

   c. Deciduous Forest

   d. Prairie Grassland

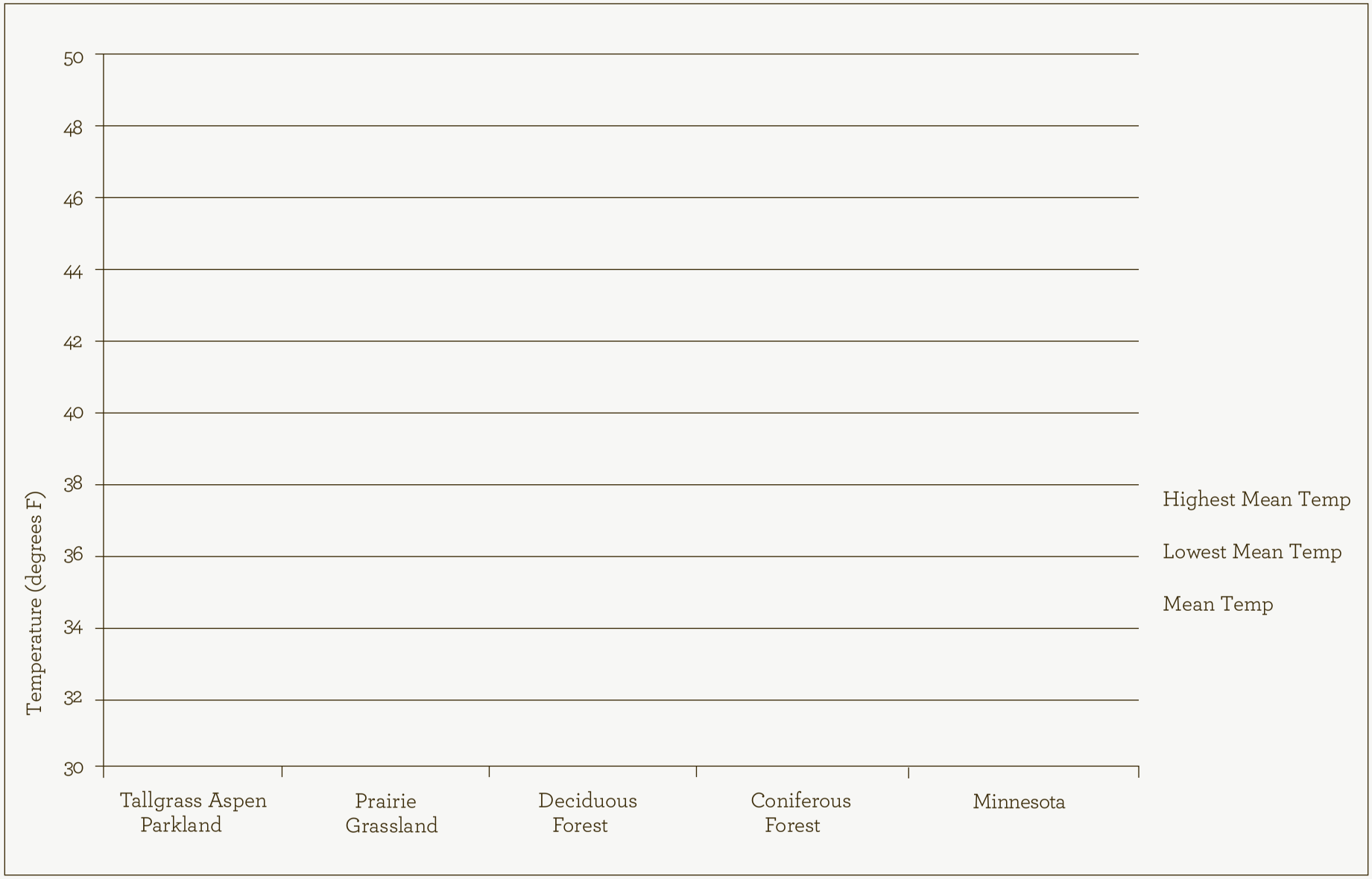
Look at both graphs side by side.
5. What can be said about each biome?
   a. Tallgrass Aspen Parkland

   b. Coniferous Forest

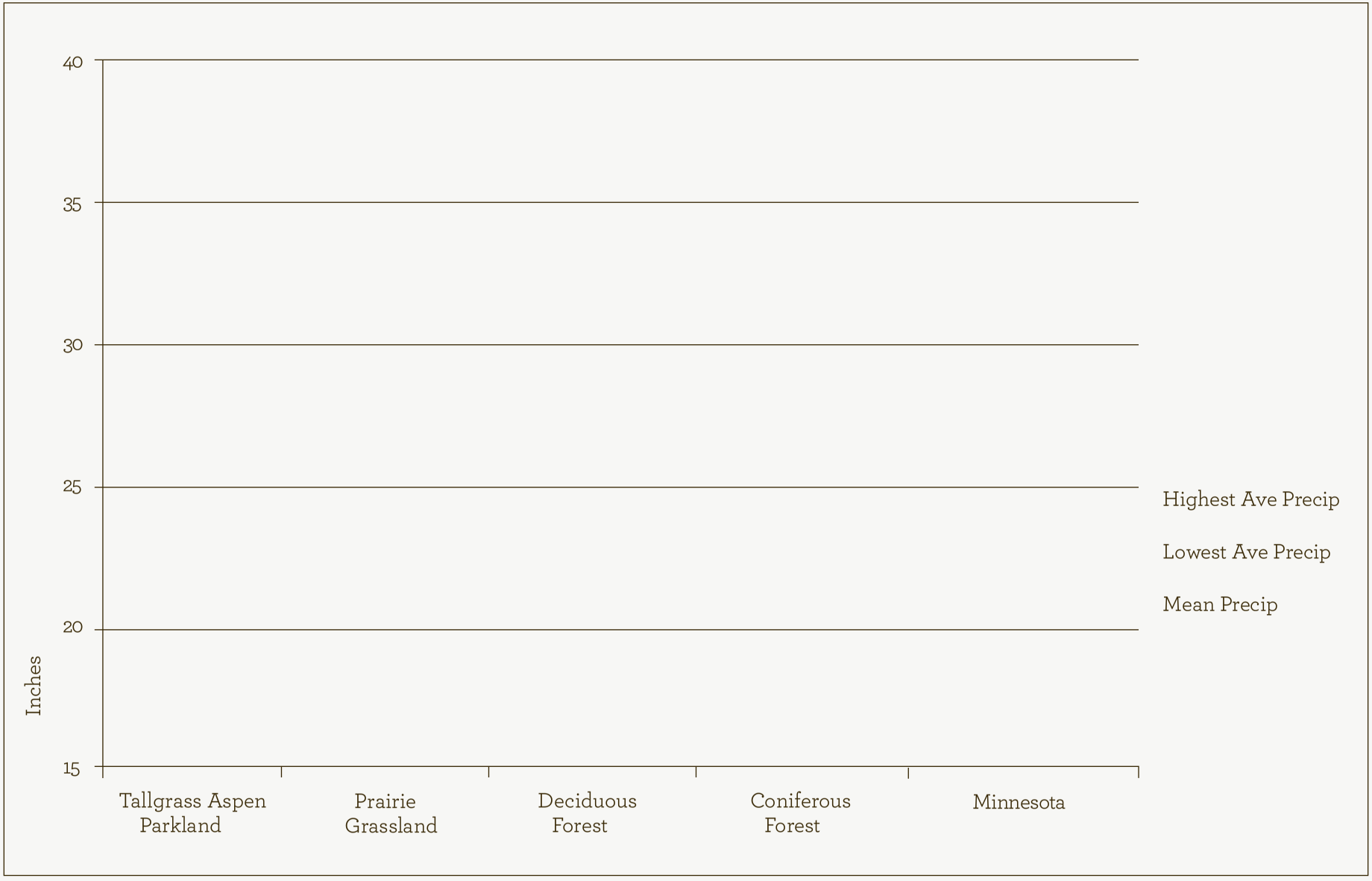
   c. Deciduous Forest

   d. Prairie Grassland

Title_____


Temperature (degrees F)
50
48
46
44
42
40
38
36
34
32
30
Tallgrass Aspen Parkland
Prairie Grassland
Deciduous Forest
Coniferous Forest
Minnesota
Highest Mean Temp
Lowest Mean Temp
Mean Temp

Title_____


40
35
30
25
20
15
Inches
Tallgrass Aspen Parkland
Prairie Grassland
Deciduous Forest
Coniferous Forest
Minnesota
Highest Ave Precip
Lowest Ave Precip
Mean Precip

Lesson 4: Minnesota's Changing Climate

What is climate change and what does it mean for Minnesota?

Age Level:	Grades 3-8
Time Needed:	Two 50-minute lessons
Materials:	Enough sets of climate change fact worksheets (8/set) that each student receives two sets Implications of Climate Change for Minnesotans handout Journals Pencils Drawing utensils
Student Learning Outcomes:	• Students will explain the causes of climate change. • Students will explain the implications of climate change. • Students will predict how climate change might impact or is impacting the area where they live. • Students will describe five key climate change implications for Minnesotans.

Background Information

In this lesson, students will be introduced to the basics of climate change.

Important points to communicate include:

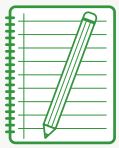
1. The earth's atmosphere that surrounds our planet is made up of gases called greenhouse gases. Greenhouse gases include carbon dioxide, methane, nitrous oxide and water vapor.
2. Greenhouse gases act like a blanket around the planet. They allow heat from the sun to enter the atmosphere. Some of this heat is absorbed and some of it is reflected back. Some of the heat is reflected into space, and greenhouse gases hold some of it in. A simple example of the greenhouse effect is when heat enters a car through its windshield and gets trapped inside, causing the car to heat up.
3. The greenhouse effect is a natural process that makes the earth habitable.
4. The greenhouse gas carbon dioxide (CO_2) has increased from 280 parts per million before 1870 and the industrial revolution, to over 390 parts per million today (2012). This information was determined by researchers by taking ice cores from Antarctica. The researchers measured the amounts of carbon dioxide trapped in air bubbles at different heights on the core which corresponded to periods of time. Since 1958, carbon dioxide measurements have been taken from on top of Mauna Loa, a Hawaiian volcano.
5. The burning of fossil fuels, as well as land use changes from deforestation and land clearing, releases carbon dioxide into the atmosphere. Fossil fuels are burned in the process of electricity production, industrial processes and the driving of vehicles. Fossil fuels include natural gas, oil and coal.
6. Throughout the history of the planet Earth, there have been increases and decreases in global average temperature. Although there have been periods of natural warming in the past, scientists are especially concerned about what is happening today because there is a change in temperature that has been rapid within the last 100 years, rather than over hundreds or thousands of years.

> The melting and freezing of the ice cap has been a natural cycle for millions of years that drastically changed the weather and topography of our landforms. It is a very delicate balance that recently accounted for the past ice ages. The major problem mankind now faces is that through pollution of the atmosphere and destruction of the natural environment, the atmosphere is warming at an alarming rate.
>
> —Will Steger, Greenland Training Expedition for Trans-Antarctic Expedition; June 12, 1988

7. This increase in temperature has an effect on Minnesota's climate as a whole, and has enormous implications for Minnesota. The results have been and continue to be experienced across Minnesota's biomes in all living communities of organisms, including humans.
8. There are climate change solutions and students can be part of the solution. Later in this unit students will have the opportunity to learn about and develop their own solutions.

There are some important implications of climate change for the Midwest and for Minnesotans, as described below and found in the report, *Global Climate Change Impacts in the United States* (United States Global Change Research Program).

1. During the summer, public health and quality of life, especially in cities, will be negatively affected by increasing heat waves, reduced air quality, and increasing occurrence of insect-transmitted and waterborne diseases.
2. Significant reductions in Great Lakes water level, which are projected under higher emission scenarios, lead to impacts on shipping, infrastructure, beaches and ecosystems.
3. The likely increase in precipitation in winter and spring, more heavy downpours, and greater evaporation in summer would lead to more periods of both floods and water deficits.
4. While the longer growing season provides the potential for increased crop yields, increases in heat waves, floods, droughts, insects and weeds will present increasing challenges to managing crops, livestock and forests.
5. Native species are very likely to face increasing threats from rapidly changing climate conditions, pests, diseases, and invasive species moving in from warmer regions.



Journal Assignment

At the end of this lesson, student journals should contain notes on what climate change is and the list of key implications for the Midwest and Minnesotans.

Activity Description

Introduction

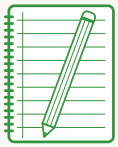
1. Ask students to look back in their journals at the definition they wrote of climate. Thinking about their definition of climate, ask students to write or draw what comes to mind when they hear "climate change."
2. Discuss as a class what they wrote or drew.

Activity: What is climate change?

1. Share the key points included in the introduction by handing out climate change fact cards included with this lesson to groups of four. Give each group member two cards to read in sets of 1 and 2, 3 and 4, 5 and 6, etc.
2. Ask each group member to read their cards and then to create a visual they think would be helpful to explain the information on the two cards. Alternatively, ask the students to find visuals through an Internet search to share.
3. Ask them to read aloud their cards and share their visual with their group in their numbered order.
4. Groups should discuss what the cards mean and make a list of any questions they might have in their journals.
5. Discuss as a class each card and questions that came up. Show the visuals created or found for each set of cards as you discuss them.

Concluding Activity: What are the implications of climate change for Minnesotans?

1. Think back to "*What defines Minnesota's biomes?*" lesson 2. Review what is unique about the biome where your school is located as far as climate, flora and fauna and other defining factors. Students can look back in their journals to review.
2. Share the five climate change implications for Minnesotans, either by projecting them (see included handout), reading them out loud, or handing them out to the class. Discuss which issues might impact the biome where you live the most and why.
3. Think about what you know about the other biomes. What issues may be most impactful in them?
4. If you haven't already, hand out the list of implications and ask students to paste it in their journal. Ask them to choose one issue that concerns them the most and to write in their journal about how they think it could affect their lives.



Journaling Connection

Ask students to think about the implications of climate that were discussed. Ask them to write a journal entry that discusses how climate change may affect them directly, or ask them to choose one issue that is of particular concern to them and explain why.

Take It Outside—Connecting With Your Place

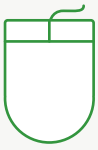
Materials

- Journals
- Colored pencils

1. Take the students outside with their journals. Make sure that they remember or have listed in their journal the key implications described.
2. Ask them to look around and draw a picture of what they see.
3. Ask them to label different parts of their picture where they predict climate change impacts will be seen or are already being seen as they relate to the key issues described. For example, if you can see agricultural fields, they may label them and write that the growing season may be longer or there may be more flooding; or any plant life seen may be labeled "will bloom earlier."

Extensions

The Will Steger Foundation's Global Warming 101 Lessons provide an opportunity to explore climate change causes and impacts more deeply. Download lessons at: http://www.willstegerfoundation.org/educator-resource-binder



Online Classroom Connection

Visit http://classroom.willstegerfoundation.org

1. Scan journal entries and pictures the students have drawn and upload them to the online classroom.
2. Click on "Climate Change Basics" and then "Climate Closeup: Temperature" in the learning module of the online classroom to play a game to extend learning on climate change.

Resources

Minnesota Department of Natural Resources. Accessed 2011-2-17 at http://www.dnr.state.mn.us/

Dispatch from 2007 Baffin Island Expedition:

From what I've seen personally, from all the interviews that we did tenting and living with the Inuit people as we've traveled, basically what's happening in the Arctic regions is that global warming is being played out on the sea ice. As the extra energy is absorbed into the ocean from human induced global warming, this is warming the ocean. 80% of the excess energy goes into the ocean and that, in turn, starts melting the ice. We're seeing later freeze-ups and earlier break-ups. In other words, what we're seeing is the winter season, the ice season, which is so important for hunting and traveling, is starting to diminish. What used to be about an 8 month season in Baffin now is, in some areas, reduced to around 6 months...Also we could tell on the glaciers that we saw and the mountains and mountain passes that we've crossed, the glaciers have definitely receded.

Fact #1

The earth's atmosphere that surrounds our planet is made up of gases called greenhouse gases. Greenhouse gases include carbon dioxide, methane, nitrous oxide and water vapor.

Fact #2

Greenhouse gases act like a blanket around the planet. They allow heat from the sun to enter the atmosphere. Some of this heat is absorbed and some of it is reflected back. Some of the heat is reflected into space, and some of it is held in by greenhouse gases. A simple example of the greenhouse effect is when heat enters a car through its windshield and gets trapped inside, causing the car to heat up.

Fact #3

The greenhouse effect is a natural process that makes the earth habitable.

Fact #4

The Greenhouse Gas carbon dioxide (CO_2) has increased from 280 parts per million before 1870 and the industrial revolution, to over 390 parts per million today. This information was determined by researchers by taking ice cores from Antarctica and measuring the amounts of carbon dioxide trapped in air bubbles at different heights on the core that correspond to periods of time. Since 1958, carbon dioxide measurements have been taken from on top of Mauna Loa, a volcano in Hawaii.

Fact #5

The burning of fossil fuels releases carbon dioxide into the atmosphere, as well as land use changes from deforestation and land-clearing. Fossil fuels are burned in the process of electricity production, industrial processes and the driving of vehicles. Fossil fuels include natural gas, oil and coal.

Fact #6

Throughout the history of the planet Earth, there have been increases and decreases in global average temperature. Although there have been periods of natural warming in the past, scientists are especially concerned about what is happening today because there is a change in temperature that has been rapid in the last 100 years, rather than over hundreds or thousands of years.

Fact #7

This increase in temperature has an effect on Minnesota's climate as a whole, and has enormous implications for Minnesota. The results have been and continue to be experienced across Minnesota's biomes in all living communities of organisms, including humans.

Fact #8

There are climate change solutions and students can be part of the solution. Later in this unit students will have the opportunity to learn about and develop their own solutions.

Implications of Climate Change for Minnesotans

1. During the summer, public health and quality of life, especially in cities, will be negatively affected by increasing heat waves, reduced air quality, and increasing insect and waterborne diseases.

2. Significant reductions in Great Lakes water level, which are projected under higher emission scenarios, lead to impacts on shipping, infrastructure, beaches and ecosystems.

3. The likely increase in precipitation in winter and spring, more heavy downpours, and greater evaporation in summer would lead to more periods of both floods and water deficits.

4. While the longer growing season provides the potential for increased crop yields, increases in heat waves, floods, droughts, insects and weeds will present increasing challenges to managing crops, livestock and forests.

5. Native species are very likely to face increasing threats from rapidly changing climate conditions, pests, diseases and invasive species moving in from warmer regions.

Lesson 5: Minnesota's Changing Climate

What does the data show?

Age Level:	Grades 3-8
Time Needed:	50-75 minutes
Materials:	Six sets of materials related to climate change in Minnesota (details in table on p. 74) A container to hold each set of materials
Student Learning Outcomes:	• Students will make their own interpretations of graph images of data that represent different impacts of climate change on Minnesota. • Students will make the connection between 3-D objects and what the data represents. • Students will divide three statements about each graph into true or false categories. • Students will share their results. • Students will brainstorm how climate change could affect their biome.

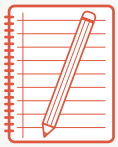
Background Information

In this activity groups of 4 students will be given a set of materials in a box. Each set should contain two 3-D objects (or photos if no objects available), two figures, and two sets of three true/false statements that correspond to each figure. There are six sets of materials; each set is related to a common theme. The table above shows the themes of each set of materials and the level of difficulty for explaining the figure. Depending on the number of students in your class and group size, you may need to replicate sets between groups. The figures will introduce students to different ways that data is represented and will demonstrate different influences climate change may have on the state of Minnesota.

> Sometimes when you explore, you find things that you know and then sometimes you find other things that you can figure out and sometimes there's a total unknown. When you don't know something, what I usually do when I go back is go to a library and look it up in a book or ask somebody a question.
>
> —Will Steger in field trip with elementary students, 1995

Educator Prep:

It is important that the materials for this activity are sorted and organized correctly and together. Beginning on page 77 there are 12 figures with corresponding explanations and true/false statements and a template to be copied. These materials are also available online at: http://classroom.willstegerfoundation.org/handouts, if you would like to print them out in color. Each set of materials needs to be separated into: figures, individual true/false statements, and figure explanations. The true/false statements for a given set of three materials can be put in an envelope and set of figure explanations in another envelope. These envelopes, along with the corresponding two figures and two 3-D objects, should be put in a box of Ziploc. There are six sets of two figures that are in some way related. The following table shows which figures should be clustered together, their common theme, the grade level the figure may be most appropriate for, a suggested 3-D object or photo, and one possible connection to an implication of climate change for Minnesotans as discussed in Lesson 4. All of the materials may be laminated for long-term usage.



Journal Assignment

At the end of this lesson, student journals should contain a list of key messages determined through an exploration and discussion of the figures shared.

Figure and Theme	Level of Difficulty	3-D Object/Photo	Possible Connected Implication
Climate Change and Ice			
Minnesota Average Ice Out Date (p. 73)	Elementary/Middle School	Ice cube	5: more heat-tolerant aquatic species could move in
ICE OUT day of year (p. 75)	Middle School/High School	Ice Fishing Postcard	See above
Climate Change and Seasons			
Fewer Days of Snow Falling (p. 77)	Elementary	Snowflake	2: fewer days of snowfall could mean lower lake levels in the spring
Extreme Heat Becomes More Frequent (p. 79)	Elementary/Middle School	Fan	1: dangerous heat waves could affect public health
Climate Change and Temperature			
Side by side comparison of Average Temperature Increase Since 1895 (p. 81)	Elementary	MN in Winter Postcard	All
Temperature Increase in Northern vs. Southern Minnesota (p. 83)	Middle School/High School	Thermometer	5: species may move north with warming temperatures
Climate Change and Water			
Water Supply Sustainability Index (p. 85)	Elementary/Middle School	Water bottle	3: more floods and water deficits
Regional air temperature and average ice cover of Lake Superior (p. 87)	Middle School/High School	Ice Skates	2: impacts beaches, ecosystems, great lakes shipping, etc.
Climate Change and Fossil Fuels			
The Midwest Burns More Fossil Fuels (p.89)	Elementary	Power plant photo	The cause for all
Greenhouse Gas Emissions from Minnesota (p. 91)	Elementary/Middle School	Car/Bus	See above
Climate Change and Plant Life			
Observed and Projected Changes in Plant Hardiness Zones (p. 93)	Elementary/Middle School	Vegetable	4
Interactions between global warming and other drivers (p. 95)	Middle School/High School	Plastic worm	5: native species threatened by invasives

Activity Description

Introduction

1. Ask the students to name the five implications of climate change for Minnesotans. They can look back in their journals to review this.
2. Ask the students to write in their journals for five minutes about what issue they might be interested in studying if they were a scientist. Ask them to describe where and how they might do their research and what questions they might have based on what they've learned so far.

Activity: Data exploration

Note: This activity can be simplified by using one set of materials per box instead of two. The table above shows which figures may be most appropriate for certain grade levels. The template included with this lesson can also help younger students organize the information provided, but may not be needed with older groups.

1. Hand out a box that contains a set of materials to each group of three to five students. Make sure the data sets are face down and only the 3-D objects, or photos if objects are not available, are visible.
2. Students should begin by taking out the 3-D objects without looking at the other papers in the box. In their group, they should brainstorm a list of how each of the objects might relate to climate change in Minnesota and write the list in their journals.
3. After the students have finished brainstorming their lists, they should remove the papers that are left in the box. Each student or pair of students should take a figure out and spend some time looking over it. They should think about what 3-D object the figure might be connected to and they should prepare to explain what the figures mean to the other members of their group.
4. Each student will explain their figure to their group and how the object is connected.
5. Students should look in the envelope labeled "figure explanations." Read each explanation and as a group decide which explanation fits with each figure.
6. Ask students to remove the envelope of true/false statements and take turns reading a statement and aligning it with the graph where they think it belongs. Explain that they don't need to worry if it is true or false yet.
7. Once they have lined up the statements as a group, read through them again and decide if they are true or false.
8. Ask the groups to look at their completed sets, discuss what they think are common themes, and create a poster that summarizes the information.

Concluding Activity: Collect the Evidence

1. Ask each group to share their poster and what they learned.
2. Summarize each set as a class and make a list of key messages.
3. As a class, decide how each set of figures might be related to one of the five key issues for Minnesotans facing climate change they learned about in lesson 4.

Journaling Connection

Ask the students to create a concept map that shows the connections between the five implications of climate change for Minnesotans and the figures they looked at in their group and/or the other groups.

Take It Outside—Connecting With Your Place

Ask the students to think about the research that went into the figures they studied. Is there a particular experiment they could design and do in the schoolyard, their backyard or nearby nature area?

Extensions

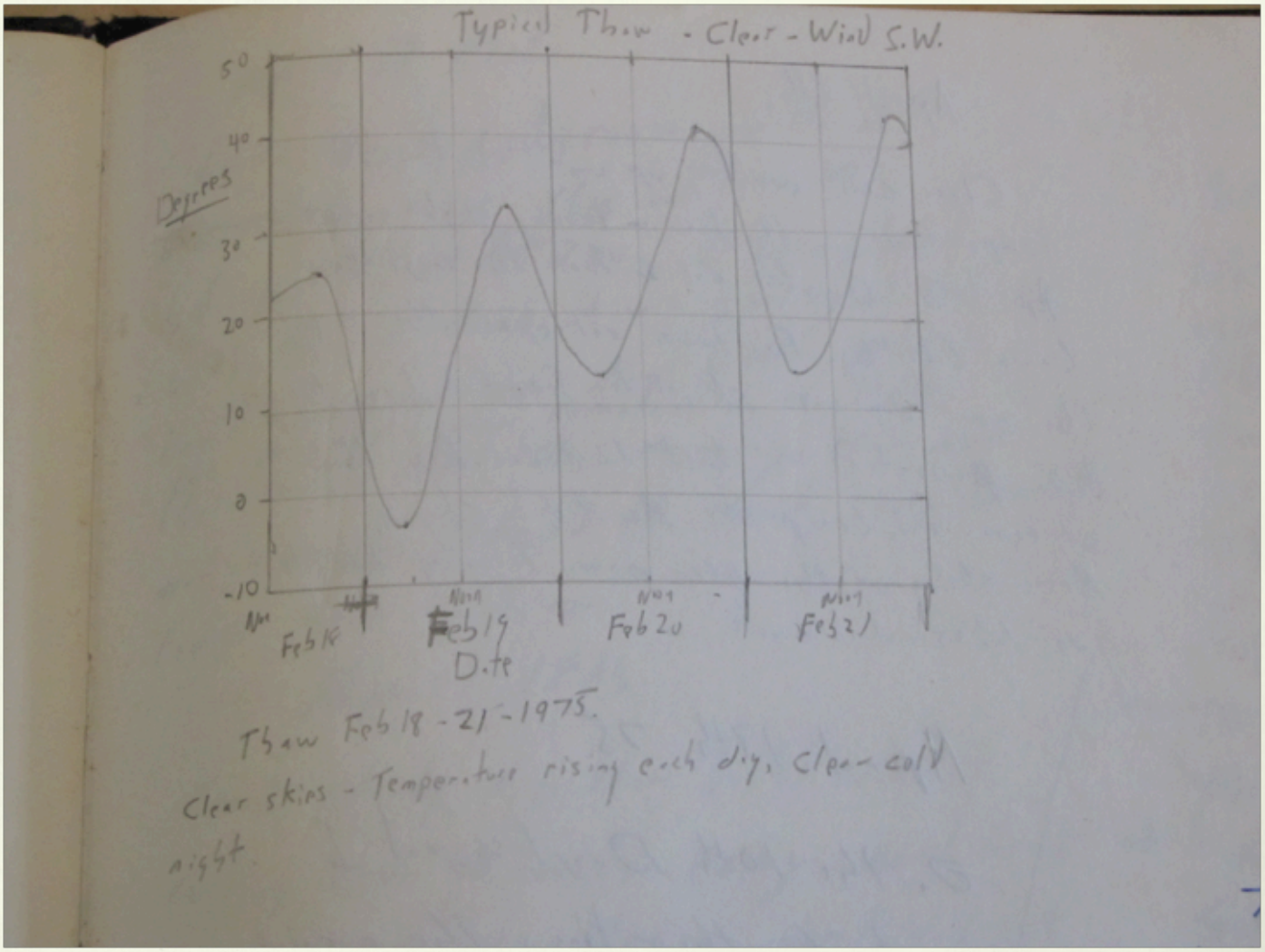
1. Ask students to develop a report based on the key messages that can be drawn from each set.
2. Ask students to develop their own sets of figures and true/false statements. Exchange with other classmates.

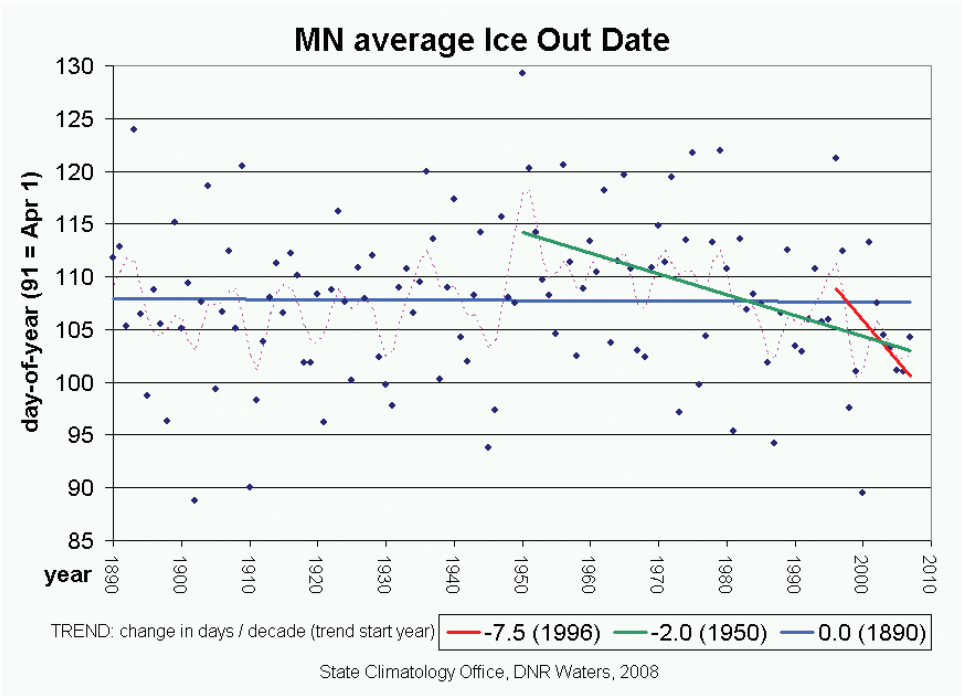
Online Classroom Connection

Visit http://classroom.willstegerfoundation.org

Visit the Climate Change Basics section and interact with some of the graphs.

Will Steger used graphs to interpret the data he gathered from his observations. In this example, he records the changes in temperature over the course of a February thaw in 1975.

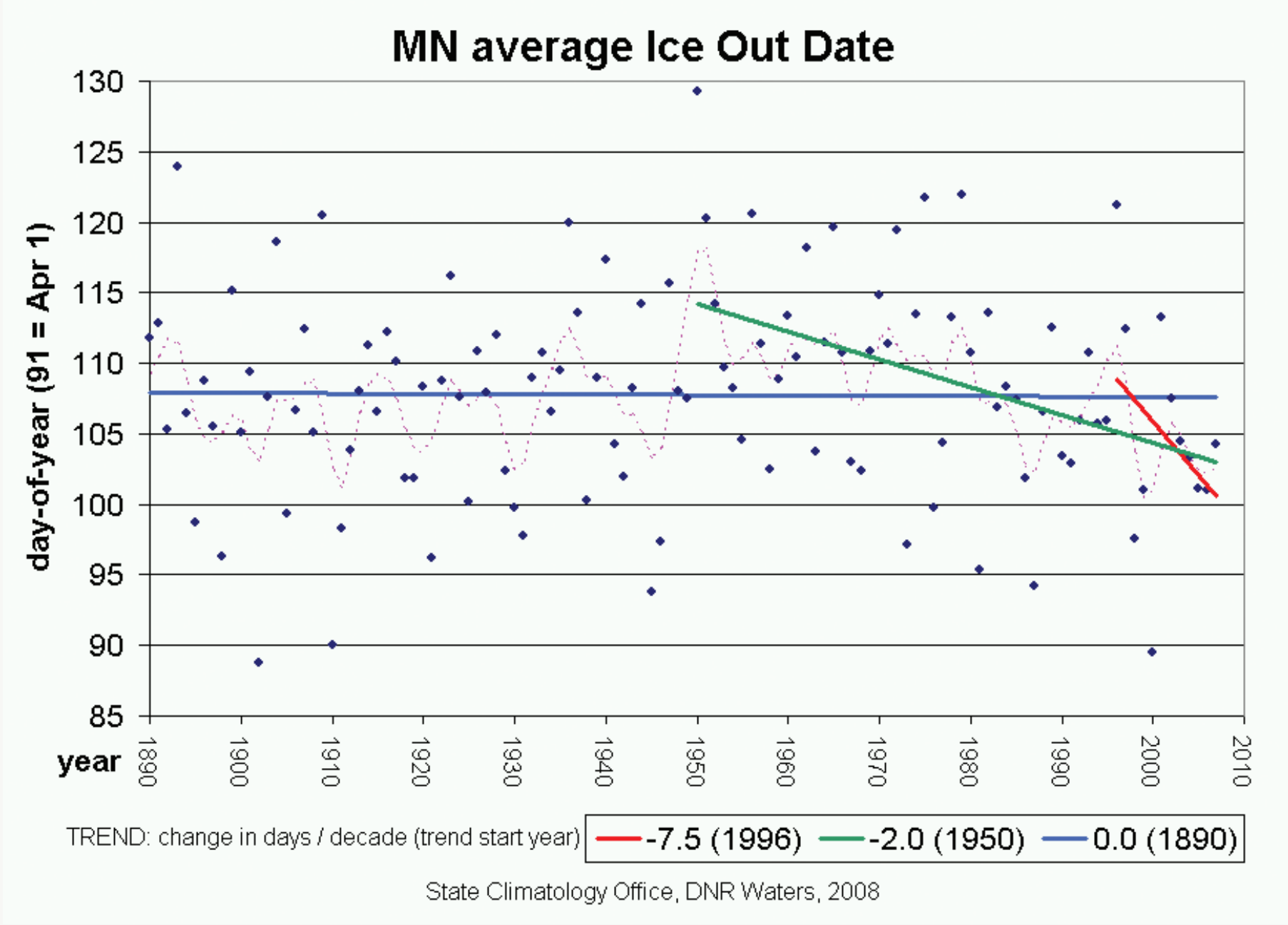




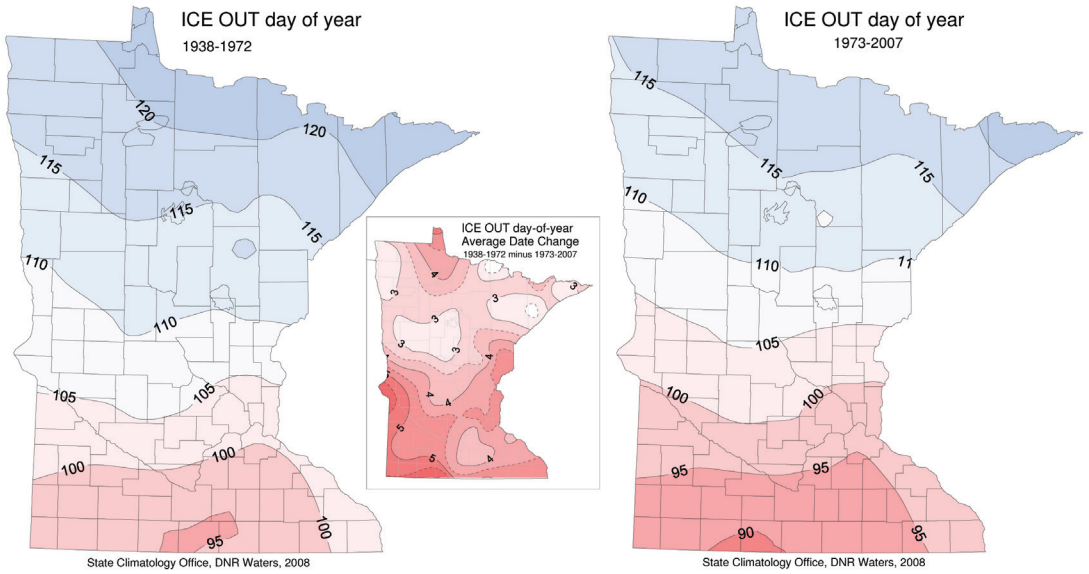
Ice out, like snow, is one of the many results of both temperature changes and humidity changes since both represent heat changes. Lake ice out has been getting earlier in the last few decades. The rate at which it has been getting earlier is greater in recent record than for longer periods.

Zandlo, Jim. (last modified 2008) Climate Change and the Minnesota State Climatology Office: Observing the Climate. Retrieved from http://climate.umn.edu/climateChange/climateChangeObservedNu.htm

TRUE STATEMENTS	FALSE STATEMENTS
The latest day the ice was recorded to go out was in 1950.	On the y-axis, 91 is the same as May 1.


MN average Ice Out Date
day-of-year (91 = Apr 1)
130
125
120
115
110
105
100
95
90
85
year
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
TREND: change in days / decade (trend start year)
-7.5 (1996)
-2.0 (1950)
0.0 (1890)
State Climatology Office, DNR Waters, 2008

Ice out dates in Minnesota 'in your father's time' were generally later than they have been in recent decades. The ice out pattern for the most recent 35-year period is shown along with the pattern for the 35-year period before that time. The small map between the maps of the 2 periods shows the number of days that ice out has become earlier. (Note: day 90 is Mar 31, 120 is Apr 30)

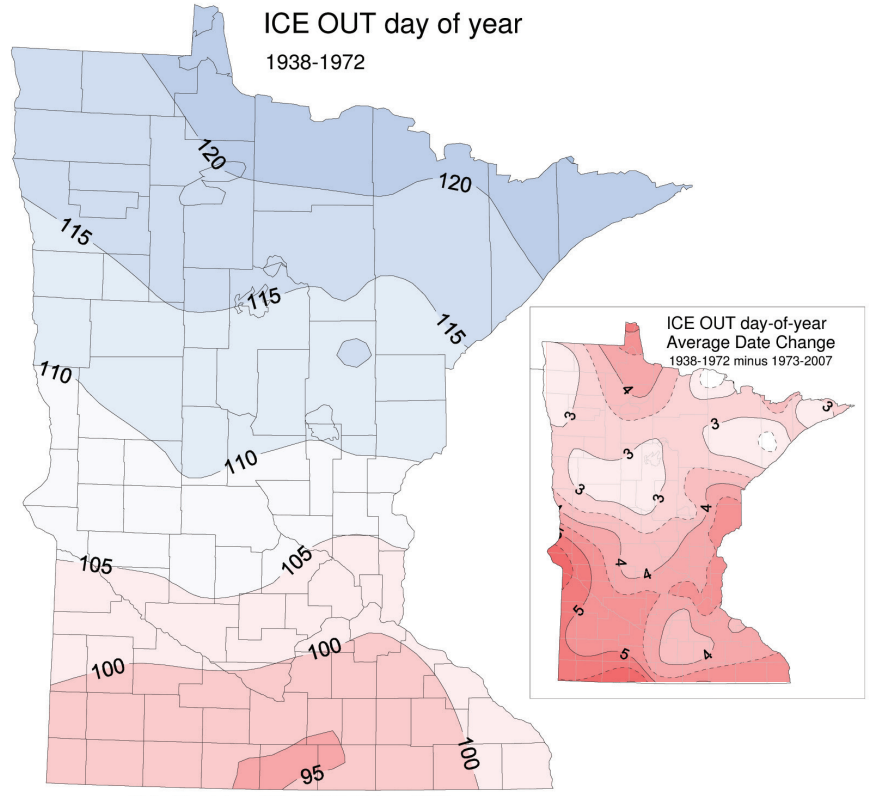


A comparison of ice-out dates in Minnesota between 1938-1972 and 1973-2007.
(Note: Day 90 is March 31, 120 is April 30)

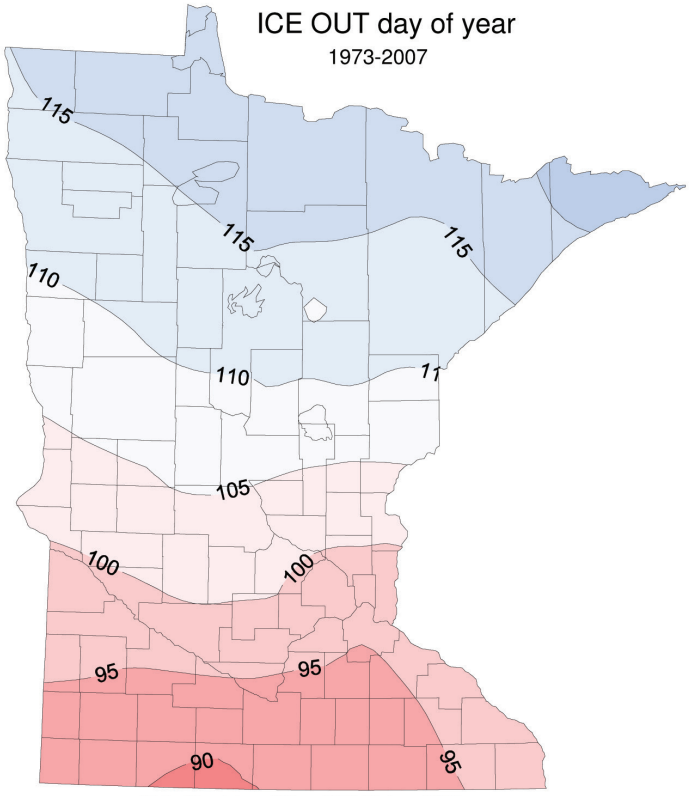
Zandlo, Jim. (last modified 2008) Climate Change and the Minnesota State Climatology Office: Observing the Climate. Retrieved from http://climate.umn.edu/climateChange/climateChangeObservedNu.htm

TRUE STATEMENTS	FALSE STATEMENTS
Ice out in the southwest corner of the state has been about 5 days earlier in recent decades.	The northern part of the state has seen 115 days of ice in recent decades.

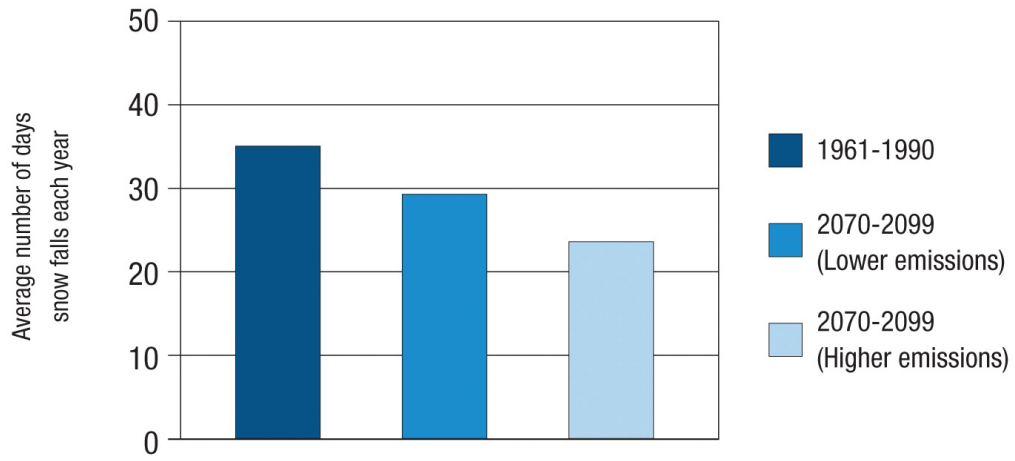
Ice out dates in Minnesota 'in your father's time' were generally later than they have been in recent decades. The ice out pattern for the most recent 35-year period is shown along with the pattern for the 35-year period before that time. The small map between the maps of the 2 periods shows the number of days that ice out has become earlier. (Note: day 90 is Mar 31, 120 is Apr 30)



State Climatology Office, DNR Waters, 2008



State Climatology Office, DNR Waters, 2008

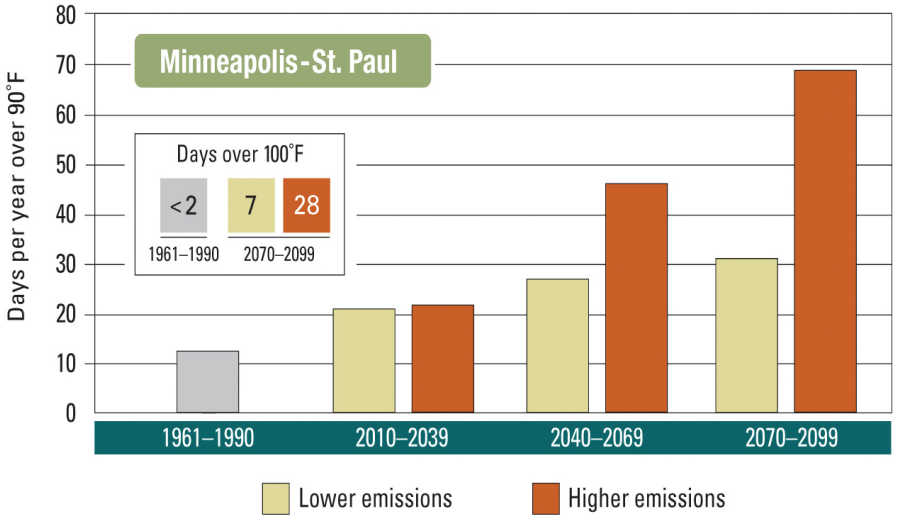


Fewer Days of Snow Falling

Union of Concerned Scientists. (2009). Confronting Climate Change in the US Midwest: Minnesota. Chicago, IL.

TRUE STATEMENTS	FALSE STATEMENTS
Even if emissions decrease, Minnesota is predicted to have shorter winters.	This graph shows that historically Minnesota has an average of 25 days of snowfall per year.

1961-1990
2070-2099 (Lower emissions)
2070-2099 (Higher emissions)
50
40
30
20
10
0
Average number of days snow falls each year

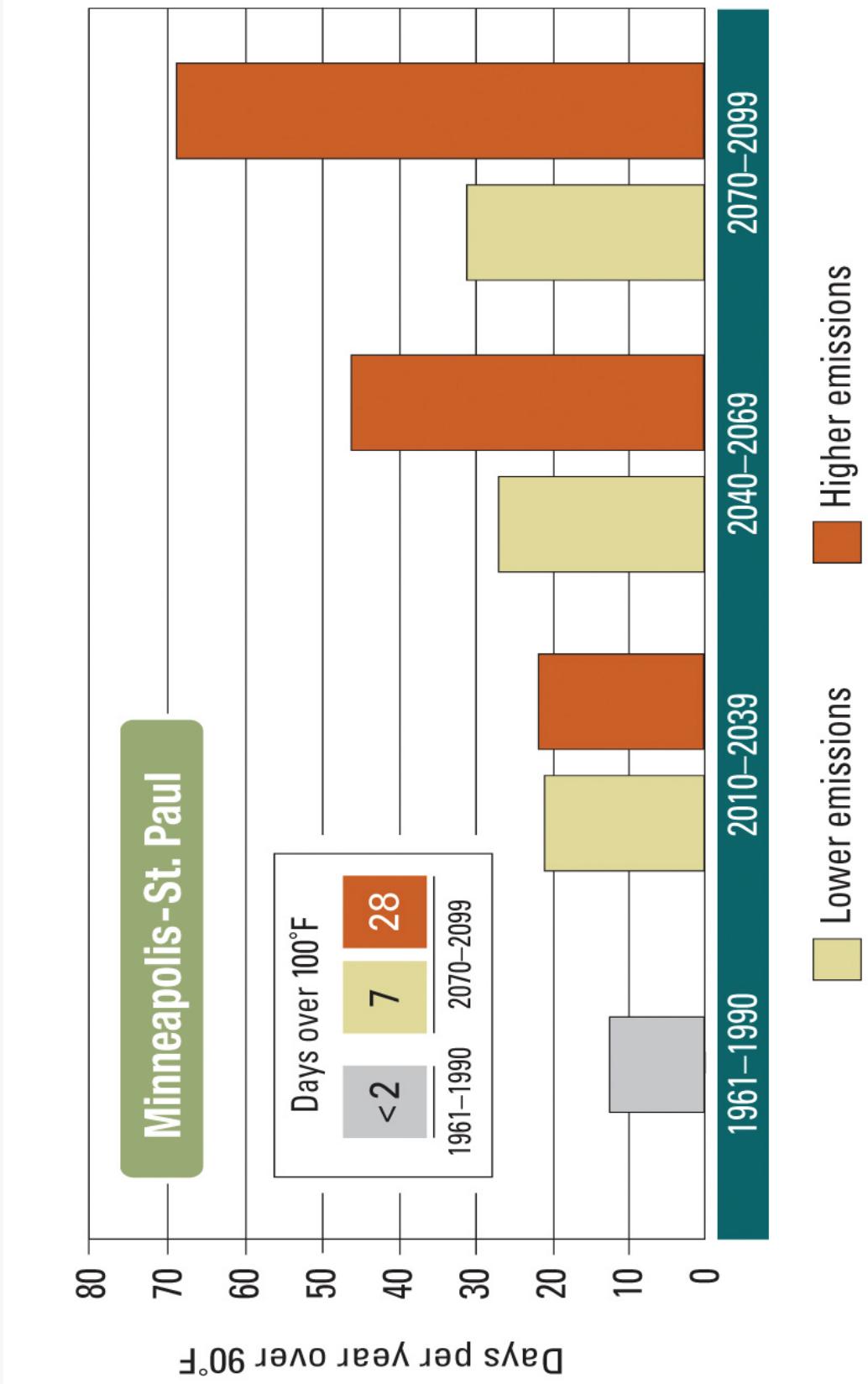


Extreme Heat Becomes More Frequent

This figure shows how models predict the temperature of the Twin Cities could change if we continue to emit large quantities of carbon dioxide (higher emissions scenario), or if we make some changes and cut our emissions (lower emissions scenario).

Union of Concerned Scientists. (2009). *Confronting Climate Change in the US Midwest: Minnesota.* Chicago, IL.

TRUE STATEMENTS	FALSE STATEMENTS
Under the higher-emissions scenario, the Twin Cities could experience almost an entire summer of days above 90 degrees F by the end of the century.	This bar graph shows how precipitation will change in the Twin Cities.


Minneapolis-St. Paul
Days over 100°F
<2
7
28
1961–1990
2070–2099
Days per year over 90°F
80
70
60
50
40
30
20
10
0
1961–1990
2010–2039
2040–2069
2070–2099
Lower emissions
Higher emissions

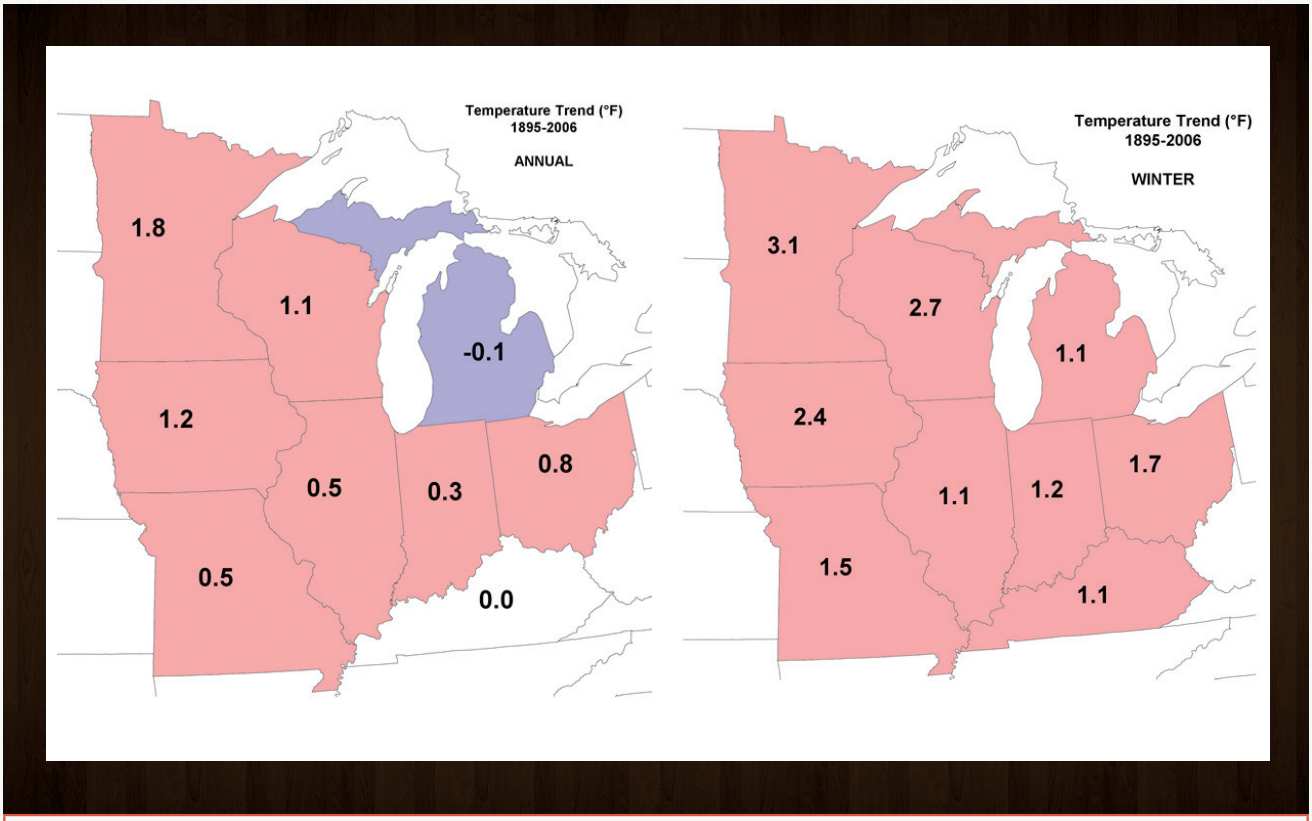
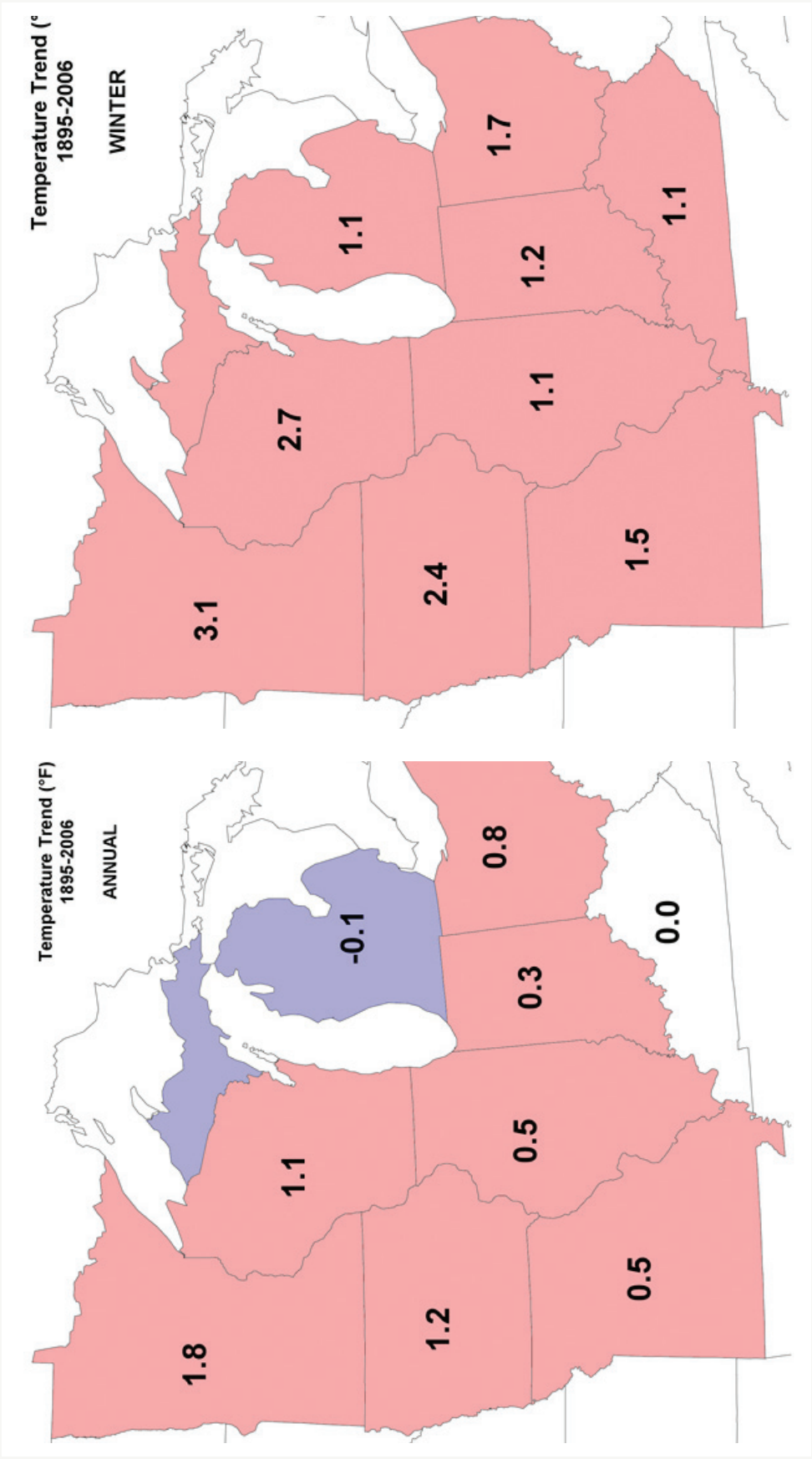
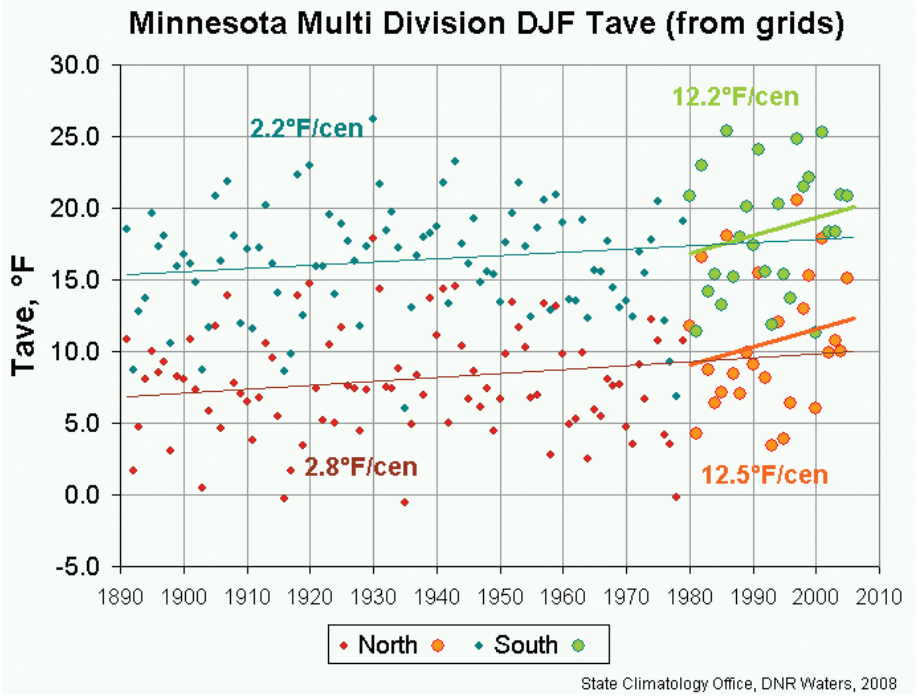


Figure 1. Annual average change in temperature, 1895-2006 (°F)
Figure 2. Average annual temperature change, winter, 1895-2006 (°F)

Minnesota Pollution Control Agency. (2010). Adapting to Climate Change in Minnesota: Preliminary Report of the Interagency Climate Adaptation Team, pp. 4-5. Retrieved from www.pca.state.mn.us/index.php/download-document.html?gid=15414

TRUE STATEMENTS	FALSE STATEMENTS
Temperature in Minnesota has increased an average of 1.8 degrees since 1895.	Minnesota winters have gotten colder since 1895.

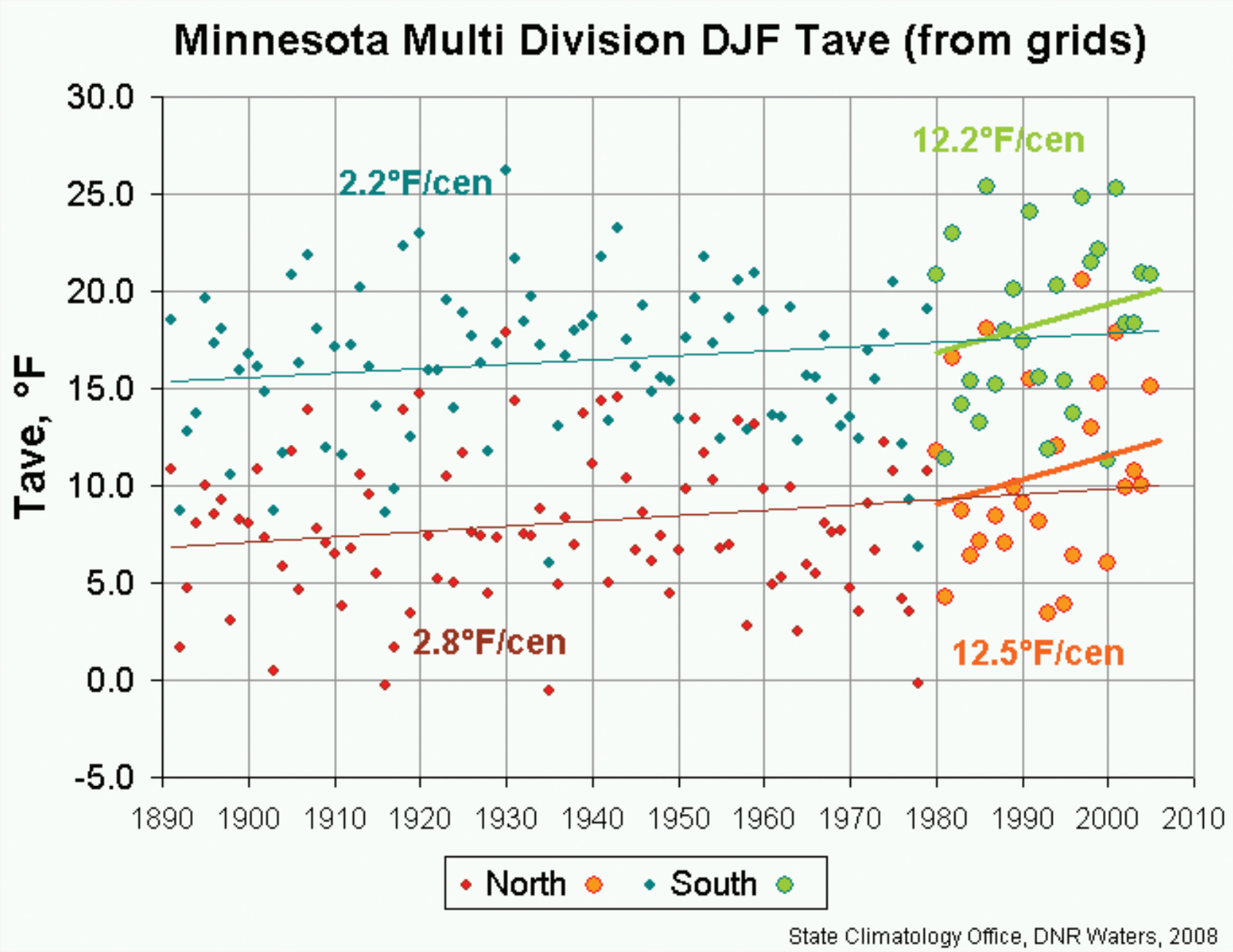

Temperature Trend (°
1895-2006
WINTER
3.1
2.7
1.1
1.7
2.4
1.1
1.2
1.1
1.5
Temperature Trend (°F)
1895-2006
ANNUAL
1.8
1.1
-0.1
0.8
1.2
0.5
0.3
0.0
0.5

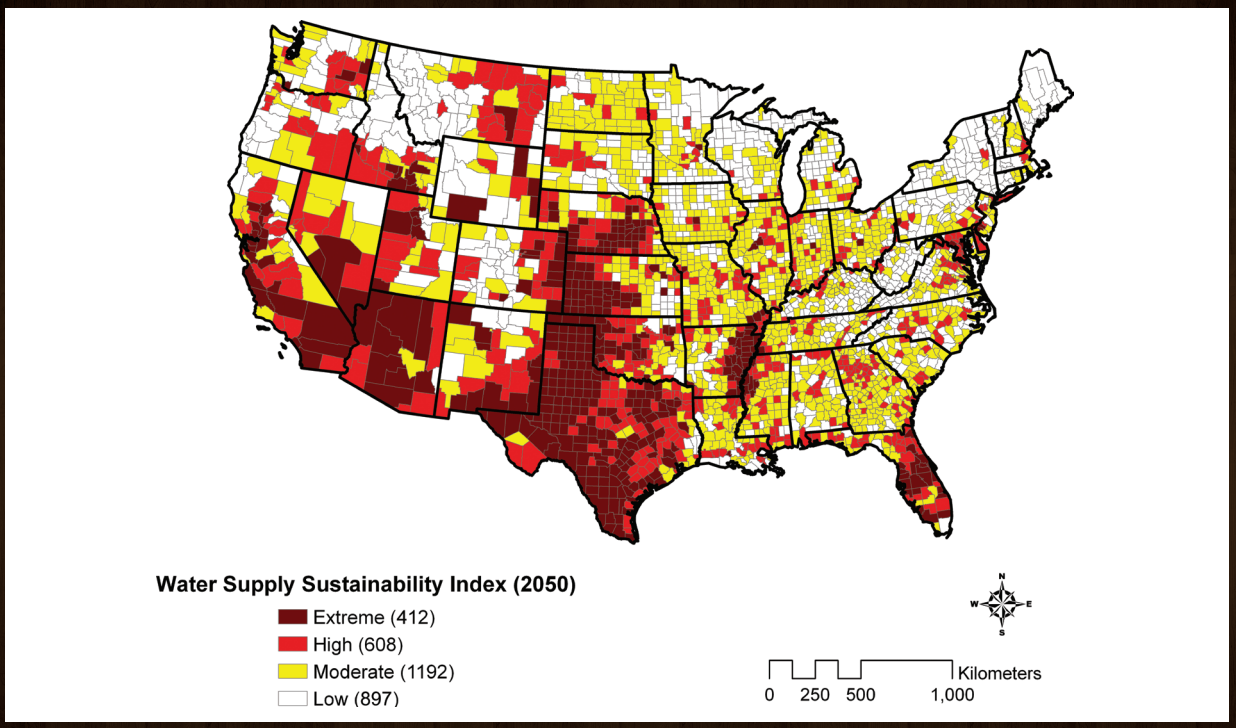


From the beginning of the record in 1891 to the early 1980s, Minnesota's average annual temperature did not change; its trend was essentially zero. Since the early 1980s the temperature has risen slightly over 1 degree F in the south to a little over 2 degrees F in much of the north; the trend has been upward.

Zandlo, Jim. (last modified 2008) Climate Change and the Minnesota State Climatology Office: Observing the Climate. Retrieved from http://climate.umn.edu/climateChange/climateChangeObservedNu.htm

TRUE STATEMENTS	FALSE STATEMENTS
If the graph ended in 1980, there would be no indication of warming in Minnesota.	The temperature on the y axis is in Celsius.

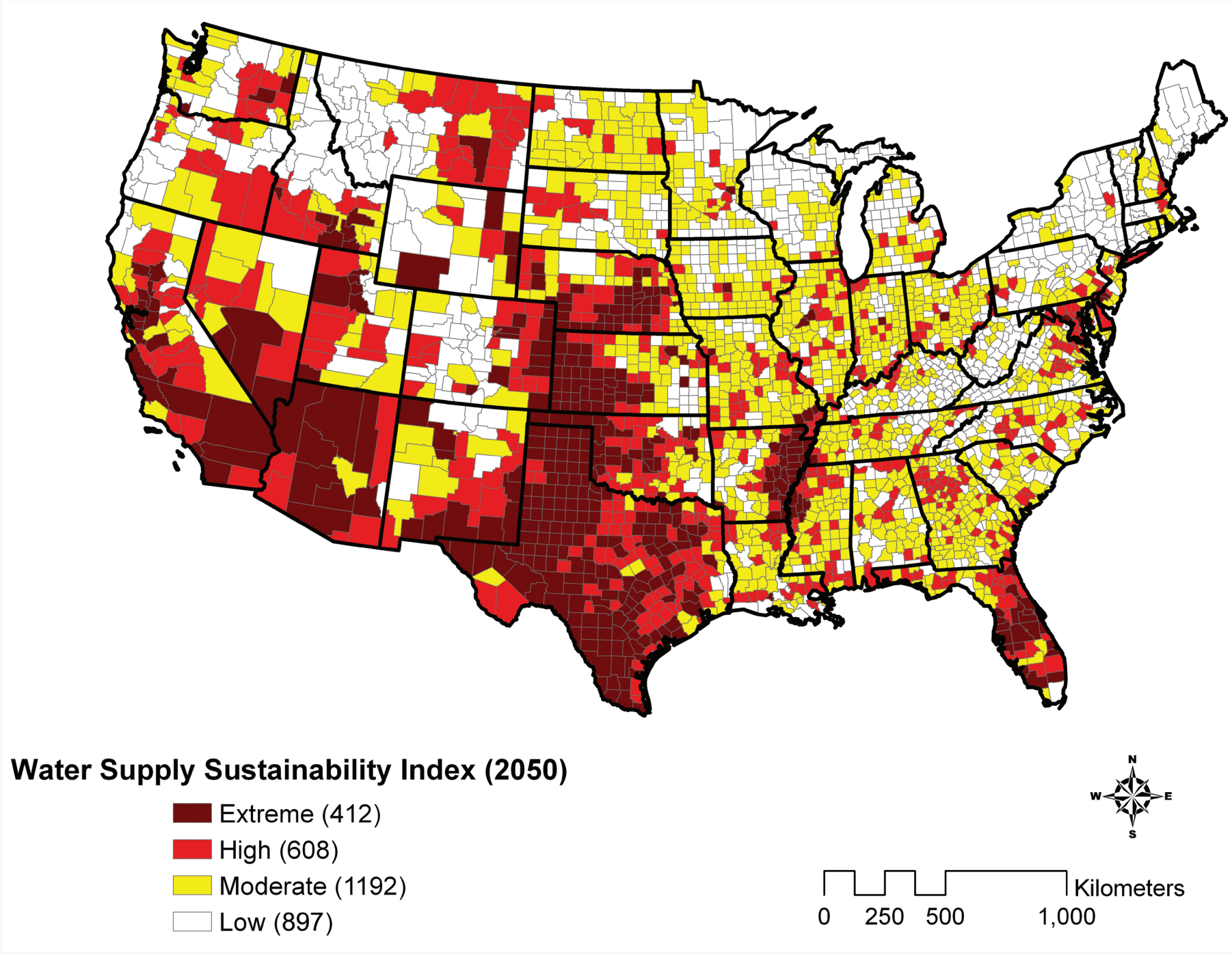




Water Sustainability Index in 2050, with available precipitation computed using projected climate change.
(The numbers in parentheses are the numbers of counties in each category.)

Natural Resources Defense Council. (2010). Evaluating Sustainability of Projected Water Demands Under Future Climate Scenarios. Lafayette, CA: Tetra Tech, Inc.

TRUE STATEMENTS	FALSE STATEMENTS
Those at the highest risk in Minnesota are generally found in urban areas.	Those at the most risk are found in the northern parts of the country.


Water Supply Sustainability Index (2050)
Extreme (412)
High (608)
Moderate (1192)
Low (897)
N
W
E
S
Kilometers
0
250
500
1,000

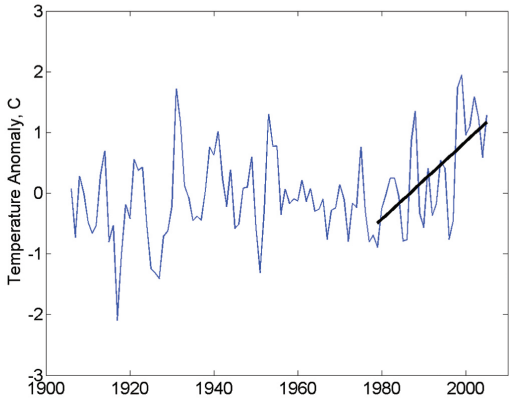


Figure A

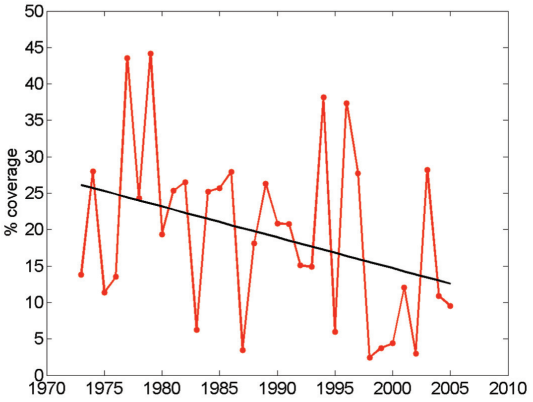


Figure B

Regional air temperature and average ice cover of Lake Superior:
a) mean July-September air temperatures from GISS sites on Lake Superior (available from http://data.giss.nasa.gov/gistemp/) and b) ice cover metric [Assel, 2003; 2005b] in percent.

Austin, J.A., and S.M. Colman. 2008. "A century of temperature variability in Lake Superior." Limnol. Oceanogr. 53, 2724–2730.

TRUE STATEMENTS	FALSE STATEMENTS
Since 1980, Lake Superior ice cover has declined almost 10 percent.	There is no correlation between ice cover and temperature.

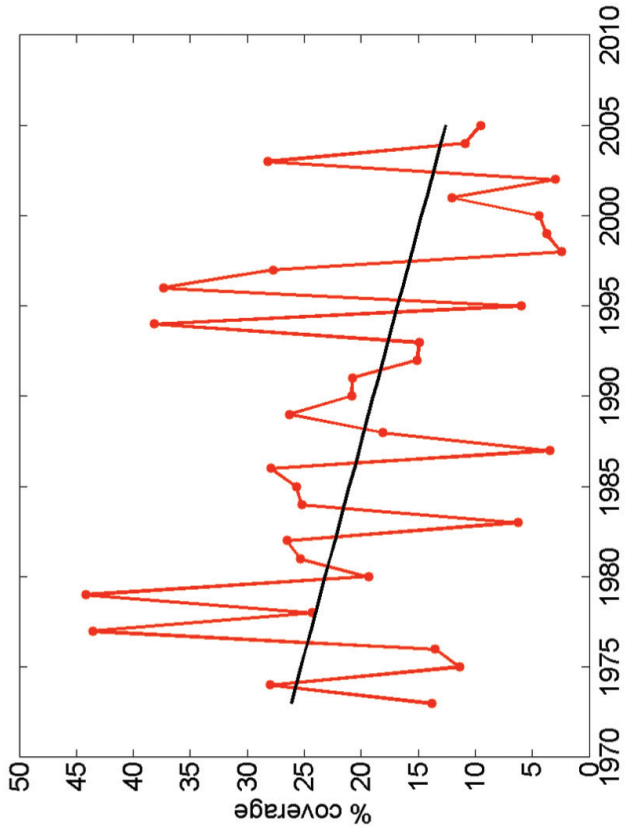


Figure B

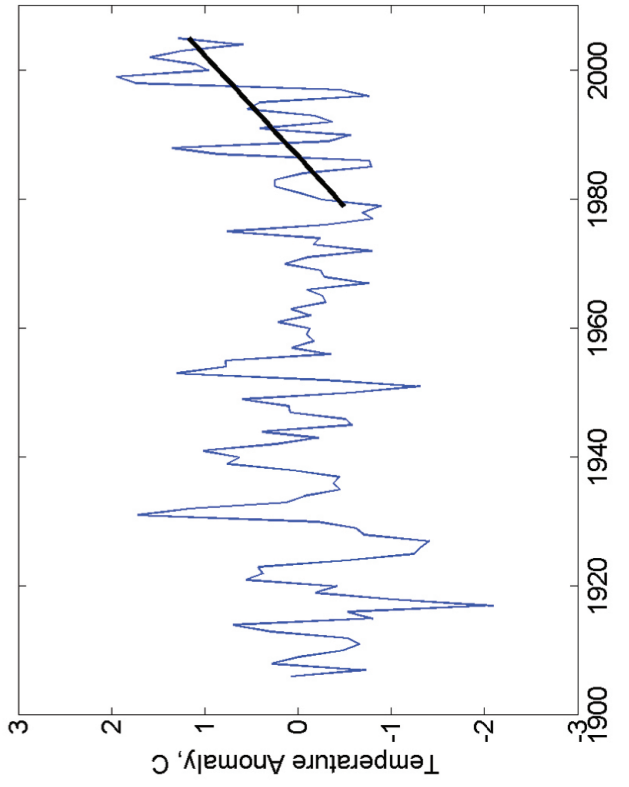
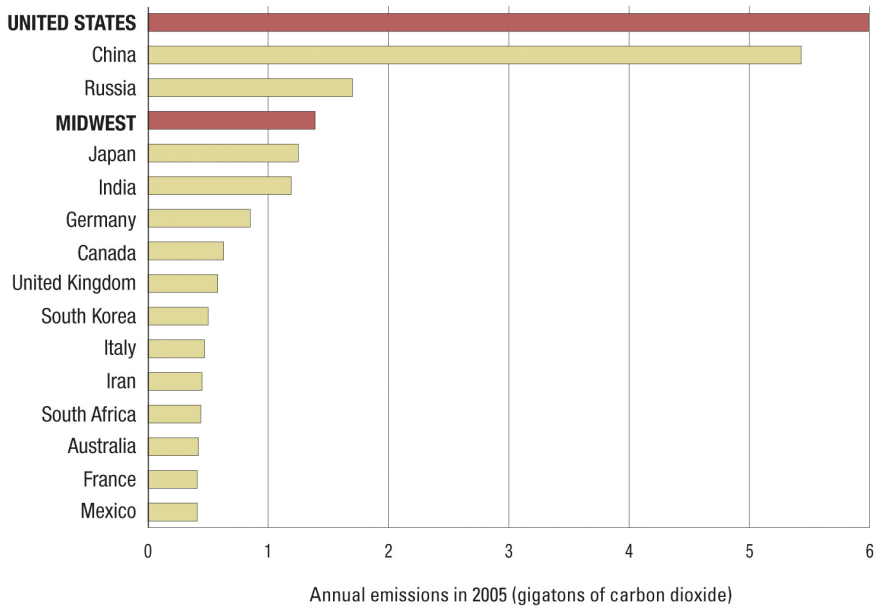


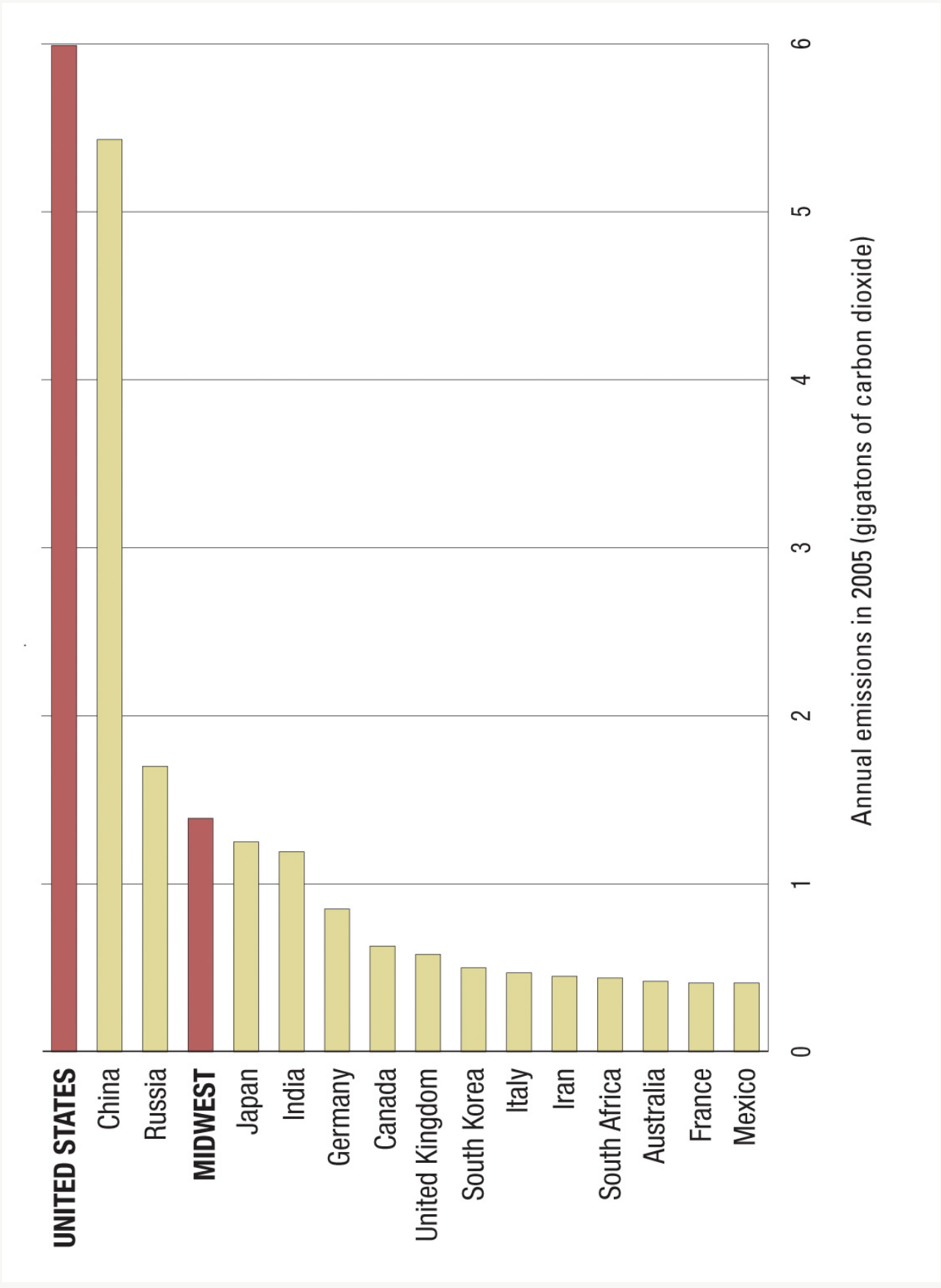
Figure A

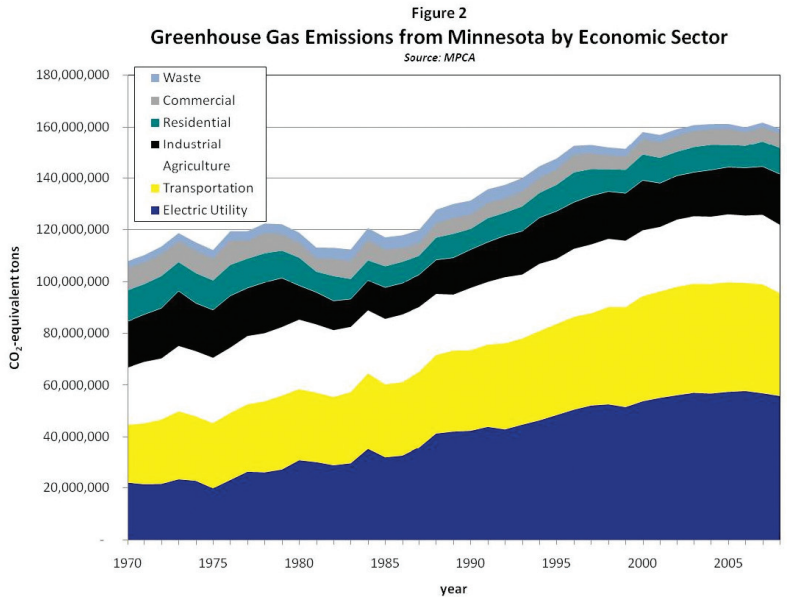


The Midwest Burns More Fossil Fuels Than Entire Nations

Union of Concerned Scientists. (2009). Confronting Climate Change in the US Midwest: Minnesota. Chicago, IL.

TRUE STATEMENTS	FALSE STATEMENTS
The total combined emissions from the eight Midwest states (Illinois, Indiana, Iowa, Michigan, Missouri, Ohio, and Wisconsin) would make the Midwest the world's fourth largest polluter if it were a nation.	China emitted more carbon dioxide than the United States in 2005.


UNITED STATES
China
Russia
MIDWEST
Japan
India
Germany
Canada
United Kingdom
South Korea
Italy
Iran
South Africa
Australia
France
Mexico
0
1
2
3
4
5
6
Annual emissions in 2005 (gigatons of carbon dioxide)



Greenhouse Gas Emissions from Minnesota by Economic Sector

Minnesota Department of Commerce, and Minnesota Pollution Control Agency. (2011) Annual Legislative Proposal Report on Greenhouse Gas Emission Reductions and Biennial Greenhouse Gas Emissions Report to the Minnesota Legislature. Minn. Statt. 216H.07, subd. 3 and 4.

TRUE STATEMENTS	FALSE STATEMENTS
The long-term trend shows increasing greenhouse gas emissions.	The waste sector accounts for the majority of the greenhouse gas emissions from Minnesota.

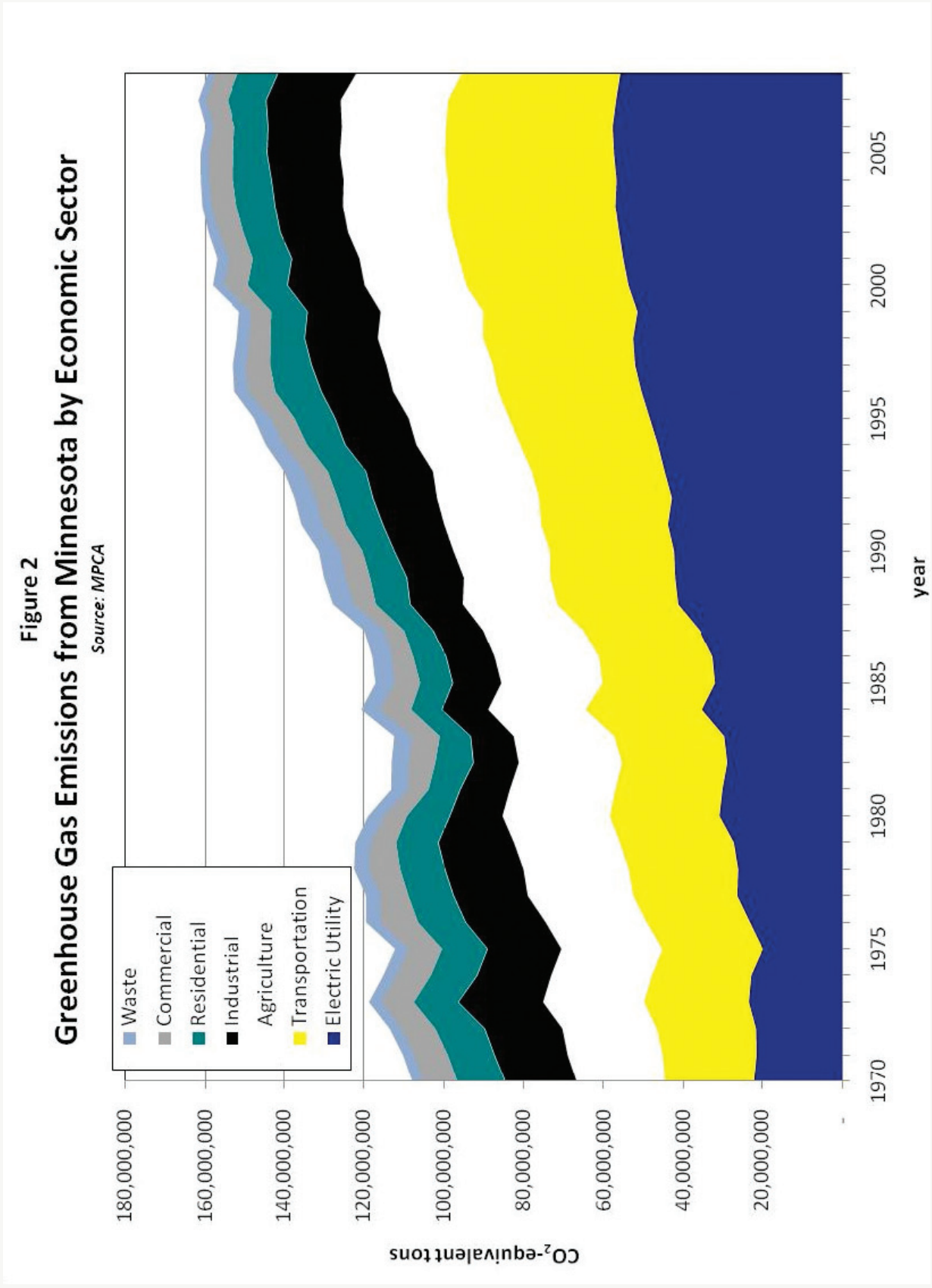
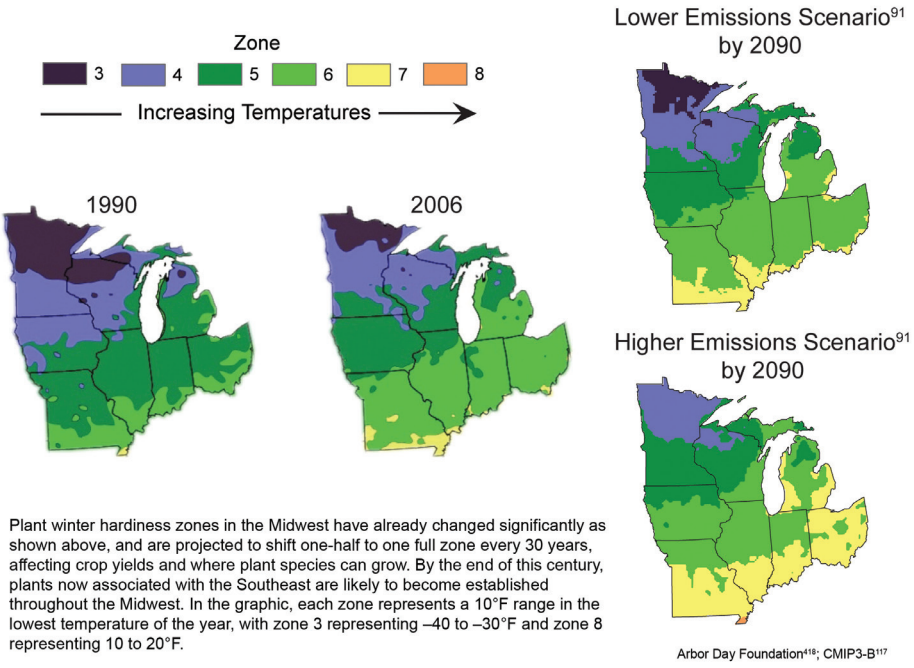


Figure 2
Greenhouse Gas Emissions from Minnesota by Economic Sector
Source: MPCA
Waste
Commercial
Residential
Industrial
Agriculture
Transportation
Electric Utility
180,000,000
160,000,000
140,000,000
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
-
CO2-equivalent tons
1970
1975
1980
1985
1990
1995
2000
2005
year



Plant winter hardiness zones in the Midwest have already changed significantly as shown above, and are projected to shift one-half to one full zone every 30 years, affecting crop yields and where plant species can grow. By the end of this century, plants now associated with the Southeast are likely to become established throughout the Midwest. In the graphic, each zone represents a 10°F range in the lowest temperature of the year, with zone 3 representing –40 to –30°F and zone 8 representing 10 to 20°F.

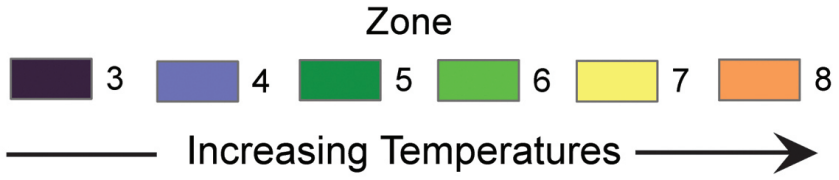
Arbor Day Foundation[418]; CMIP3-B[117]

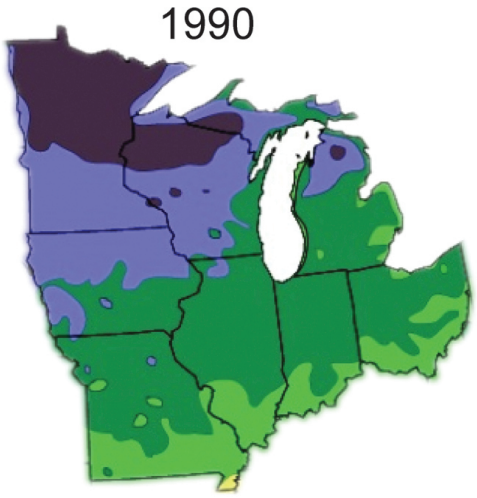
Observed and Projected Changes in Plant Hardiness Zones

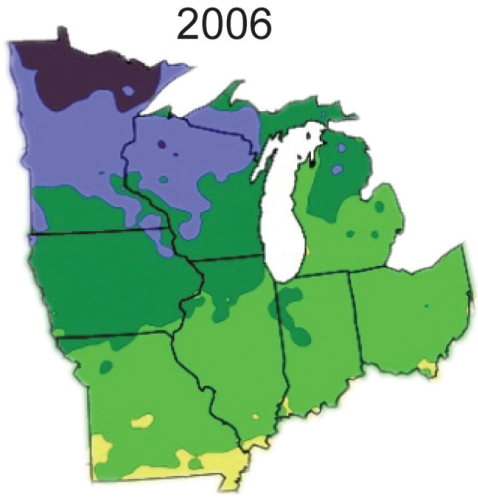
Each zone represents a 10 degree F range in the lowest temperature of the year, with zone 3 representing -40 to -30 degree F and zone 8 representing 10 to 20 degrees F.

U.S. Global Change Research Program. (2009). Global Climate Change Impacts in the United States. New York, NY: Cambridge University Press.

TRUE STATEMENTS	FALSE STATEMENTS
By the end of this century plants now associated with the Southeast are likely to become established throughout the Midwest.	Minnesota will see little change in plant zones under these projections.

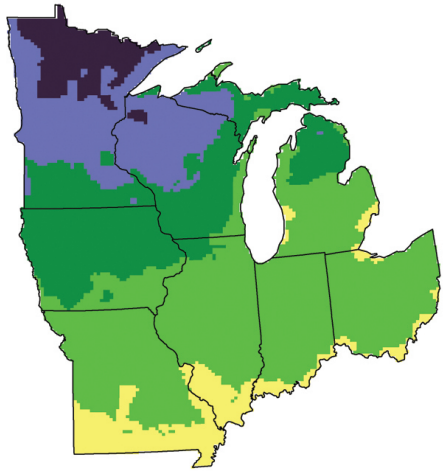




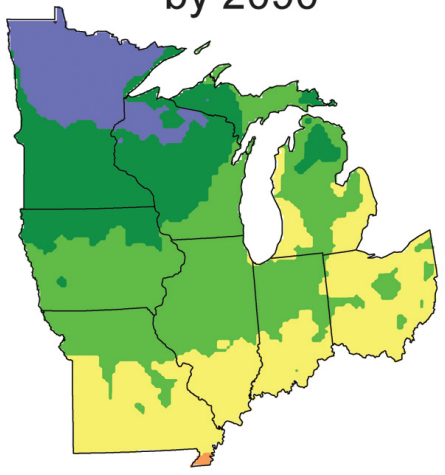


Plant winter hardiness zones in the Midwest have already changed significantly as shown above, and are projected to shift one-half to one full zone every 30 years, affecting crop yields and where plant species can grow. By the end of this century, plants now associated with the Southeast are likely to become established throughout the Midwest. In the graphic, each zone represents a 10°F range in the lowest temperature of the year, with zone 3 representing –40 to –30°F and zone 8 representing 10 to 20°F.

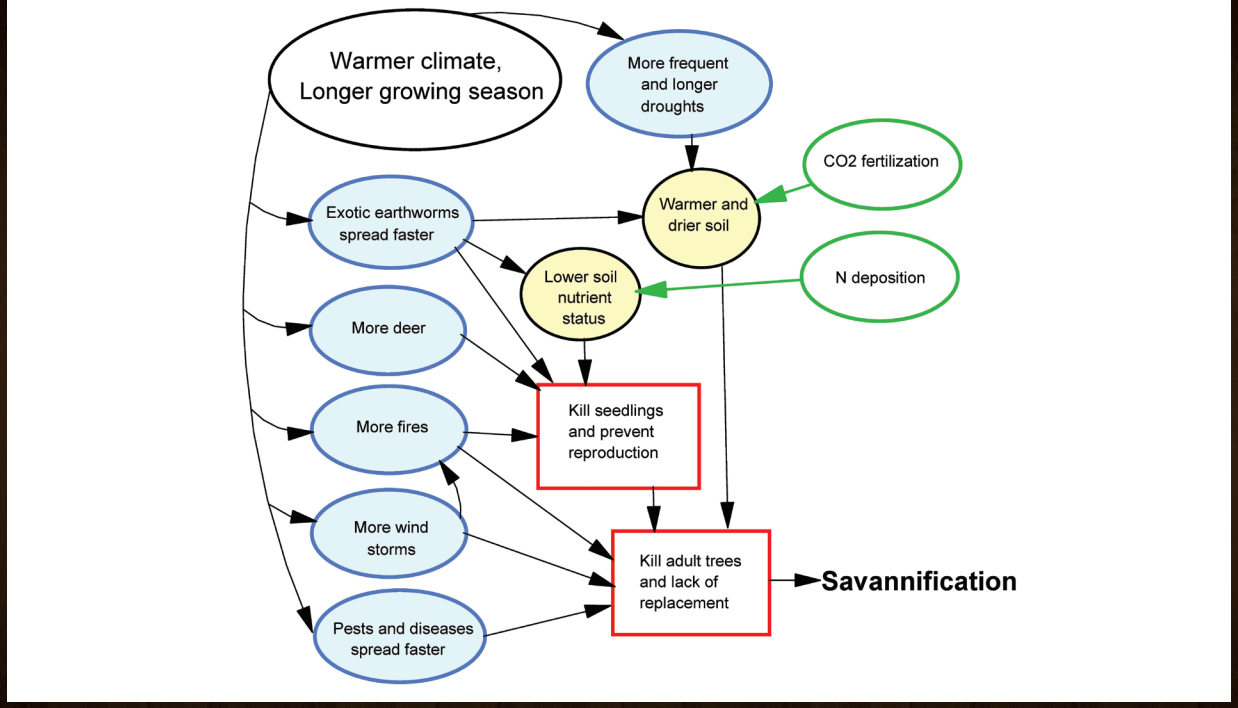
Lower Emissions Scenario[91] by 2090



Higher Emissions Scenario[91] by 2090



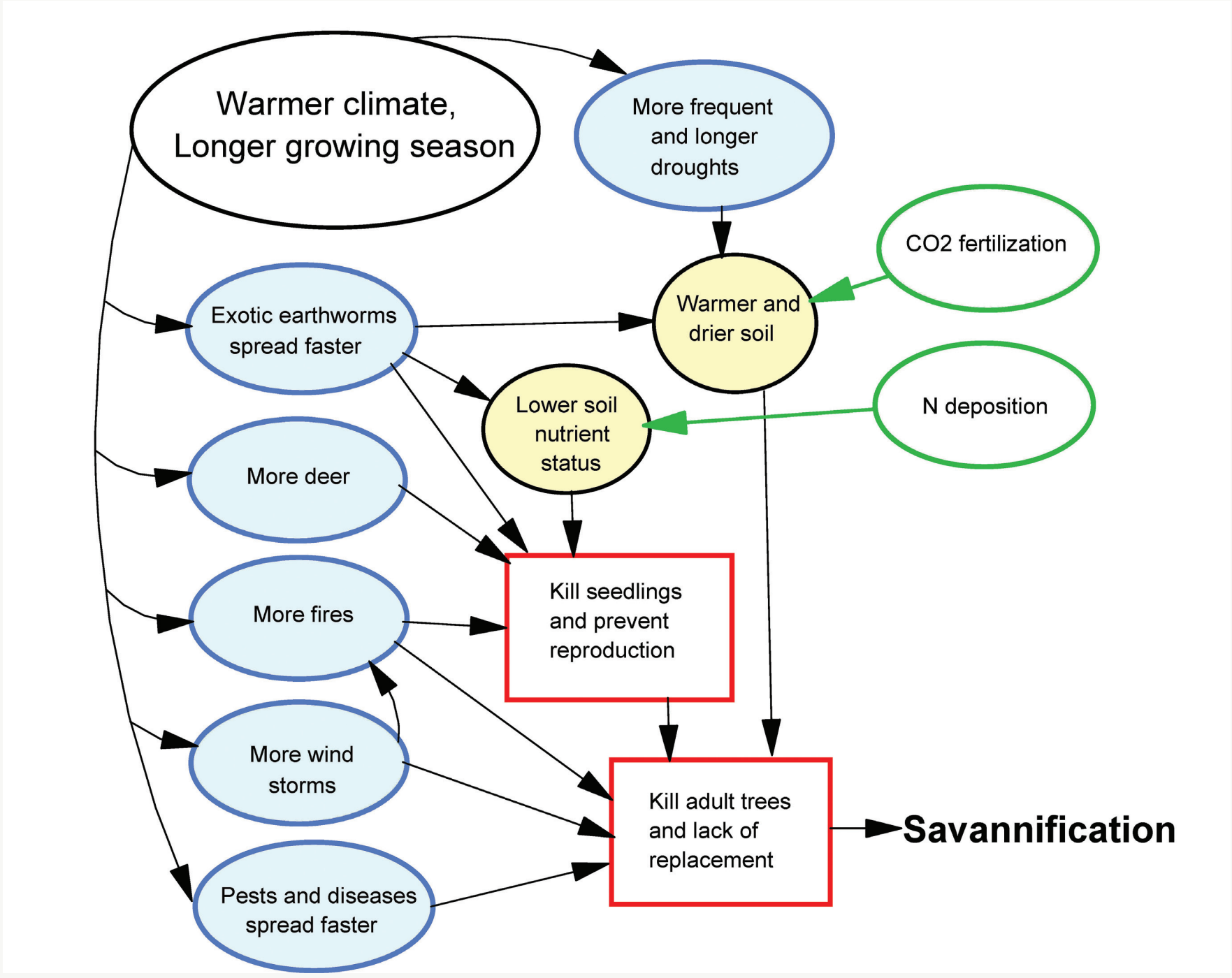
Arbor Day Foundation[418]; CMIP3-B[117]



This chart shows interactions between global warming and other drivers of change affecting the prairie-forest border of central North America, and other impacts on trees. Blue ovals represent drivers with potential negative impacts on trees that are likely to be enhanced by a warmer climate. Yellow ovals represent basic resources that may be changed by a warmer climate or by its interactions with other drivers. Green ovals represent drivers that may counteract negative impacts on trees to some extent. Red rectangles show the results of drivers on trees and their reproduction.

Frehlich, L.E., and Reich, P.B. 2009. "Will environmental changes reinforce the impact of global warming on the prairie-forest border of central North America?" Frontiers In Ecology.

TRUE STATEMENTS	FALSE STATEMENTS
A warmer climate could lead to an increase in deer populations.	Earthworms will help fight the impacts of a warming climate.


Warmer climate,
Longer growing season
More frequent and longer droughts
CO2 fertilization
Exotic earthworms spread faster
Warmer and drier soil
Lower soil nutrient status
N deposition
More deer
Kill seedlings and prevent reproduction
More fires
More wind storms
Kill adult trees and lack of replacement
Savannification
Pests and diseases spread faster

TRUE STATEMENTS	FALSE STATEMENTS

Lesson 6: Minnesota's Changing Climate

What can I do?

Age Level:	Grades 3-12
Time Needed:	To be determined by students
Materials:	Poster paper Markers Action Worksheet and Template
Student Learning Outcomes:	• Students will brainstorm appropriate solutions and select one for their group, class or school • Students will develop a climate action plan and begin to implement it

Background Information:

Student action to mitigate the effects of climate can take many forms. Crafting position statements and testifying before the legislature, designing public service announcement posters, videos or podcasts, planting trees to absorb carbon dioxide, starting or joining a citizen science project to record phenology, or starting a compost for school or home food waste to decrease methane gas release are all legitimate actions, especially when student driven.

> We need to start communicating...we need to really get active and do what we can in our own sphere of influence ... we need the youth.
>
> —Will Steger at youth event, September 2, 2008

The most important outcome of this lesson and unit on *Minnesota's changing climate*, is that this final action project is student led and student driven. Making sure students feel that they can part of the solution and that their ideas are valuable is an essential key to helping them not feel overwhelmed by the current and predicted impacts of climate change. In addition, the action projects that they develop are valuable assessments of what they understood and connections that they made about what is causing climate change and how it will impact their lives, biome and Minnesota as whole.

Activity Description

This is only one suggested way to help identify student action projects. Throughout this unit, project ideas may have already been developed or started. As noted earlier, the two most important outcomes are that there is a project so that students feel part of a solution, and that these projects are as student-initiated and driven as possible.

Introduction

1. Divide students into five groups and hand out one key issue to each group. Ask each group to dissect the issue to the root cause.
2. Ask students to glue the issue in the center of a large piece of butcher paper or poster board. From the issue, ask them to break it into smaller and smaller parts to identify the root cause or problem. (See example below)

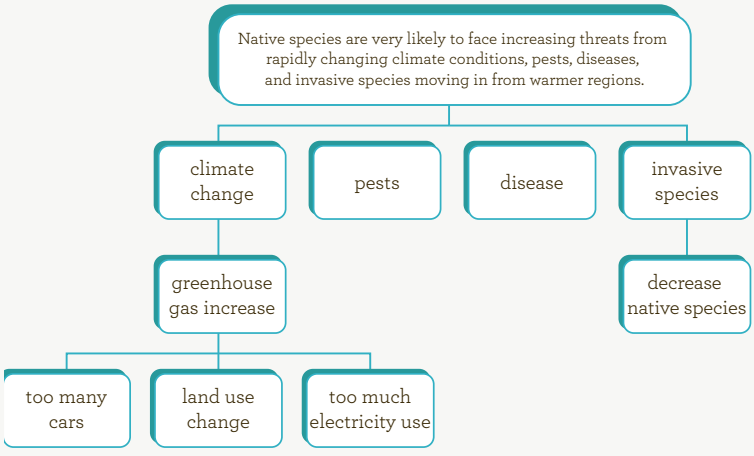


Diagram 1: Native species are very likely to face increasing threats from rapidly changing climate conditions, pests, diseases, and invasive species moving in from warmer regions.

3. Once they have identified a few problems, ask them to turn their poster over and put one problem in the middle of their paper and make a concept map of solutions. Encourage creative thinking and tell them no idea is too crazy at this point. (See example below) This may also be a time to do some Internet research about solutions and project ideas.

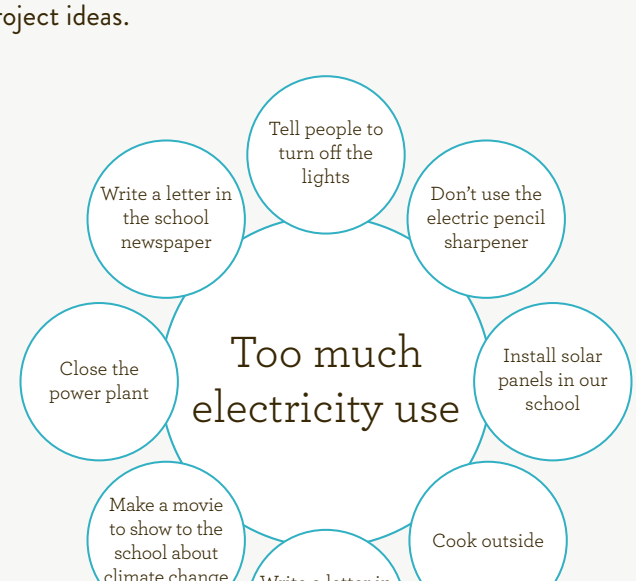
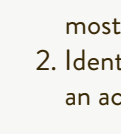


Diagram 2: Too much electricity use

Activity: Developing Action Plans

1. Once the groups have identified solutions. Ask them to post their visuals and have everyone in the class walk around to read the different solutions. Take notes in their journal about which solutions they think are the most interesting and which ones they would be interested in working on.
2. Identify a few solutions through voting as a class, and ask students to break into interest groups to work on an action plan. Use the attached climate action plan worksheet and template.



Journaling Connection

Ask students to document their "action journey" in their journal. This could be in words, poetry, cartoons, photos pasted in or whatever creative way they can think of.

Take It Outside—Connecting With Your Place

There are many action projects connected with climate change that can happen in your schoolyard or nature area close by. If your students are able to articulate the connection between what they are proposing and climate change, that is the most important part.

Online Classroom Connection

Visit http://classroom.willstegerfoundation.org

Submit your climate action plans, as well as photos and videos of you in action, or email them to education@willstegerfoundation.org

Climate Action Plan Template

Part One: Brainstorming

1. What issue are you most passionate about regarding the impacts of climate change in Minnesota? Why?

2. What do you want to see change at your school and/or what does your school or community need to do to help mitigate or adapt to the impacts of climate change?

3. What connections do you see between your passions and the needs of your school/community?

4. Use the space below to jot ideas for potential projects based on the previous questions and your participation in workshops/discussions:

Part Two: Action Plan

Now that you've done some brainstorming, it's time to get more specific. Here is a step-by-step process that can help you identify a project and develop SMART goals. Use the Project Planning Worksheet to create a strategic and successful action project while referring to the steps below to guide your work.

Step One: Choose a Project Focus

Some potential areas to work on are listed below, but don't limit yourself to these ideas. Get creative, and address the greatest needs in your school or community.

Project ideas include: energy efficiency on campus, climate change curriculum/awareness/eco-literacy education, greening your school cafeteria, organic gardening, composting, recycling, reducing your school's carbon footprint, less dependence on fossil fuel transportation, make your school a bike friendly school, install a rain garden, plant trees and native plants, green financing/purchasing, etc.

The area I will focus on for this action plan is: _____

Step Two: Setting SMART Goals

Something to keep in mind when you're creating your Goals and Objectives is S.M.A.R.T. decision-making. S.M.A.R.T. stands for "Specific, Measurable, Achievable, Realistic, and Timely." You can begin with some pretty lofty goals (such as the desire to make your community 100% carbon neutral), but they have to be broken down into manageable activity chunks that have specific measures of success. For example, rather than have a goal of "Get everyone at school to start recycling," the S.M.A.R.T. way of stating that goal would be to say ... get two recycling bins placed in each classroom and create a student-led pick-up program for this year."

There are two major benefits of having realistic goals with definite measurements of success. One, you'll feel a sense of accomplishment when you've met your goal. The community will also be able to see progress—and will therefore be much more likely to get involved. Two, the people who give you money for your project will prefer those kinds of specific goals. If you need to write a grant or ask the local millionaires' club for a donation, they will ask for specifics to make sure that their money goes toward some tangible achievement.

S.M.A.A.R.T.T.

Specific	can be well-defined and clearly understood by anyone who has basic knowledge of the project
Measurable	can know if a goal is obtainable, when it has been achieved and how far away completion is
Achievable	can be achieved within the current environment
Agreed Upon	agreement with all the stakeholders what the goals should be
Realistic	can be accomplished within the availability of resources, knowledge and time
Timetable	are limited by a timeframe
Tangible	anyone can experience it

Step Three: Building Your Team

As much as you'd love to do this solo, you're going to have to partner with a team, group, and/or organization in order to achieve your goals. You may already have a team you're working with, or you may be starting from scratch; either way, it's helpful to know who you'll be working with. Brainstorm a list of the people that you want to include in your team. This could include students passionate about your issue, students working in related groups, educators/advisors/administrator, facility management, community members, parents, etc.

Step Four: Identifying Potential Roadblocks

Brainstorm a list of potential obstacles you may need to overcome in order to reach your goal (for example: lack of funding, disinterested students, no administrative support, intimidating facilities manager, etc.)

Step Five: Identifying Your Project Resources
What space, money, materials and other resources do you have that will help to achieve your goals?

Consider your assets:
Human assets – individual skills and knowledge of members of your community
Association assets – groups that have come together for a common purpose
Institutions (public or private) – schools, local government, businesses, nonprofits
Built Assets – buildings, public spaces, other infrastructure
Financial Assets – funding potential, grants, investments, etc.

Step Six: Building Support
Who needs to know about this project? How will you share your story and build the support you need?

Step Seven: Making a Project Timeline
Create a realistic and concrete timeline that includes preparation for your project, project implementation, and any wrap-up or follow through that needs to happen.

Step Eight: Implement Your Project
Get out there and DO something great!

Step Nine: Share Your Success!
Report on your accomplishments to your school and community via newspapers, forums and social media, including:
http://classroom.willstegerfoundation.org

Part Three: Climate Action Plan Summary

Use the action plan worksheet to fill out this summary.
Full name of lead educator/adult mentor contact: _____
First names of student group members: _____

Email: _____
Phone number: _____
School/grade: _____
What is your project focus? _____

Please list your top three S.M.A.R.T. goals
a) _____
b) _____
c) _____
Include a brief summary of your timeline _____

We would love to share your plan and the outcomes of your project! Please return this form by mail, email or fax with photos or other relevant supporting documents to:
Minnesota's Changing Climate Project
Will Steger Foundation
2810 21st Avenue South, Ste 110
Minneapolis, MN 55407
education@willstegerfoundation.org
Fax# (612) 278-7101

Or upload it on the *Minnesota's Changing Climate* website at:
http://classroom.willstegerfoundation.org

ACTION PLAN WORKSHEET

WILL STEGER FOUNDATION

1 Project Focus: _____

Specific

Measurable

Achievable

Realistic

Timetable

2 Goals/Objectives:

3 Your Team:

4 Road Blocks:

5 Resources/Assets:

7 Timeline of Activities (by month):

Nov:

Dec:

Jan:

Feb:

Mar:

Apr:

May:

June:

Next School Year:

6 Building Support:

Will Steger Foundation 2801 21st Ave S, Suite 110 Minneapolis, MN 55407
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www.willstegerfoundation.org

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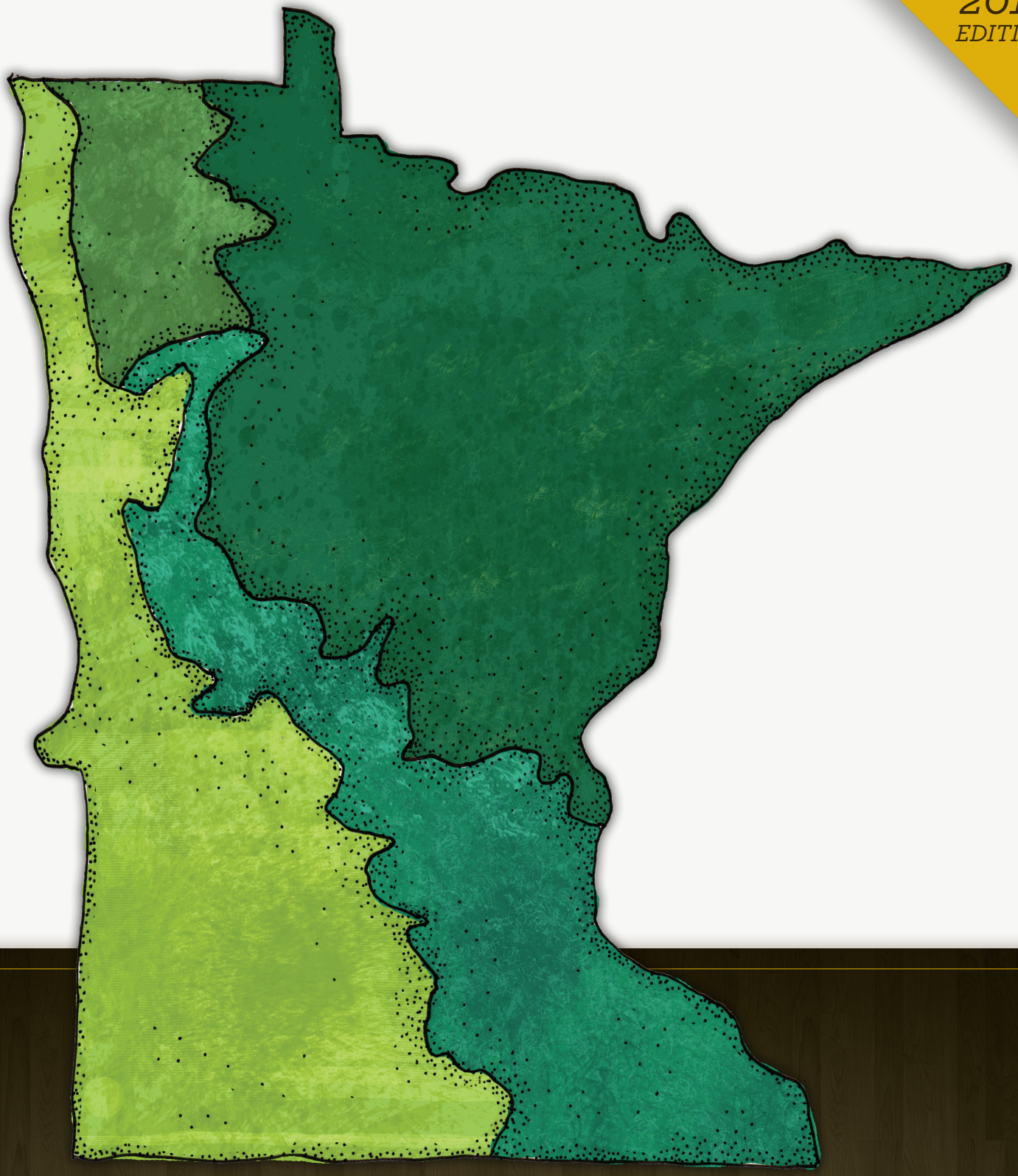
2012
EDITION



Minnesota's Changing Climate

Grades 9–12

WILL STEGER FOUNDATION

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Grades 9–12

Acknowledgements

August 2012

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Erica Sniegowski, Education and Outreach Specialist, Mississippi Watershed Management Organization
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The Center for Global Environmental Education, Hamline University
Additional science and environmental education professionals, organizations and agencies

Dr. Audrey C. Rule at the University of Northern Iowa developed the curriculum materials from which lesson 5 was adapted.

Excerpts from *Eden Summer Collages* were generously made available by David Coggins. For more information, visit http://www.cobaltpress.com. For an in-depth look at the book and the collages, see Mason Riddle's article "An Eden of One's Own" in mn.artists.org. The link is: http://mnartists.org/article.do?rid=219636 The book is available at various Twin Cities locations, including Walker Art Center, Minneapolis Institute of Arts, Common Good Books and Micawber's Books in St. Paul, Birchbark Books in Minneapolis, and the Bookcase in Wayzata.

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Minnesota Science Standard alignment by Angela Rosendahl.

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For additional information on the Will Steger Foundation please visit:
http://www.willstegerfoundation.org

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www.nationalparks.org

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Minnesota's Changing Climate - Curriculum Introduction

Dear Educator:

The Will Steger Foundation created *Minnesota's Changing Climate* because we believe that environmental stewardship and action begins with a local connection and sense of appreciation, or *environmental sensitivity*, towards the natural environment. As educators, you have the unique opportunity to lead your students through the environmental education continuum of knowledge, awareness, and skills that lead to an informed and active environmental citizenry. *Minnesota's Changing Climate is a* great place to start because it follows this model of inspiring an appreciation and understanding of Minnesota's natural environment and empowering action.

Climate change is one of the most critical issues of our time. The overwhelming consensus of the scientific community for the past two decades has been that the planetary warming we are now experiencing, and the resulting climate change, is largely a human-induced phenomenon. This was reconfirmed with overwhelming consensus in 2007 with the release of the fourth report by the Intergovernmental Panel on Climate Change (IPCC). Climate change is largely driven by human activities, primarily the burning of fossil fuels to produce electricity and drive our cars, which in turn emit gases—principally carbon dioxide—that blanket the planet and trap heat, raising the earth's surface temperature.

Minnesota is at risk from climate change. From the Boundary Waters Canoe Area Wilderness and the great northern boreal forests, to the northern tall grass prairie, water is a critical element of Minnesota's rich ecological character. Lake Superior borders the state to the northeast, the Mississippi and Red Rivers define large portions of the eastern and western borders respectively, and there are thousands of inland lakes throughout the state. Minnesotans benefit from the many recreational, inspirational, and economic opportunities provided by this diversity of biomes. It is precisely these ecological and natural resources that are at risk from climate change.

Will Steger 's compelling life story of adventure has motivated thousands of Minnesotan's to care about our state and has generated real concern over the threat of climate change to our economy, natural resources, and way of life. Using Will's archives, starting when he was a young boy growing up in the suburbs of Minneapolis, to his Mississippi River adventures, to his homestead on the edge of the Boundary Waters wilderness, and the inspiration these experiences gave him to explore the Arctic, we share his story to inspire others. It was Will's early observation of the natural world and his curiosity of weather and climate that eventually enabled him to explore and survive in the Arctic. It is these critical skills that we focus on in *Minnesota's Changing Climate*.

In this set of lessons, we explore and learn about Minnesota's unique biomes and what a changing climate will mean for the state. Specifically, we examine how Minnesota's climate has already changed and how it is projected to change; how these changes may impact agriculture, forests and wildlife, aquatic ecosystems, our economy, and tourism and recreation; and how you can help reduce these potential impacts and help your biome adapt to a changing climate.

The following section gives suggestions of how to integrate this curriculum into your educational setting. We welcome and appreciate feedback and stories from all of you. Please share them with us at education@willstegerfoundation.org and don't forget to visit our online classroom developed in conjunction with this written curriculum http://classroom.willstegerfoundation.org

Thank you for your commitment to climate change education!

Kristen Poppleton

Kristen Iverson Poppleton
Director of Education
Will Steger Foundation

The Will Steger Foundation Education Program

Will Steger Foundation

Established in January 2006 by polar explorer Will Steger, the Will Steger Foundation (WSF), located in Minneapolis, Minn, is dedicated to creating programs that foster international cooperation and leadership through environmental education and policy. The Will Steger Foundation has seen firsthand the dramatic effects of climate change on both the environment and the human condition through the efforts of its founder, Will Steger, who has explored the polar regions for 45 years. With that knowledge, WSF is leading humanity to slow the pace of climate change.

The Will Steger Foundation educates, inspires and empowers people to engage in solutions to climate change. The strategic goal of our education program is:

To support educators, students and the public with science-based interdisciplinary educational resources on climate change, its implications and solutions to achieve climate literacy.

K-12 Education Program Overview

WSF's education program offers thought-provoking and practical solutions for educators and students by developing, supporting and connecting them with:

- Climate Change Curriculum
- Professional Development Opportunities
- Online Resources

Climate Change Curriculum

WSF offers a suite of curriculum resources via our two online learning portals, as well as our Educator Resources Binder and *Minnesota's Changing Climate* lesson plans. All lesson plans are available for free online and include lessons appropriate for grades 3-12. Aligned with the national and Minnesota state standards, the curriculum has been reviewed by the National Education Association, and the Union of Concerned Scientists. It can be purchased or downloaded for free at http://www.willstegerfoundation.org.

Educator Resources Binder

The Educator Resource binder was developed to support educators looking for innovative and engaging ways to integrate climate change into their classroom. In addition to the three sets of lesson plans for Grades 3-12 in the binder, each lesson is linked to archived video and audio footage of past expeditions, as well as other online resources.

Minnesota's Changing Climate Curriculum

WSF created *Minnesota's Changing Climate* because we believe that environmental stewardship and action begins with a local connection and sense of appreciation, or *environmental sensitivity*, towards the natural environment. This set of lesson plans for Grades 3-8 and 9-12 explores Minnesota's unique biomes and what a changing climate will mean for the state.

Online Curriculum

- Arctic Community Online Curriculum: This curriculum features the Arctic community as seen by animals, native peoples, explorers and scientists; all with diverse perspectives and ways of knowing, and all contributing to knowledge and action to slow climate change. The focus is on solutions and positive messages of hope and action.
- *Minnesota's Changing Climate* Online Classroom: This online classroom was developed in conjunction with the *Minnesota's Changing Climate* lessons. Through the classroom, students have the opportunity to learn about Minnesota's unique biomes and the impacts of climate change. Students also have the opportunity to contribute their own observations and action projects, in photo or written format, and see what other students from around the state have observed.

Professional Development Opportunities

Summer Institute for Climate Change Education: WSF has provided professional development to educators for six years through annual summer institutes. The institutes provide educators with tools to communicate climate change in the classroom. Past keynote speakers have included Bill McKibben, Dr. James Hansen, Andrew Revkin, and Dr. Naomi Oreskes.

Graduate Course on Communicating Climate Change in the Classroom (2 credits): WSF staff teach an annual graduate level course in the fall at Hamline University on "Teaching Climate Change in the Classroom."

Online Resources

Climate Lessons Blog for Educators: WSF maintains a weekly blog dedicated to providing tools and references for educators and communicators of climate change.

Video Gallery: WSF's video gallery contains 100s of videos featuring past expedition footage in the polar regions, as well as presentations by leading climate scientists and other climate educators.

Adventure Learning: WSF is a leader in adventure learning, a hybrid distance education approach that provides students with opportunities to explore real-world issues through authentic learning experiences. WSF harnesses the power of adventure learning by providing the organization's website and its virtual library of multi-media resources, classroom visits, and real-time web conferences to classrooms during WSF expeditions.

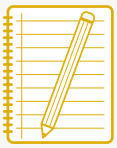
Using Minnesota's Changing Climate in your educational setting

Minnesota's Changing Climate was created with the following goals in mind:

1. To build awareness and interest in
   - Minnesota's natural environment
   - The impact of climate change
2. To provide educators and students with the tools necessary for active and lifelong stewardship.

Recognizing the time constraints and standards-based school environment that exists today, WSF developed these six lessons to make them as useful as possible to educators. They are aligned to Minnesota State Science and Literacy Standards, as well as the Climate Literacy Principles. It is not meant to provide students with an in-depth introduction to the science of climate change, but rather as a review if they have studied it before, or an introduction if it is a new issue. For educators interested in providing students with a more in-depth study of climate change, our Grades 3-5 and Grades 6-12 Global Warming 101 Lessons provide this opportunity and can be downloaded for free at http://www.willstegerfoundation.org.

This set of lessons will be most effective when used in their entirety, including the "Journal Connection" and "Take It Outside-Connecting With Your Place" sections, in conjunction with the online classroom. That said, these lessons could be used in a variety of educational settings. It can also follow a variety of different timelines such as over an intense week of study or once a week over the course of a month and a half. The following suggestions might be helpful when developing your plan of implementation for *Minnesota's Changing Climate*, but we also trust that as an educator you are the experts and will change and adapt lessons best for your situation. We would love to hear how you are using the curriculum in your classroom or school. Please share your stories and photos or videos with us at education@willstegerfoundation.org or upload them to our online classroom at http://classroom.willstegerfoundation.org



Document, document, document

The first lesson of this curriculum is about starting a journal and includes examples of different ways of documenting and reflecting. This lesson was deliberately developed with the idea that a journal, science notebook or blog can provide students with an excellent means to practice reflection, observation and synthesis of information. In addition, if used throughout the implementation of this curriculum, the final product can provide educators with a great assessment of student learning.

Teach Across the Curriculum

Some schools work in team settings with different educators taking on different subject areas. While this is the norm in middle and high school, it can occur in elementary classrooms as well. If possible, break apart the lessons between educators or subject area teaching time, and emphasize the relevant content.

For example:

Lesson 1: What is a journal for?
This lesson is obviously well aligned with any English/language arts course; however, many science classes have begun using science notebooks, and an art class could work on creating the stylistic/graphic design. In addition, it could be possible to set up a blog for each or your students, putting an emphasis on technology skills.

Lesson 2: What defines Minnesota's biomes?
This lesson could fit well with life science, environmental science, earth science and physical geography, depending on what content you wanted to emphasize.

Lesson 3: What defines Minnesota's climate?
Earth science, life science and math could address this lesson.

Lesson 4: What is climate change and what does it mean for Minnesota?
Although this lesson presents students with climate science information, there is a big emphasis on communicating the information that would work well in any English or public speaking course or unit.

Lesson 5: What does the data show?
This lesson is very data- and graph-focused and therefore would work well with any earth science or life science unit focused on interpretation of information. It could also be used and extended in a math course.

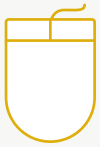
Lesson 6: What can I do?
Some schools have volunteer or service learning staff that might be able or interested in facilitating this lesson. Bringing together all the staff that participated, and making this the assessment for students that have completed this unit would also be an exciting possibility. Finally, students may be able to take on this part in an after-school setting through an environmental club.

Using Minnesota's Changing Climate in your educational setting

We really mean it when we say "Take It Outside!"

The "Take It Outside—Connecting with Your Place" section of each lesson is not meant to be an extension, but rather an integral part of each lesson. Connecting students with the biome in which they live and providing them with the skills to be eyewitnesses to the changing climate we live in is an important goal of this project. Not only do we think this is important, but research shows that getting students outside daily is beneficial not only to their health, but their ability to perform in school. (See http://www.childrenandnature.org/research/) Suggestions of how to "Take it Outside" with your classroom include:

- Make an outing to your schoolyard once a week throughout the entire year to observe the same area and record changes in a journal or science notebook.
- Select a weather reporter each day that records the temperature, precipitation, etc. as well as researches weather history via the Internet or an almanac. Record in the classroom and use data for different graphing exercises and compare year to year.
- Ask students to select an area to observe near their home and make weekly observations in a journal or science notebook.



Use the Online Classroom

The Online Classroom designed in conjunction with this curriculum is a fantastic way to bring some of the content alive in the classroom or in an educator-facilitated setting. Ideally, students will be introduced to the classroom and given time to explore it at school. Additional opportunities for assessment are available through the classroom, and if your students have the Internet available at home, exploring pieces of the classroom could be integrated as homework. We highly encourage educators and students to share what they have learned through this curriculum, and the online classroom is a place where students and educators can upload photos of their biome, journal entries and other observations, as well as see what other schools around the state are doing.

Do an Action Project

Climate change can be overwhelming and frightening. Students should understand the consequences and impacts of climate change in Minnesota, but then be offered the opportunity to discuss and learn about potential solutions. Facilitating a discussion of possible action projects, rather than selecting one for students to do, will make students feel more involved and empowered, as well as provide educators with a good assessment of what the students have learned and how much they have connected the causes of climate change with possible actions.

Science

Grade - 9–12
Strand - 1. The Nature of Science and Engineering
Substrand - 1. The Practice of Science
Standard - 1. Science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.

Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
9.1.1.1.2	Understand that scientists conduct investigations for a variety of reasons, including: to discover new aspects of the natural world, to explain observed phenomena, to test the conclusions of prior investigations, or to test the predictions of current theories.	•	•	•		•	•
Grade - 9–12 Strand - 1. The Nature of Science and Engineering Substrand - 1. The Practice of Science Standard - 2. Scientific inquiry uses multiple interrelated processes to pose and investigate questions about the natural world.							
9.1.1.2.2	Evaluate the explanations proposed by others by examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the scientifically acceptable evidence, and suggesting alternative scientific explanations.						•
9.1.1.2.3	a line of reasoning to judge the validity of a claim.						•
9.1.1.2.4	Use primary sources or scientific writings to identify and explain how different types of questions and their associated methodologies are used by scientists for investigations in different disciplines.			•	•	•	
Grade - 9–12 Strand - 1. The Nature of Science and Engineering Substrand - 3. Interactions Among Science, Technology, Engineering, Mathematics and Society Standard - 1. Natural and designed systems are made up of components that act within a system and interact with other systems.							
9.1.3.1.1	Describe a system, including specifications of boundaries and subsystems, relationships to other systems, and identification of inputs and expected outputs. For example: A power plant or ecosystem.		•	•			•
9.1.3.1.2	Identify properties of a system that are different from those of its parts but appear because of the interaction of those parts.			•			
9.1.3.1.3	Describe how positive and/or negative feedback occurs in systems. For example: the greenhouse effect				•	•	•
Grade - 9–12 Strand - 1. The Nature of Science and Engineering Substrand - 3. Interactions Among Science, Technology, Engineering, Mathematics and Society Standard - 3. Science and engineering operate in the context of society and both influence and are influenced by this context.							
9.1.3.3.2	Communicate, justify, and defend the procedures and results of a scientific inquiry or engineering design project using verbal, graphic, quantitative, virtual, or written means.						•

Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Grade - 9–12 Strand - 1. The Nature of Science and Engineering Substrand - 3. Interactions Among Science, Technology, Engineering, Mathematics, and Society Standard - 4. Science, technology, engineering and mathematics rely on each other to enhance knowledge and understanding.							
9.1.3.4.2	Determine and use appropriate safety procedures, tools, computers and measurement instruments in science and engineering contexts. For example: Consideration of chemical and biological hazards in the lab.			•			
9.1.3.4.3	Select and use appropriate numeric, symbolic, pictorial, or graphical representation to communicate scientific ideas, procedures and experimental results.		•	•	•	•	•
Grade - 9–12 Strand - 2. Physical Science Substrand - 4. Human Interactions with Physical Systems Standard - 1. There are benefits, costs and risks to different means of generating and using energy.							
9.2.4.1.1	Compare local and global environmental and economic advantages and disadvantages of generating electricity using various sources or energy. For example: Fossil fuels, nuclear fission, wind, sun or tidal energy.				•		
Grade - 9–12 Strand - 3. Earth and Space Science Substrand - 4. Human Interactions with Earth Systems Standard - 1. People consider potential benefits, costs and risks to make decisions on how they interact with natural systems.							
9.3.4.1.2	Explain how human activity and natural processes are altering the hydrosphere, biosphere, lithosphere and atmosphere, including pollution, topography and climate. For example: Active volcanoes and the burning of fossil fuels contribute to the greenhouse effect.				•	•	•
Science (continued)							
Grade - 9–12 Strand - 4. Life Science Substrand - 4. Human Interactions with Living Systems Standard - 1. Human activity has consequences on living organisms and ecosystems.							
9.4.4.1.2	Describe the social, economic and ecological risks and benefits of changing a natural ecosystem as a result of human activity. For example: Changing the temperature or composition of water, air or soil; altering populations and communities; developing artificial ecosystems; or changing the use of land or water.		•		•	•	•
Chemistry Strand - 1. The Nature of Science and Engineering Substrand - 3. Interactions Among Science, Technology, Engineering, Mathematics and Society Standard - 3. Developments in chemistry affect society and societal concerns affect the field of chemistry.							
9C.1.3.3.1	Explain the political, societal, economic and environmental impact of chemical products and technologies. For example: Pollution effects, atmospheric changes, petroleum products, material use or waste disposal.				•		

Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Physics Strand - 1. The Nature of Science and Engineering Substrand - 3. Interactions Among Science, Technology, Engineering, Mathematics and Society Standard - 3. Developments in physics affect society and societal concerns affect the field of physics.							
9P.1.3.3.1	Describe changes in society that have resulted from significant discoveries and advances in technology in physics. For example: Transistors, generators, radio/television or microwave ovens.				•		
Social Studies - Geography							
Grades - 9–12 Substrand - B. Essential Skills Standard - The student will use maps, globes, geographic information systems, and other databases to answer geographic questions at a variety of scales from local to global.							
	1. Students will demonstrate the ability to obtain geographic information from a variety of print and electronic sources. 2. Students will make inferences and draw conclusions about the character of places based on a comparison of maps, aerial photos, and other images.		•				
Grades - 9–12 Substrand - C. Spatial Organization Standard - The student will understand the regional distribution of the human population at local to global scales and its patterns of change.							
	1. Students will describe the pattern of human population density in the United States and major regions of the world.		•				
Grades - 9–12 Substrand - C. Spatial Organization Standard - The student will use regions and the interaction among them to analyze the present patterns of economic activity in the United States and around the world at various scales.							
	8. Students will explain the variations in economic activity and land use within the state of Minnesota, analyze issues related to land use, and reach conclusions about the potential for change in various regions.		•				
Grades - 9–12 Substrand - D. Interconnections Standard - The student will describe how humans influence the environment and in turn are influenced by it.							
	1. Students will provide a range of examples illustrating how types of government systems and technology impact the ability to change the environment or adapt to it. 2. Students will analyze the advantages and drawbacks of several common proposals to change the human use of environmental resources. 3. Students will understand and analyze examples of the impacts of natural hazards on human activities and land use.		•	•	•	•	

English Language Arts - K–12

Please note: Due to the extensive number of standards aligned there is not as much detail provided below. More information on Minnesota Language Arts Standards can be found at:
http://education.state.mn.us/MDE/EdExc/StanCurri/K-12AcademicStandards/index.htm

English Language Arts							
Grades - 9–12 READING in Science and Technical Subjects							
Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
		13.6.6	12.1.1 12.2.2 13.3.3 13.4.4 13.5.5 13.7.7 13.10.10	12.1.1 12.2.2 13.4.4 13.5.5 13.7.7 13.9.9 13.10.10	12.1.1 12.2.2 13.4.4 13.5.5 13.7.7 13.9.9 13.10.10	12.1.1 12.2.2 13.4.4 13.5.5 13.7.7 13.9.9 13.10.10	12.1.1 12.2.2 13.3.3
Grades - 9–12 WRITING in History/Social Studies, Science and Technical Subjects							
		14.3.3 14.4.4 14.10.10	14.2.2 14.3.3 14.4.4 14.7.7 14.8.8 14.10.10	14.2.2 14.3.3 14.4.4 14.6.6 14.8.8 14.10.10	14.2.2 14.3.3 14.4.4 14.6.6 14.8.8 14.10.10	14.1.1 14.2.2 14.3.3 14.4.4 14.6.6 14.8.8 14.10.10	14.2.2 14.3.3 14.4.4 14.5.5 14.6.6 14.10.10

Minnesota Environmental Literacy Scope and Sequence Benchmarks							
Grades - 9–12							
Code	Benchmark	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
	The interaction of social and natural systems can create properties that are different from either individual system.		•	•	•	•	
	Interaction between social and natural systems is defined by their boundaries, relation to other systems, and expected inputs and outputs.		•	•	•	•	
	Feedback of output from some parts of a managed social or natural system can be used to bring it closer to desired results.		•	•	•	•	•
	It is not always possible to predict accurately the result of changing some part or connection between social and natural systems.		•	•	•	•	

The Essential Principles of Climate Literacy

Developed through a cooperative effort of numerous US federal agency scientists, formal and informal educators, interested individuals, and representatives from nongovernmental organizations and other institutions involved in climate research, education, and outreach, the Essential Principles of Climate Science summarizes the most important principles and concepts of climate science. It presents important information for individuals and communities to understand Earth's climate, impacts of climate change, and approaches for adapting and mitigating change. Principles can serve as discussion starters or launching points for scientific inquiry. They can also serve educators who teach climate science as part of their science curricula.

More information can be found at: http://cleanet.org/cln/climateliteracy.html

A climate literate person will

- understand the essential principles of Earth's climate system;
- knows how to assess scientifically credible information about climate;
- communicates about climate and climate change in a meaningful way;
- is able to make informed and responsible decisions with regard to actions that may affect climate.

The Essential Principles of Climate Literacy						
The Guiding Principle for Informed Climate Decisions Principle: Humans can take actions to reduce climate change and its impacts.						
Supporting concepts	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
A. Climate information can be used to reduce vulnerabilities or enhance the resilience of communities and ecosystems affected by climate change. Continuing to improve scientific understanding of the climate system and the quality of reports to policy and decision makers is crucial.				•	•	•
B. Reducing human vulnerability to the impacts of climate change depends not only upon our ability to understand climate science, but also upon our ability to integrate that knowledge into human society. Decisions that involve Earth's climate must be made with an understanding of the complex interconnections among the physical and biological components of the Earth system as well as the consequences of such decisions on social, economic, and cultural systems.				•	•	•
C. The impacts of climate change may affect the security of nations. Reduced availability of water, food, and land can lead to competition and conflict among humans, potentially resulting in large groups of climate refugees.						
D. Humans may be able to mitigate climate change or lessen its severity by reducing greenhouse gas concentrations through processes that move carbon out of the atmosphere or reduce greenhouse gas emissions.						•
E. A combination of strategies is needed to reduce greenhouse gas emissions. The most immediate strategy is conservation of oil, gas, and coal, which we rely on as fuels for most of our transportation, heating, cooling, agriculture, and electricity. Short-term strategies involve switching from carbon-intensive to renewable energy sources, which also requires building new infrastructure for alternative energy sources. Long-term strategies involve innovative research and a fundamental change in the way humans use energy.						•
F. Humans can adapt to climate change by reducing their vulnerability to its impacts. Actions such as moving to higher ground to avoid rising sea levels, planting new crops that will thrive under new climate conditions, or using new building technologies represent adaptation strategies. Adaptation often requires financial investment in new or enhanced research, technology, and infrastructure.						•
G. Actions taken by individuals, communities, states, and countries all influence climate. Practices and policies followed in homes, schools, businesses, and governments can affect climate. Climate-related decisions made by one generation can provide opportunities as well as limit the range of possibilities open to the next generation. Steps toward reducing the impact of climate change may influence the present generation by providing other benefits such as improved public health infrastructure and sustainable built environments.						•

The Essential Principles of Climate Literacy (continued)						
The Essential Principles of Climate Science 1. The sun is the primary source of energy for Earth's climate system.						
Supporting concepts	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Sunlight reaching the Earth can heat the land, ocean, and atmosphere. Some of that sunlight is reflected back to space by the surface, clouds, or ice. Much of the sunlight that reaches Earth is absorbed and warms the planet.						
When Earth emits the same amount of energy as it absorbs, its energy budget is in balance, and its average temperature remains stable.						
The tilt of Earth's axis relative to its orbit around the sun results in predictable changes in the duration of daylight and the amount of sunlight received at any latitude throughout a year. These changes cause the annual cycle of seasons and associated temperature changes.						
Gradual changes in Earth's rotation and orbit around the sun change the intensity of sunlight received in our planet's polar and equatorial regions. For at least the last 1 million years, these changes occurred in 100,000-year cycles that produced ice ages and the shorter warm periods between them.						
A significant increase or decrease in the sun's energy output would cause Earth to warm or cool. Satellite measurements taken over the past 30 years show that the sun's energy output has changed only slightly and in both directions. These changes in the sun's energy are thought to be too small to be the cause of the recent warming observed on Earth.						
The Essential Principles of Climate Science 2. Climate is regulated by complex interactions among components of the Earth system.						
Earth's climate is influenced by interactions involving the sun, ocean, atmosphere, clouds, ice, land, and life. Climate varies by region as a result of local differences in these interactions.			•			
Covering 70% of Earth's surface, the ocean exerts a major control on climate by dominating Earth's energy and water cycles. It has the capacity to absorb large amounts of solar energy. Heat and water vapor are redistributed globally through density-driven ocean currents and atmospheric circulation. Changes in ocean circulation caused by tectonic movements or large influxes of fresh water from melting polar ice can lead to significant and even abrupt changes in climate, both locally and on global scales.						
The amount of solar energy absorbed or radiated by Earth is modulated by the atmosphere and depends on its composition. Greenhouse gases—such as water vapor, carbon dioxide, and methane—occur naturally in small amounts and absorb and release heat energy more efficiently than abundant atmospheric gases like nitrogen and oxygen. Small increases in carbon dioxide concentration have a large effect on the climate system.				•		
The abundance of greenhouse gases in the atmosphere is controlled by biogeochemical cycles that continually move these components between their ocean, land, life, and atmosphere reservoirs. The abundance of carbon in the atmosphere is reduced through seafloor accumulation of marine sediments and accumulation of plant biomass, and is increased through deforestation and the burning of fossil fuels as well as through other processes.						
Airborne particulates, called "aerosols," have a complex effect on Earth's energy balance: they can cause both cooling, by reflecting incoming sunlight back out to space, and warming, by absorbing and releasing heat energy in the atmosphere. Small solid and liquid particles can be lofted into the atmosphere through a variety of natural and manmade processes, including volcanic eruptions, sea spray, forest fires, and emissions generated through human activities.						
The interconnectedness of Earth's systems means that a significant change in any one component of the climate system can influence the equilibrium of the entire Earth system. Positive feedback loops can amplify these effects and trigger abrupt changes in the climate system. These complex interactions may result in climate change that is more rapid and on a larger scale than projected by current climate models.				•	•	

The Essential Principles of Climate Literacy (continued)						
The Essential Principles of Climate Science 3. Life on Earth depends on, is shaped by, and affects climate.						
Supporting concepts	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Individual organisms survive within specific ranges of temperature, precipitation, humidity, and sunlight. Organisms exposed to climate conditions outside their normal range must adapt or migrate, or they will perish.		•	•			
The presence of small amounts of heat-trapping greenhouse gases in the atmosphere warms Earth's surface, resulting in a planet that sustains liquid water and life.				•		
Changes in climate conditions can affect the health and function of ecosystems and the survival of entire species. The distribution patterns of fossils show evidence of gradual as well as abrupt extinctions related to climate change in the past.						
A range of natural records shows that the last 10,000 years have been an unusually stable period in Earth's climate history. Modern human societies developed during this time. The agricultural, economic, and transportation systems we rely upon are vulnerable if the climate changes significantly.						
Life—including microbes, plants, and animals and humans—is a major driver of the global carbon cycle and can influence global climate by modifying the chemical makeup of the atmosphere. The geologic record shows that life has significantly altered the atmosphere during Earth's history.						
The Essential Principles of Climate Science 4. Climate varies over space and time through both natural and man-made processes.						
Climate is determined by the long-term pattern of temperature and precipitation averages and extremes at a location. Climate descriptions can refer to areas that are local, regional, or global in extent. Climate can be described for different time intervals, such as decades, years, seasons, months, or specific dates of the year.			•	•	•	
Climate is not the same thing as weather. Weather is the minute-by-minute variable condition of the atmosphere on a local scale. Climate is a conceptual description of an area's average weather conditions and the extent to which those conditions vary over long time intervals.			•			
Climate change is a significant and persistent change in an area's average climate conditions or their extremes. Seasonal variations and multi-year cycles (for example, the El Niño southern oscillation) that produce warm, cool, wet, or dry periods across different regions are a natural part of climate variability. They do not represent climate change.			•	•		
Scientific observations indicate that global climate has changed in the past, is changing now, and will change in the future. The magnitude and direction of this change is not the same at all locations on Earth.				•	•	
Based on evidence from tree rings, other natural records, and scientific observations made around the world, Earth's average temperature is now warmer than it has been for at least the past 1,300 years. Average temperatures have increased markedly in the past 50 years, especially in the North Polar region.				•	•	
Natural processes driving Earth's long-term climate variability do not explain the rapid climate change observed in recent decades. The only explanation that is consistent with all available evidence is that human activity is playing an increasing role in climate change. Future changes in climate may be rapid compared to historical changes.				•	•	
Natural processes that remove carbon dioxide from the atmosphere operate slowly when compared to the processes that are now adding it to the atmosphere. Thus, carbon dioxide introduced into the atmosphere today may remain there for a century or more. Other greenhouse gases, including some created by humans, may remain in the atmosphere for thousands of years.						

The Essential Principles of Climate Literacy (continued)						
The Essential Principles of Climate Science 5. Our understanding of the climate system is improved through observations, theoretical studies, and modeling.						
Supporting concepts	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
The components and processes of Earth's climate system are subject to the same physical laws as the rest of the Universe. Therefore, the behavior of the climate system can be understood and predicted through careful, systematic study.					•	
Environmental observations are the foundation for understanding the climate system. From the bottom of the ocean to the surface of the sun, instruments on weather stations, buoys, satellites, and other platforms collect climate data. To learn about past climates, scientists use natural records, such as tree rings, ice cores, and sedimentary layers. Historical observations, such as native knowledge and personal journals, also document past climate change.	•	•	•	•	•	
Observations, experiments, and theory are used to construct and refine computer models that represent the climate system and make predictions about its future behavior. Results from these models lead to better understanding of the linkages between the atmosphere-ocean system and climate conditions and inspire more observations and experiments. Over time, this iterative process will result in more reliable projections of future climate conditions.					•	
Our understanding of climate differs in important ways from our understanding of weather. Climate scientists' ability to predict climate patterns months, years, or decades into the future is constrained by different limitations than those faced by meteorologists in forecasting weather days to weeks into the future.			•			
Scientists have conducted extensive research on the fundamental characteristics of the climate system and their understanding will continue to improve. Current climate change projections are reliable enough to help humans evaluate potential decisions and actions in response to climate change.				•	•	
The Essential Principles of Climate Science 6. Human activities are impacting the climate system.						
The overwhelming consensus of scientific studies on climate indicates that most of the observed increase in global average temperatures since the latter part of the 20th century is very likely due to human activities, primarily from increases in greenhouse gas concentrations resulting from the burning of fossil fuels.				•	•	
Emissions from the widespread burning of fossil fuels since the start of the Industrial Revolution have increased the concentration of greenhouse gases in the atmosphere. Because these gases can remain in the atmosphere for hundreds of years before being removed by natural processes, their warming influence is projected to persist into the next century.				•	•	
Human activities have affected the land, oceans, and atmosphere, and these changes have altered global climate patterns. Burning fossil fuels, releasing chemicals into the atmosphere, reducing the amount of forest cover, and rapid expansion of farming, development, and industrial activities are releasing carbon dioxide into the atmosphere and changing the balance of the climate system.				•	•	
Growing evidence shows that changes in many physical and biological systems are linked to human-caused global warming. Some changes resulting from human activities have decreased the capacity of the environment to support various species and have substantially reduced ecosystem biodiversity and ecological resilience.			•	•	•	
Scientists and economists predict that there will be both positive and negative impacts from global climate change. If warming exceeds 2–3°C (3.6–5.4°F) over the next century, the consequences of the negative impacts are likely to be much greater than the consequences of the positive impacts.				•		

The Essential Principles of Climate Literacy (continued)						
The Essential Principles of Climate Science 7. Climate change will have consequences for the Earth system and human lives.						
Supporting concepts	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Melting of ice sheets and glaciers, combined with the thermal expansion of seawater as the oceans warm, is causing sea levels to rise. Seawater is beginning to move onto low-lying land and to contaminate coastal fresh water sources, and beginning to submerge coastal facilities and barrier islands. Sea-level rise increases the risk of damage to homes and buildings from storm surges such as those that accompany hurricanes.						
Climate plays an important role in the global distribution of freshwater resources. Changing precipitation patterns and temperature conditions will alter the distribution and availability of freshwater resources, reducing reliable access to water for many people and their crops. Winter snowpack and mountain glaciers that provide water for human use are declining as a result of global warming.				•	•	
Incidents of extreme weather are projected to increase as a result of climate change. Many locations will see a substantial increase in the number of heat waves they experience per year and a likely decrease in episodes of severe cold. Precipitation events are expected to become less frequent but more intense in many areas, and droughts will be more frequent and severe in areas where average precipitation is projected to decrease.				•	•	
The chemistry of ocean water is changed by absorption of carbon dioxide from the atmosphere. Increasing carbon dioxide levels in the atmosphere is causing ocean water to become more acidic, threatening the survival of shell-building marine species and the entire food web of which they are a part.						
Ecosystems on land and in the ocean have been and will continue to be disturbed by climate change. Animals, plants, bacteria, and viruses will migrate to new areas with favorable climate conditions. Infectious diseases and certain species will be able to invade areas that they did not previously inhabit.				•		
Human health and mortality rates will be affected to different degrees in specific regions of the world as a result of climate change. Although cold-related deaths are predicted to decrease, other risks are predicted to rise. The incidence and geographical range of climate-sensitive infectious diseases—such as malaria, dengue fever, and tick-borne diseases—will increase. Drought-reduced crop yields, degraded air and water quality, and increased hazards in coastal and low-lying areas will contribute to unhealthy conditions, particularly for the most vulnerable populations.				•	•	

Grades 9–12 Lesson Organizer

Lesson Outcomes	*Lesson Materials*
Lesson 1: What is a journal for?	
• Students will identify key features of a journal • Students will identify journal entry themes • Students will compare journal entries from different time periods and in different styles • Students will create their own journal to be used for outdoor observation and documenting their exploration of *Minnesota's Changing Climate*	Three Will Steger Journal Entries Three Excerpts from *Eden Summer Collages* (David Coggins) Four Historical Biome Journal Excerpts
Lesson 2: What defines Minnesota's biomes?	
• Students will identify Minnesota's four main biomes. • Students will identify characteristic vegetation and animals found in each biome. • Students will describe and compare factors that define each biome.	Will Steger Journal Entry Handout 1: Biome Cards Handout 2: Minnesota Biomes Table Handout 3: Minnesota Biomes Map Handout 4: 1990's Census of the Land Handout 5: The Natural Vegetation of Minnesota
Lesson 3: What defines Minnesota's Climate?	
• Students will define climate and weather • Students will define climate change • Students will define phenology • Students will gather their own weather data from their school site and record it in their journal • Students will graphically represent authentic data from Minnesota's Climatology site • Students will make three predictions of how a change in climate might affect Minnesota's biomes	Three Will Steger Journal Entries Handout 1: Normal Mean Temperature Annual Map Handout 2: Normal Annual Precipitation Map Handout 3: What defines Minnesota's climate? Student Worksheet Handout 4: Annual Climate Trends in Precipitation and Temperature Handout 5: Selection of Seasonal, Regional Climate Trends
Lesson 4: What is climate change and what does it mean for Minnesota?	
• Students will explain the causes of climate change • Students will explain the implications of climate change • Students will predict how climate change might impact or is impacting the area where they live • Students will describe five key climate change implications for Minnesotans	Will Steger Journal Entry Handout 1: Key Implications for Minnesotans Facing Climate Change Cards Handout 2: Climate Change Fact Cards
Lesson 5: What does the data show?	
• Students will make their own interpretations of figures of data that represent different impacts of climate change on Minnesota. • Students will make the connection between 3-D objects and what the data represents. • Students will divide 3 statements about each graph into true or false categories. • Students will share their results. • Students will brainstorm how climate change could affect their biome.	Will Steger Journal Handout 1: Twelve Activity Sheets Handout 2: Full Size Figures Handout 3: Activity Sheet Template/Gameboard
Lesson 6: What can I do?	
• Students will brainstorm appropriate solutions and select one for their group, class or school. • Students will develop a climate action plan and begin to implement it.	Handout 1: Climate Action Template Handout 2: Climate Action Plan Worksheet

Lesson 1: Minnesota's Changing Climate

What is a journal for?

Age Level:	Grades 3-12
Time Needed:	50 minutes
Materials:	Journal/Notebook for each student Access to the Internet (to watch videos and view journal examples) Projector or handouts of journal examples
Student Learning Outcomes:	• Students will identify key features of a journal. • Students will identify journal entry themes. • Students will compare journal entries from different time periods and in different styles. • Students will create their own journal to be used for documenting their outdoor observations and exploration of *Minnesota's Changing Climate*.

Background Information

Journals are a tool for exploring the natural world and can be used to develop many different skills. In this lesson, students will have the opportunity to look at journal excerpts written by Will Steger at different points in his life. They show different styles of journaling and ways of observing and documenting the natural world. In addition to excerpts from Will's journals, there are examples from individuals who have kept journals about Minnesota's natural world throughout history. Finally, David Coggins, a Minnesota writer and artist, provided us with beautiful examples of art/collage journals. Journal excerpts are found on pages 6-13.

> There is something to journaling that is extremely important. It's a way of learning where you absorb yourself... you put your mind and your attention and your focus on one observation. It's a mechanism of where you are going through your curiosity and your thought and you're documenting and you're writing it down....It's a learning process. The idea [is] to see [nature] in a different way.
>
> —Will Steger, Interview, July, 2010

Journal Assignment

Each lesson in the *Minnesota's Changing Climate* includes journaling activities, and assessments that should be kept together in a journal or notebook. Students will conclude this lesson by designing their own journal. Students should paste their work from this lesson in the journal to look back on in later lessons.

Activity Description

Introduction

Click on the "Journal Basics" category of the "Journals" section in any biome in the learning module of the online classroom at http://classroom.willstegerfoundation.org to play Will Steger's short video clip on journaling. Afterwards, have a short discussion about journaling and journals.

There are many different types of journals. Nature journals, personal journals, travel journals, scrapbooks, sketchbooks and blogs are just a few examples. Will shows examples of some of his journal entries in the video and talks about why he thinks it is important.

1. What has Will used his journals for and why were they important?
2. What does he mean when he says the point of journaling is "to see nature in a different way?"
3. Has anyone used a journal before or does anyone have a journal, or a diary?
4. What do you use it for?
5. What sorts of things do you put in it?
6. Is it just writing or do you sketch or put other objects (newspaper clippings, programs, stickers, pressed flowers, etc.)?
7. Why do you think journals might be useful?

Activity: Explore different styles of journals

1. Hand out copies of the different journal excerpts found on pages 6-13 or access them online at http://classroom.willstegerfoundation.org/handouts. If you have internet access also show the examples listed below under Internet Journal Examples. These journal examples show a number of different styles of journals focused on nature observation, and provide a broad array of examples from the early exploration of Minnesota's natural resources to more contemporary and artistic enjoyment of nature.

Journal Excerpts Include:

- Weather Journal, 1956, Will Steger (12 years old)
- Astronomy Journal-when Sputnik was launched, 1957, Will Steger (13 years old)
- Phenology Journal, 1978, Will Steger
- Art/Collage Journal, 2004, David Coggins (3 entries)
- Historical Minnesota Biome Journal Excerpts (4 entries)

Internet Journal Examples

- Botany Journal, 1836, Charles Geyer
  http://www.stolaf.edu/academics/nicollet/geyerjournalintro.html
- Selection of Natural History Blogs found at
  http://neurophilosophy.wordpress.com/2007/03/03/natural-history-blogs/

3. Ask the students to answer the following questions independently on a sheet of paper:
   1. What journal entry did you think was the most interesting? Why?
   2. What journal entry do you think was the most useful? Why?
   3. How were the journal entries similar?
   4. How were the journal entries different?
   5. What topics were covered in the journal entries?
   6. If you were to start a journal what would you use it to record? What would be important to include in each entry? Ask them to answer the questions.

4. Bring the students back together as a class. On the board make a list of
   - Things they found interesting;
   - Things that were common between the examples;
   - Things that are different between the examples;
   - Topics or themes that the different journal entries covered.

5. Ask the students to choose one of the journal entries. Hand out pieces of paper and ask them to write their own journal entry in the same style as the journal entry they chose. Before they start they should identify key elements that define the journal entry. This could include date, sketches, observations of weather, or lists of birds or plants seen.

Concluding Activity

The students will have investigated different styles of journaling through the excerpts provided. Students should now create or be provided with a notebook that will be their own journal to use during their exploration of *Minnesota's Changing Climate*. Students should personalize their journal and integrate the exploration of Minnesota's biomes, the impacts of climate change, and solutions that can happen at schools and be led by students.

Descriptions of different styles of journals are provided in the following pages. If you have time, take a few class periods or portions of class periods to explore the different styles of journaling described in the following pages. Discuss when each type of journal might be used and how most journals don't just use one style, but depending on the person's mood or what information they would like to record, may have many different styles.

Science Notebooks

Materials:

- Notebook
- Colored pencils
- Graphing paper
- Items for investigations

Klentschy writes, "A science notebook is a central place where language, data, and experience work together to form meaning for the student."(2005) Creating and using a science notebook helps develop skills such as student organization, data recording and interpretation, question development, reasonable predictions, and reflection.

Each entry in a science notebook should begin with a question that is investigable. Developing good questions that don't have yes or no answers can be difficult. Taking the students outside a few times observing and exploring will often elicit curiosity around a particular subject. Developing a question about something that is real and tangible and interesting to them will lead to a much richer project.

Once the student has developed a question, they should also come up with a prediction of what they will discover through their investigation.

After the student develops the question, they will need to determine how they can go about answering it through an investigation. Planning for their investigation should include the steps involved, material needs and how they will organize the data they collect. It will be important to have a discussion about charts, tables, graphs, Venn diagrams, and labeled sketches or diagrams as possible data organizers.

Once students have determined their question, prediction, and how they will organize their observations they may begin their investigation. Investigations can last an hour to an entire school year depending on the questions they ask.

Once students have finished their investigation they will need to review their science notebook and data. Their observations should help them develop some sort of claims related to their question and help them develop a statement of what they learned. This step of interpreting and explaining what they learned is an important skill in science and can involve oral presentations, PowerPoints, graphing and other multimedia. The science notebook will be integral to development of any presentation.

Finally, the students should be asked to think about what new questions they have as a result of their investigation. If they could do another investigation, what would they do?

Art or Collage Journals

Materials:

- Notebook
- Colored pencils
- Flower/plant press
- Glue
- Photos

Some students may be interested in making their observations through sketching, poetry or creative writing, or collages of objects associated with their observations. Pressed flowers, photos, maps are just a few examples of what can go into this type of journal.

Blogging

Materials:

- Internet access
- Digital camera
- Computer

If you are interested in sharing and collaborating with students or others anywhere in the world, a blog is an easy and fun way to do this. A blog, or web log, is an online shared journal. In addition to written material, it is possible to embed videos, photos and audio in a blog. Blogs can generally be made as publicly accessible as you want them to be and after each blog post it is possible to leave comments for the writer. This function makes it possible for peer interaction around a particular topic both locally and globally. Some good places to start a blog include posterous.com or blogspot.com.

Take it Outside—Connecting With Your Place

Phenology Journals

Materials:

- Notebook
- Colored pencils
- Thermometer
- Rain gauge
- Barometer
- Cloud charts
- Historic weather data
- Camera

Phenology is the study of the cyclical nature of biological events as they relate to climate and season. Phenology journals often include observations of the natural world, sketches, photographs and other data that relate. Because phenology is the study of how the natural world responds to climate and season, there are a few elements that are important to include in a journal entry. Date, time, location, temperature, and precipitation type or amount are basic things that should be included. Barometric readings, cloud cover and type, as well as historic highs and lows of temperature can also be included.

Phenology journals are ideally done outside, but can be done looking out the window of a classroom as well. Spending five minutes at the start of every day asking students to record certain weather elements and what observations they made of the natural world on their way to school is another method. Observations might include what color the trees were turning, if they saw birds flying south or north, what birds or other animals they saw and what the observed animals were doing. Asking the students good questions about what they saw will help them remember to look more closely the next day.

Observations of the natural world can be made in writing, sketches or photos. It can be interesting for students to choose a spot that they follow throughout the school year, observing and recording the changes with the seasons.

Temperatures and other numeric data recorded over time can be used to make graphs either in the student journals, on graph paper and then pasted in. Consider keeping your own phenology journals year to year, and making them available for students to view, to use for comparing of the timing of seasonal events.

Extensions

Take time to try out the different styles of journaling as described above.

Online Classroom Connection

Visit http://classroom.willstegerfoundation.org

1. There are a variety of journal examples provided for each biome. Read through each journal entry and discuss them as a class, or ask students to try and write their own journal entry in the style of one those shared.
2. Upload journal entries from your classroom! Upload them at http://classroom.willstegerfoundation.org/get-social/share-your-observations
   Read and comment on entries from other students.

Monday October 8 1956
Partly cloudy
temperature 58 degrees
high 58
Low 49
Humidity at 6:30 p.m 38 per cent
Precipitation 24 hours ending at 6:30 p.m.: none. Total since Jan. 1 to date 23.27 inches.
Sun rises 6:21 a.m., set 5:39 p.m.
Moon phase new, Rises 12:06 p.m., sets 9:22 p.m.
Wind at 4:05 p.m 15 miles per hour and at 4:30 p.m. miles per hour coming from the North west
Year ago high 67 Low 38
all-time record high for the date 80, in 1905.
all-time record Low for this date 28, in 1917

Seattle, cloudy
San Francisco, clear
Los Angeles, clear
Billings, Partly cloudy

Weather Journal, 1956, Will Steger (12 years old)

diation fog this morning. Last night clear with
roaching full. I'm told by the locals that on
moon nights we get our early frosts. If the
er system sits over us for several more days
a frost by full moon. The fog from the lake
ill keep the frost away from the garden somewhat.
last night. It's been a long time since we have
like that.

is now a misty yellow just a little ways above the
uetted trees on the other side of the lake. This is
early fall morning. All the animals are quite except
sional red squirrel who insists on voicing his
the world. Last night and almost every night this
have heard the white throated sparrows who
ep at night.
morning, the first morning or a quite, clear high pressure
ometer 29.92, rising. Dead Calm.

-Note
Sept. 4th Southern and
Minnesota had the
early killing frost.
Ely, but as expected
this lake with the
keep the frost
from the garden

led and walked to Halbuckle field this morning. The early
lhouetted the many cobwebs hanging in the trees
ot much of a walk because of the wet, wet waist
ss.
erday talked with Dave Fruthmiller from Cedar. He skin
the area. Dave said the thermocline (division of cool and
ter) was only 20 feet deep in Cedar as compared with
30 feet. Cool summer he said. A cold May and June but a
and warm August. It got so cold in Mid-June that
atoe plants turned purple.

Just got back from a paddle on Cedar and a visit with
who lives on the lake where the stream flows out. On Cedar
from a large white pine near shore, I got the ~~first~~ close look
erican Bald Eagle - Beautiful bird. When he swooped down from
trees, the seagulls altered their flight route 180° and the parent loons
babies dive. ~~ts~~ ... cracked their house foundation in 20 places from the
blasting on Sunday. Also the blasting
made the lake so rough that
their nephew had to come in
from fishing. ~~other~~ They

writing and drawing table
← 30" →

Common Evening Primrose*
Evening - Primrose Family*
* Largely showy flowers which close after mi
Flower parts of four. 4-branched stigma for

Phenology Journal, 1978, Will Steger

at 4:00 a.m.

October 4 1957

Russia launched the first Earth Satellite today. The Satellite can be picked up by a ham radio at 20.005 and 40,002 megacycles. It is estimated to be 23 inches in diameter, 187 pounds, going at 18,000 miles per hour, altitude 560 miles, circles the earth once every one hour and 31 minutes and estimated life not more than three weeks.

October 5 1957

Russia misplaced the decimal place. It Weighs 18.7 pounds and goes around the earth every 93 minutes

October 20 1957

The Orionide meteor shower will reach it peak at the 21st at 20 meteor per hour. 2:20-4:00 I saw 15 meteors. The Orionide are swift in flight.

2:15-400

1 2:31, swift, Red, Magnitude 3d
2 2:34, swift, Red, long, Magnitude 1st
3 2:40, swift, Red, Magnitude 2d
4 2:42, swift, Red, train leaving meteor, Magnitude 1st
5 2:48, swift, Red, short, Magnitude 2d
6 2:51, swift. Red, long, train, Magnitude 2d
7 2:57, swift, Red, the only one going toward Orion, Magnitude 2d
8 3:01, swift, Red, long, train leaving meteor, Magnitude 1st
9 3:20, swift, Red, long, Magnitude
10 3:25, swift, Red, very faint, Magnitude 4th
11 3:28, swift, Red, short, faint, Magnitude 3d
12 3.32, swift, Red, train lasting 3 seconds, Magnitude 2d
13 3 46, swift, Red, magnitude 3 d

Astronomy Journal-when Sputnik was launched, 1957, Will Steger (13 years old)

moon sets in ethereal pale blue across the lake
quarter of it luminous white, the rest faint orange
low and big above trees and close
it's magnetic, supernatural as it drops
by the time it's gone sky is a navy blanket of stars
in front of me as I grill
flying squirrels, small with dark bulging eyes,
glide serenely to and from trees around bird feeder
they land on silent feet chase each other up and down
like children in impossibly fast race cars
this is the first year I've seen them
they come out only when it gets dark

21 august 2004

Used with permission from the author (Copyright 2008 David Coggins)

Plants Belonging to the Liliaceae Family.

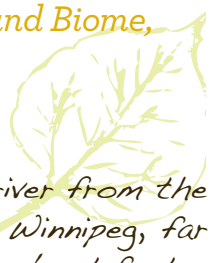
1. Onion.
2. Leek.
3. Garlic.
4. Asparagus.
5. Lily of the Valley.
6. Tulip.
7. Trillium.
8. Dog tooth Violet.
9. Hyacinth.
10. Camas (camas lily)

Plants Belonging to the Cruciferae Family

1. Mustard.
2. Shepherds purse.
3. Grabis (white rock.)
4. Stalk.
5. Turnips.
6. Cress.
7. Candy Tuft.
8. Cabbage.
9. Brussels sprouts.
10. Cauliflower.
11. Radish.

Trillium Hill below studio Friday, 28 May 2004

Historical Journal Excerpt Describing Minnesota's Tallgrass Aspen Parkland Biome, from Henry Hind (1823-1908)



The ancient Lake Ridge...extends in an unbroken line, except where the river from the higher level in the rear has cut channels through it, from near Lake Winnipeg, far beyond the international boundary. At the crossing-place on the Roseau, about forty-six miles from the Red River, its height is estimated to be the same as at the Middle Settlement; it forms a beautiful dry gravel road wherever traversed, and suffers only from the drawback of being the favorite haunt of numerous badgers, whose holes in the flank, and sometimes also on the summit, are dangerous to horses; it is, apparently, perfectly level for a hundred miles, and everywhere, as far as my observation enabled me to judge, shows the same even rounded summit; it may yet form an admirable means of communication through the country, and it marks the limit of the good land on the east of Red River. This ridge is a favourite resort of the prairie hen (Tetro cupido), when they perform their curious dances in the early spring months.

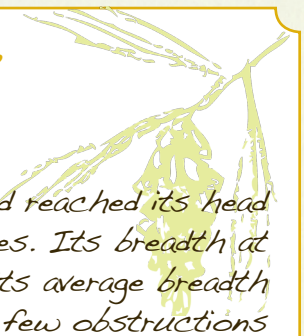
from: Narrative of the Canadian Red River Exploring Expedition of 1857 and Reports of Progress on the Assiniboine and Saskatchewan Exploring Expedition

Historical Journal Excerpt Describing Minnesota's Prairie Grassland, from Joseph Nicollet (1786-1843)

Thursday, June 28, 1838
We enter the Great Oasis, which offers the only direction to take without going into water several feet deep. This beautiful grove is surrounded by large lakes [Crooked, Great Oasis, Rush, and Bear] ornamented with aquatic plants, in which live innumerable families of muskrats and water birds. These lakes are from 7 to 12 feet deep, and the soil that surrounds them is suitable for potatoes and other vegetables. The distance through the grove is about 1½ miles. The growth of the various species forming it is as beautiful as any which can be seen in the basin of the lower Missouri. I will list the principle ones: 1. The linden [basswood] - 30 to 40 feet; the white birch - 20 to 30; swamp white oak- 20 to 30; swamp ash - 20 to 30; beaver wood [aspen] - 15 to 20; prickly ash - to 15 feet. As this oasis is protected from the spring and fall fires by the lakes which surround it, one can understand why the climate has been able to develop such a richness here. It is good testimony in favor of my opinion that all the prairies watered by the Mississippi and the Missouri are the work of the Indians who destroyed by fire the rich vegetation to assure themselves of animal food. Let the vast and shorn prairies that we cross remain untouched and the forests, with time will reappear.

from: 1838 Minnesota River and Blue Earth River Expeditions, Published 1843, Joseph N. Nicollet: On the Plains and Prairies, Pages 54-55, 66-67

Historical Journal Excerpt Describing Minnesota's Coniferous Foreset, from William Keating (1799-1844)



We entered Rainy-Lake River on the morning of the 28th of August, and reached its head early on the 31st. The length of this stream is about one hundred miles. Its breadth at its mouth is about four hundred yards; it becomes narrower above; its average breadth is three hundred yards; its current is rapid and uniform; there are very few obstructions to the navigation, there being but two places at which canoes are lightened and towed up. The longest of these is about one mile.

At its mouth the banks of this stream are low and marshy; beyond this they rise somewhat, but present few hills; the river runs in many places over a pebbly bed. The country assumes a more smiling appearance, which led us to anticipate the meeting with limestone rocks; we saw none along the river, but some precipices, seen at a distrance, were supposed from their horizontal stratification to be composed of limestone. On the river the rocks seldom appear in place; where we saw them they were principally mica-slate, sometimes, however, sienite. Dr. Bigsby found staurotide in the slate of this river.

from: Narrative of an expedition to the source of St. Peter's River, Lake Winnepeck, Lake of the Woods performed in the year 1823, by order of the Hon. J.C. Calhoun, Secretary of war, under the command of Stephen H. Long, Major U.S.T.E. Volume 1. Published: 1824

Historical Journal Excerpt from Minnesota's Deciduous Forest, from Jonathon Carver (1710-1780)

June 4, 1767
Came to the great meadows or plains. Here I found excellent good land and very pleasant country. [This is the area near Lake Pepin on the Wisconsin-Minneesota border.] One might travel all day and only see now and then a small pleasant grove of oak and walnut. This country is covered with grass that affords excellent pasturage for the buffeloe which here are very plenty. Could see them at a distance under the shady oaks like cattle in a pasture and sometimes a drove of an hundred or more shading themselves in these groves at noon day which afforded a very pleasant prospect for an uninhabited countyr.

We killed several of these buffaloes, one of which we all judged would weigh fifteen hundred weight and if the same could be fed as is common to fatten our tame cattle undoubtedly would weigh three thousand, they being by far the largest creatures in bulk that I ever saw...

from: Travels through the Interior Parts of North America in the Years 1766, 1767, and 1768. Published: 1778

Find more on each of these writers and hear more of their excerpts read outloud in the Will Steger Foundation online classroom within each biome's featured journal section.

Lesson 2: Minnesota's Changing Climate

What defines Minnesota's biomes?

Age Level:	Grades 9-12
Time Needed:	Two 50-minute periods
Materials:	Animal and plant biome cards (1 for each student) Biome Map (1 for each student to paste in journal or large poster for classroom) Biomes Table (1 for each student to paste in journal) 1990s Census of the Land (1 for each student to paste in journal) The Natural Vegetation of Minnesota (1 for each student to paste in journal)
Student Learning Outcomes:	• Students will identify Minnesota's four main biomes. • Students will identify characteristic plants and animals found in each biome. • Students will describe abiotic and biotic factors that define each biome. • Students will describe how Minnesota biomes have changed in the last 100 years

Educator Prep:

- Cut out the animal and vegetation biome cards. Laminate for longevity. Make a classroom set that has equal numbers of plants and animals from each biome. Hole punch each card and put enough string through it so that it can hang around the student's neck.
- Using masking tape, make the shape of the map of Minnesota on the floor of your classroom large enough so that all of the students in your class would fit. Using chalk outside would work as well.
- Make copies of the Minnesota Biomes Table for each student
- Make copies of the Minnesota map of biome boundaries for each student
- Make copies of the 1990s Census of the Land for each student
- Make copies of the Natural Vegetation of Minnesota for each student (Note: color pdfs of the biome cards can be downloaded from the website at http://classroom.willstegerfoundation.org)

Background Information

The Minnesota DNR uses the word "biome" to describe a biological community. Usually, biomes occur over large areas and include many similar plant communities and the animals that live in them. Climate is what defines the geographical area of a biome. It is important to understand that a biome is an area that is climatologically capable of supporting certain species; however, because of human-induced land use change, characteristic species may be less abundant or absent. (MN DNR-Biomes Sheet) Abiotic and biotic factors allow or limit plants and animals to live where they live. Abiotic factors include climate and soil types.

Journal Assignment

At the end of this lesson, student journals should include the names of all four Minnesota biomes, what defines them, a map of Minnesota that shows approximately where each biome is, a map of Minnesota that shows vegetation at the turn of the century, and a map that shows land use in Minnesota today.

I have spent much time alone on the porch this summer, reading and writing and other quiet things. The local animals have taken me as just another piece of furniture for they don't pay me any attention.

—Will Steger, August 17, 1974

The key is to be comfortable in order to relax and take in actually what is happening, the raw nature that is experienced: the sting of the wind on hands and nose, the freshness of the air, the beauty of the sky and land forms in such weather.

—Will Steger, Ely Homestead, January 25-27, 1977

Activity Description

Introduction

1. Read out loud a journal excerpt from the biome where your school is located. These can be found in the Journals section of each biome in the online classroom at http://classroom.willstegerfoundation.org. Ask the students to write an excerpt in their own journal that describes the plants and animals they see every day. Compare and contrast journal excerpts discussing why there may or may not be similarities.
2. If there is time, read an excerpt from another biome and discuss.

Activity: Biome Meet and Greet

1. Ask each student to sit with their eyes shut. Hang a card around each of their necks with it hanging on their back. Explain that they will have to figure out what kind of animal or plant is on their back using yes or no questions, one per person in the class. Allow them to walk around the room asking other students.
2. Once they determine their animal or plant, they should still participate, helping other students out.
3. Ask students to take a seat. Explain that they are all wearing a plant or animal that is native to Minnesota. Show or draw a biome map of Minnesota on your blackboard, wipe board or smart board. Ask them to read silently about their animal or plant on the back of the card. In what biome are they found?
4. Hand out the biomes table for them to paste in their journal. What makes the different biomes unique based on the table and the different plants and animals they greeted?
5. Using the panoramic view available on the online classroom, show examples of each biome, watch the video excerpts about each biome, or if you have access to a computer lab, allow the students to individually "explore" each biome. If you are viewing as a class, ask a few of them to share the information on their card as the biome where their plant or animal comes up, and to explain how their animal or plant fits into the biome.

Activity: Biomes Yesterday and Today

1. Hand out the Minnesota biomes map, the Natural Vegetation of Minnesota at the Time of the Public Land Survey: 1847-1907 and the 1990s Census of the Land. Ask students to spend some time looking over the maps.
   - Are the biome boundaries based on the map from modern day or the turn of the century?
   - How has each biome changed since the turn of the century?
   - What biotic and abiotic factors allow and/or limit the plants and animals that live in each biome?
2. Ask the students to paste the maps in their journal and write a few sentences about how each biome has changed in the last 100 years and how this may or may not have affected the plant or animal they learned about in the opening activity.

Concluding Activity: Design your own state boundaries

1. Discuss the biome where your school is found, ask if any of the students are familiar with the plants and animals listed in the biomes table. Why or why not? Would they describe the area they live as being uniquely different from another biome in the state? How?
2. What else defines the different biomes of Minnesota besides its plants, animals and climate? Use the 1990s Census of the Land map to determine or theorize where agriculture might be common? Winter tourism? Forestry? Urban centers? If the students could split up the state based on their own boundaries what would be they be?
3. In their journals, have students describe their new state boundaries, explain what they are based upon, and create a visual to show where they are.

Journaling Connection

Note: The Take It Outside activity also involves use of the journal.

1. In their journal, the students should paste the photo of their animal or plant.
2. Ask the students to write a story about their plant or animal including what they know about the biome where the animal or plant lives.

Take It Outside—Connecting With Your Place

Materials
- Field guides for your region
- Journal

1. Ask students to turn to a page in their journal and make a line down the middle of the page to make two columns, label one fauna and one flora (please remind them that insects are animals).
2. Take students out into the schoolyard, or to a nearby nature area if possible. Ask them to choose a place where they are comfortable to sit and are able to look all around them. Ask them to make a list of what they see. If they don't know the name of the animal ask them to sketch it. If you have digital cameras they could also take a photo, or if they have guidebooks they could use it to identify whatever they are observing.
3. Return inside and make a list on the board of what was seen. Look back at the list of common animals and plants found in your biome. Were any of these seen? Discuss why or why not you may have seen them.

Extensions

1. Ask students to research the animal or plant they were in the biome meet and greet game. Create a classroom encyclopedia of Minnesota flora and fauna.
2. Ask students to write a story from the perspective of the animal or plant they were in their biome meet and greet.
3. The websites listed in the resources section have extensive opportunities to explore various data related to Minnesota's landscapes. Choose a theme for all the students to explore or let each select a theme to explore and research Minnesota's landscape.

Online Classroom Connection

Visit http://classroom.willstegerfoundation.org

1. Explore each biome virtually. Watch the intro video for each biome.
2. Connect with another classroom in another biome and use Skype (web conference) to discuss the different or similar animals and plants they see outside their window.
3. Upload photos and journal entries to http://classroom.willstegerfoundation.org/get-social/share-your-observations. Look through other photos uploaded by students around the state.

Resources

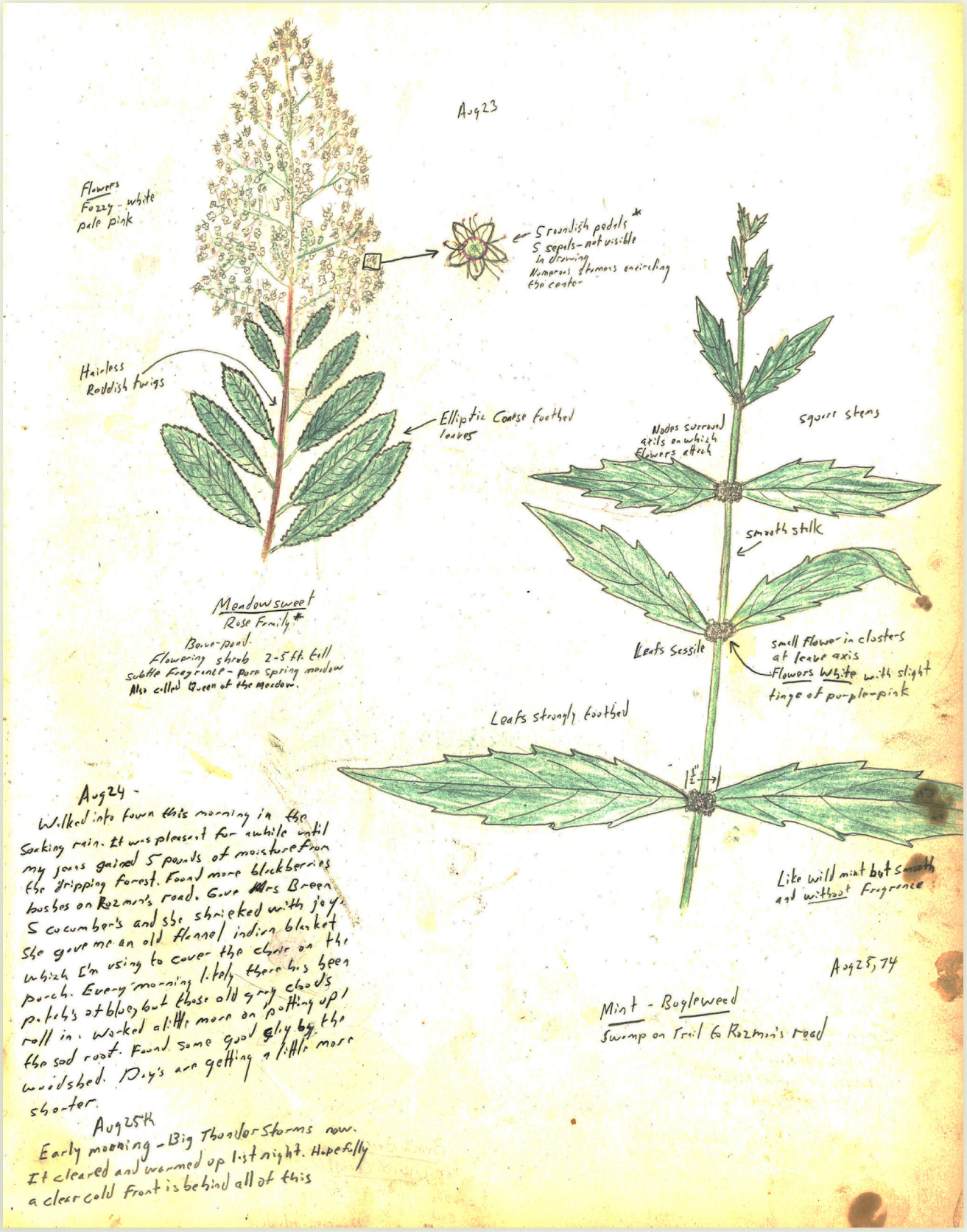
Monitoring Minnesota's Changing Landscapes
http://land.umn.edu/quickview_data/index.html

Land Use/Cover Info for Minnesota
http://www.mngeo.state.mn.us/chouse/land_use.html

Ely Homestead
Aug 17th, 1974

Another clear day. It's 8:00am, 57° and barometer steady. There are also a few small patches of altocumulus and fracto-cumulus clouds. The fracto-cumulus are a sign of later thundershowers. There is a squirrel perched by the railing in his usual spot eating balsam pine cones. He is watching me and eating at the same time. Last night he sat on my lap when I was reading. I have spent much time alone on the porch this summer, reading and writing and other quiet things. The local animals have taken me as just another piece of furniture for they don't pay me any attention. I have watched a white throated sparrow family grow. Soon the young will be on their own.

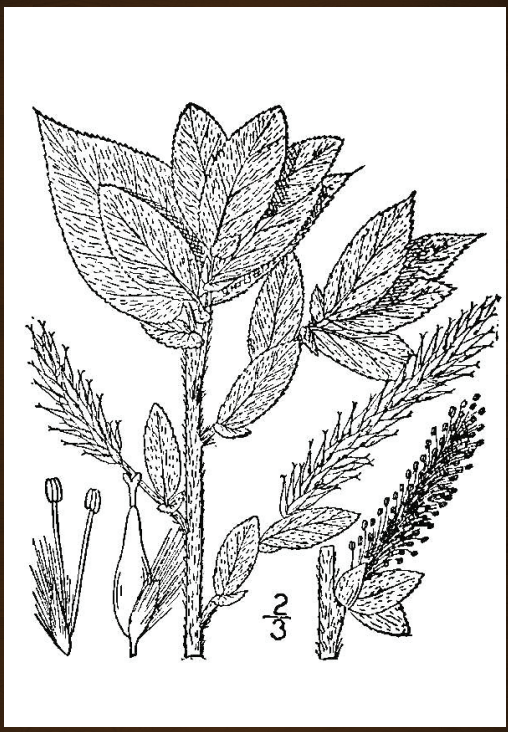
Quiet morning, the sound of a few August flies, a noisy blue jay family down the lake, pine cones falling and hitting branches as the squirrels begin to harvest and stock up for the winter, peep-peep-peep of the white throated sparrow and the wind in the poplars across the lake. A ruby-throated hummingbird was hovering around the trees this morning in front of the porch. I have seen him a score of times this summer near the cabin.



Phenology Journal, Will Steger, 1978

Phenology Journal, Will Steger, 1978

Phenology Journal, Will Steger, 1978



Heart-Leaved Willow

Salix cordata

Biome: Tallgrass Aspen Parkland

Heart-leaved willow is a perennial plant that is found in sandy soils, often on the shores of a lake.

Aspen

Populus tremuloides

Biome: Tallgrass Aspen Parkland

Aspen leaves are 1 to 4 inches long with a broad oval shape and finely toothed edges. They become yellow in the fall. Aspen trees have a white to grey-green bark that is thin and smooth. Aspen grows quickly and grows in space left by a fire or harvest. Aspen can grow well on sandy soil but grows best on a more nutrient-rich soil.

Small White Lady's Slipper

Cypripedium candidum

Biome: Tallgrass Aspen Parkland

Habitat: Prairies and grasslands

Threats: Loss of habitat, listed as Minnesota State Special Concern Species

The small white lady's slipper is a perennial plant that blooms in the spring—usually by early June. It can be 4 to 13 inches tall. The small white lady's slipper has one flower per stem that is white and shaped like a pouch, and this can have some purple spots or streaks. The flower column in the middle of the pouch is yellow. There are also two twisted side petals that are a greenish shade. This wildflower is threatened by loss of habitat due to land use change from prairie to agriculture or an urban environment, and invasion of weeds or more woody forest species.

Wiregrass Sedge

Carex lasiocarpa

Biome: Tallgrass Aspen Parkland

Wiregrass sedge is a perennial herb that grows in bogs and marshes, often in shallow water. It has very thin leaves and stems that can grow to about 3 feet. Wiregrass sedge has the characteristics that allow it to form a floating mat structure in a bog.

Sharp-Tailed Grouse

Tympanuchus phasianellus

Biome: Tallgrass Aspen Parkland

Diet: Seeds in the summer and fall; buds and twigs in the winter

Threats: Loss of open brushland and grassland, the suitable sharp-tailed grouse habitat

The range of sharp-tailed grouse in Minnesota has declined significantly due to the decline in their habitat. This brown and grey grouse is 15 to 20 inches long and weighs from 2 to 3 pounds. Its predators include great horned owls, foxes, skunks and raccoons.

Little Bluestem

Schizachyrium scoparium

Biome: Tallgrass Aspen Parkland

Little bluestem begins to grow in August with the appearance of its thin blue or blue-green stems. In can grow to be about 3 feet tall and becomes a deep red color in the fall. In the winter, little bluestem produces fuzzy white seeds that attract birds. The deep, dense root system of little bluestem allows it to be less susceptible to droughts and grow successfully in the drier prairie soils. Little bluestem also serves as habitat for many animals.

American Bittern

Botaurus lentiginosus

Biome: Tallgrass Aspen Parkland

Diet: Fish, insects, amphibians, crayfish, small mammals, snakes

Habitat: Freshwater wetlands

Threats: Habitat loss, Minnesota Species of Greatest Conservation Need

The American bittern is 23 to 34 inches long. It is well camouflaged in its wetland habitat and feeds by slowly following its prey or waiting for it to approach.

Sandhill Crane

Grus Canadensis

Biome: Tallgrass Aspen Parkland

Diet: Omnivore—grains, plants, insects, worms, mice, snakes

Habitat: Wetlands

Threats: Loss of wetland habitat

Sandhill cranes find most of their food in shallow wetlands and wetland soil, but they are also able to find seeds, such as corn, that have been planted in agricultural land. This can damage crops and cause conflicts with farmers. Sandhill cranes have a red crown on their heads and are grey, however, they often appear brown because they groom themselves with mud from their wetland area.


Family Cervidae
Cervus elaphus canadensis
E. C. Oaks
ASM - MIL


© Smithsonian Institution

American Elk

Cervus elaphus

Biome: Tallgrass Aspen Parkland

Habitat: Forests and open areas

Diet: Plants such as grasses and woody plants, including parts of aspen trees

Threats: Winter habitat loss, forests are needed and can be lost due to land use change

The American elk requires both forested habitat as well as open areas since forest offers the cover and protection while open areas offer the grasses and other plants that American elk eats. The American elk eats a wide variety of plants, so they will eat what is available. The American elk also has different summer and winter coats that have different appearances.

Canadian Toad

Bufo hemiophrys

Biome: Tallgrass Aspen Parkland

Diet: Insects, worms

Habitat: Woodlands, near water

The Canadian toad is 2 to 3.5 inches and is active at night. It digs burrows and its habitat includes more water than the habitats of other toads in Minnesota. Its main predator is the hognose snake as well as raccoons and skunks.

Northern White Cedar

Thuja occidentalis

Biome: Coniferous Forest

Threats: Structures that restrict movement of water through soil, such as roads, pipelines or beaver dams

Northern white cedar requires an area where water moves well through the soil in order to grow successfully. They can grow to be 50 to 60 feet tall. Northern white cedar will grow near black spruce on wetter soils and aspen on drier soils. This is a shade-tolerant tree. White-tailed deer and snowshoe hares feed on the seedlings, and this can damage a young, growing population.

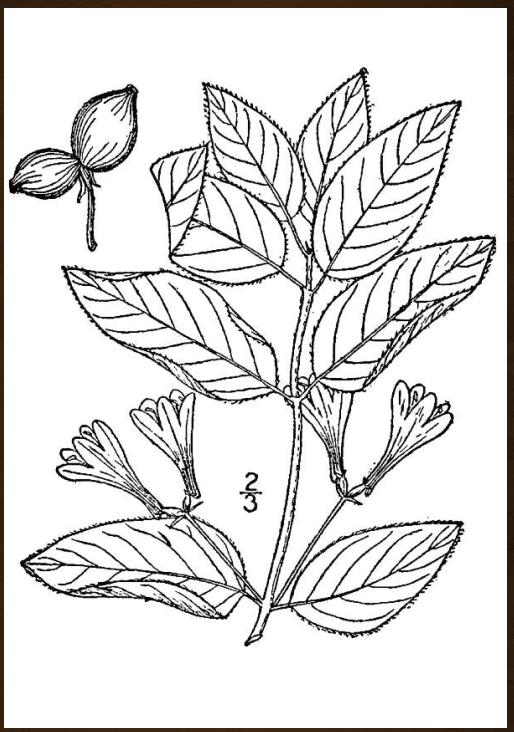
Black Spruce

Picea mariana

Biome: Coniferous Forest

Threats: Eastern dwarf-mistletoe

Black spruce trees often grow in areas after fires have occurred, and produce cones to reproduce. They grow on wet soils and can live for 200 years. Black spruce trees are harvested primarily for pulp as well as Christmas trees and lumber. The spruce grouse relies on black spruce trees for its habitat.



Copy Master - Biome Cards (Two-sided copying recommended)

Red Pine

Pinus resinosa

Biome: Coniferous Forest

Red pine's bark is red-brown plates, the leaves are dark green needles and it produces light brown cones. It often grows in areas after fires and can grow to be 60 to 80 feet high. Red pine grows on dry soils, does not tolerate shade and grows well in cold environments. Red pine is a habitat for many animals as well as food for deer and snowshoe hares. Birds, mice and chipmunks eat red pine seeds. Red pine is grown for a variety of uses including pulp and lumber.

Balsam Fir

Abies balsamea

Biome: Coniferous Forest

Threats: Spruce budworm insect; needle rust and root rot disease; easily killed by fires

Balsam fir grows well in cool, damp environments. It has smooth, gray bark, narrow leaves that are ½ to 1 inch long and purple cones. It can be 60 feet high and live for 100 years. It can also grow in shady conditions, so it can grow under forests under other trees. Balsam fir serves as food and habitat for a variety of species such as moose, white-tailed deer, snowshoe hare, red squirrel and grouse. Balsam fir is also used for pulp, Christmas trees and lumber.

Wood Frog

Rana sylvatica

Biome: Coniferous Forest

Diet: Small invertebrates

Habitat: Forests, bogs

The wood frog has a dark band over its eyes that appears to be a mask. It is 2 to 2.75 inches long. The wood frog breeds in bodies of water and then often moves far from these areas, into the forest. It lives well in cold climates.

Fly Honeysuckle

Lonicera canadensis

Biome: Coniferous Forest

Fly honeysuckle is perennial shrub that is about 7.5 feet high. It has yellow and white flowers that are in bloom April to July. This plant is beneficial to hummingbirds and butterflies.


Family Canidae
Canus lupus
L. L. Master
ASM - MIL


Family Cervidae
Alces americanus
J. O. Wolff
ASM - MIL

Compton's Tortoise Shell Butterfly

Nymphalis vaualbum

Biome: Coniferous Forest

The Compton's tortoise shell caterpillars depend on aspen, cottonwood, willow, gray birch and paper birch trees. The butterfly emerges as an adult in July and has a wing span of 2.5 to 3 inches.

Boreal Chickadee

Poecile hudsonicus

Biome: Coniferous Forest

Diet: Seeds and insects

Habitat: Spruce and fir forests

Threats: Destruction of spruce and fir forests due to industry and climate change

Boreal chickadees are often omnivores that eat seeds and insects. They store seeds and insect larvae for the winter. They find food in groups, except during breeding. They construct their nests in holes in trees and do not migrate during the winter.

Moose

Alces alces

Biome: Coniferous Forest

Diet: Aspen, maple and cherry trees and aquatic plants

Habitat: Forests

Threats: Warmer climate

Moose weigh 950 to 1,000 pounds, making them Minnesota's largest wild animal. They have strong senses of smell and hearing. Moose are very stressed by warmer temperatures, which makes them more susceptible to diseases. Wolves and bears are moose predators.

Gray Wolf

Canis lupus

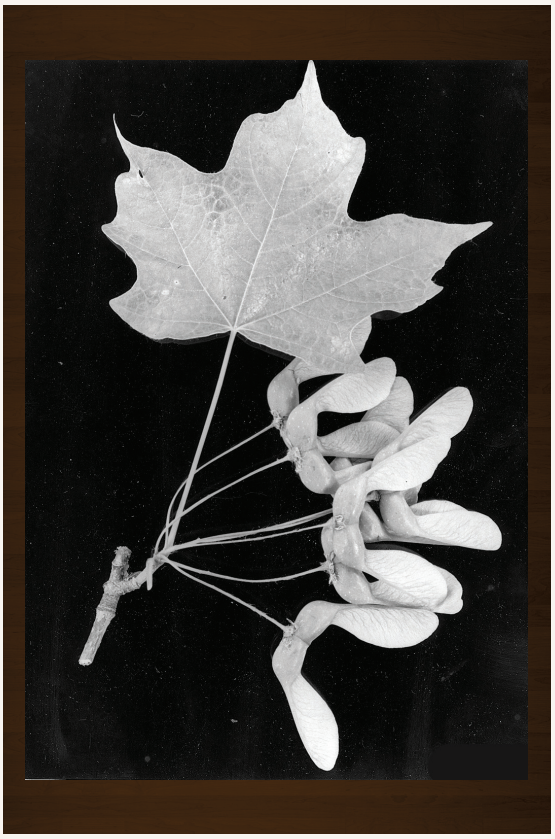
Biome: Coniferous Forest

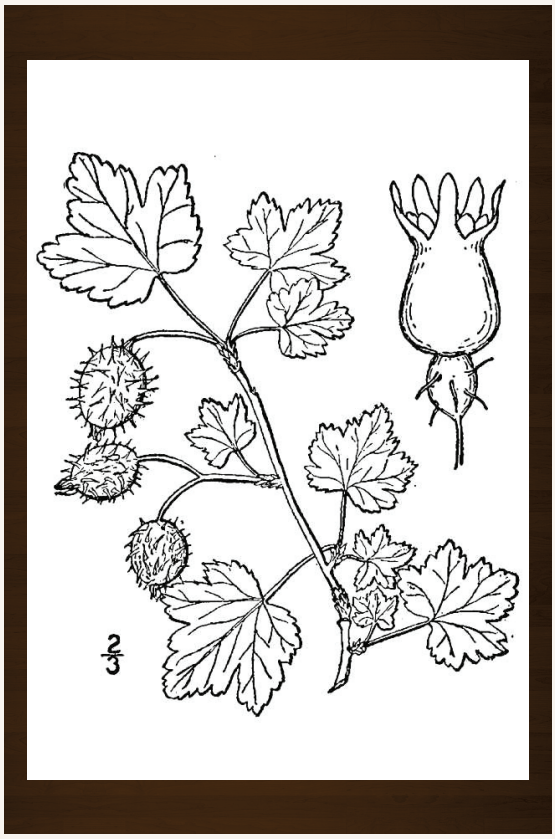
Diet: Small mammals and deer, moose and beavers

Habitat: Forests

Threats: Endangered Species

Gray wolves live in packs that are made up of 5 to 12 wolves. The pack hunts together, which allows them to catch the larger animals. Gray wolves weigh 60 to 120 pounds and their sense of smell is 100 times stronger than humans.





American Basswood

Tilia americana

Biome: Deciduous Forest

The American basswood tree has white-yellow flowers that bloom around June and are fragrant. It grows in forests with sugar maple trees as well as northern red oaks. American basswood can be 60 to 80 feet high with gray bark. Its leaves are 3 to 6 inches long and heart-shaped.

Northern Red Oak

Quercus rubra

Biome: Deciduous Forest

Threats: Oak wilt fungus and gypsy moths

Northern red oak grows quickly and can be 55 to 80 feet tall. Its leaves are 5 to 9 inches long and they turn bright red in the fall. It provides a good habitat for many animals. The northern red oak also produces acorns. These, as well as leaves and seedlings, are food for deer, elk, moose and rabbits. Northern red oak is harvested for lumber and grows well in urban areas. Oak wilt fungus has become a serious threat to northern red oak trees in Minnesota.

Prickly Gooseberry

Ribes cynosbati

Biome: Deciduous Forest

Prickly gooseberry is a perennial shrub that is about 36 inches tall. Its flowers are a green-yellow color and bloom in May or June. It also has a bristly, purple berry that birds often eat.

Sugar Maple

Acer saccharum

Biome: Deciduous Forest

Threats: Asian long-horned beetle

Sugar maple grows to a height of 80 feet or more. It grows slowly and can grow well in shady conditions. Its leaves are 3 to 5 inches long with 3 to 5 points. Sugar maple is used for lumber and it also produces maple syrup.

Eastern Hognose Snake

Heterodon platyrhinos

Biome: Deciduous Forest

Diet: Toads primarily and small mammals

Habitat: Edge of forests, on sandy soil

The eastern hognose snake is not venomous and its predators are hawks and other mammals. This snake is usually 24 to 46 inches long and can be a variety of colors: yellow, gray, brown or black

Rue Anemone

Anemonella thalictroides

Biome: Deciduous Forest

Rue anemone is a perennial flower that often grows in shady areas. Its flowers can be white or light purple and it blooms in April or May. This flower grows in areas of healthy soil.

Eastern Pipistrelle Bat

Perimyotis subflavus

Biome: Deciduous Forest

Diet: Insects such as moths, flies, beetles, ants

Habitat: Caves, primarily

Threats: Minnesota Species of Special Concern, disturbance during hibernation

The eastern pipistrelle bat is the smallest bat species in Minnesota. It is known as a tricolored bat because of the variation in color of its individual hairs. This bat hibernates from October to April in caves or tunnels.

Cerulean Warbler

Dendroica cerulean

Biome: Deciduous Forest

Diet: Insects

Habitat: Large areas of deciduous forest

Threats: Loss of forest habitat

The cerulean warbler migrates a long distance to South America for the winter, and it arrives in Minnesota around May each year. The cerulean warbler lives in forests with oak, maple and basswood trees. It lives in forest areas with older, mature trees.

Eastern Spotted Skunk

Spilogale putorius

Biome: Deciduous Forest

Diet: Insects and small rodents

Habitat: Woodlands, thickets, brush

Threats: Minnesota Threatened Species

The eastern spotted skunk is 18-22 inches long and its tail usually has a white tip. This skunk lives in dens during the winter and is an extremely rare species. They eat primarily insects and small rodents but will eat almost anything they can find.

Gray Fox

Urocyon cinereoargenteus

Biome: Deciduous Forest

Diet: Small mammals such as rabbits

Habitat: Forest

The gray fox can be identified by the dark stripe along its back and bushy tail. It is 35 to 40 inches long. The gray fox can climb trees, which is a unique characteristic for this type of animal. Its main predator is the coyote.

Blazing Star

Liatris spicata

Biome: Prairie Grassland

Blazing star is a perennial that can be 18 inches tall. Its pink-purple spike blooms in August.

Big Bluestem

Andropogon gerardii

Biome: Prairie Grassland

Big bluestem is a perennial grass that grows in moist soil. It has a blue tint and there is a purple flower cluster at the top of this grass. Big bluestem provides nesting habitat for birds and insects. Songbirds and prairie chickens also eat its seeds while white-tailed deer and bison eat the grass itself. This grass can also be grazed by livestock.

Prairie Dropseed

Sporobolus heterolepis

Biome: Prairie Grassland

Prairie dropseed is a grass that grows to about 2 feet tall and has orange flowers. These flowers are in bloom beginning in late summer.

Purple Prairie Clover

Petalostemum purpureum

Biome: Prairie Grassland

Purple prairie clover is a perennial that is 1 to 3 feet tall. Its purple flowers are in bloom from July to September. This plant attracts many butterfly species.

Great Plains Toad

Bufo cognatus

Biome: Prairie Grassland

Diet: Insects and earthworms

Habitat: Damp areas in prairies, farm fields

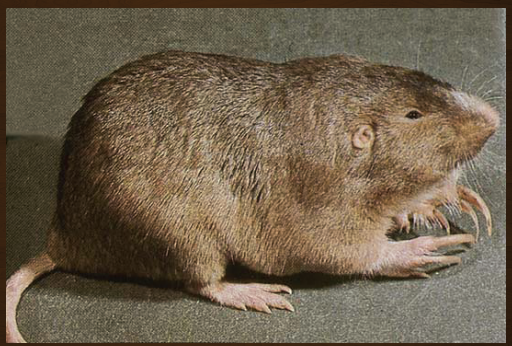
The great plains toad is 2 to 3.5 inches long, making it Minnesota's largest toad. They breed in bodies of water, so this habitat must also be nearby. This toad burrows into the ground for shelter.

Leadplant

Amorpha canescens

Biome: Prairie Grassland

Leadplant is a perennial that has blue or purple flowers. It is from 1 to 3 feet tall and its flowers are in bloom from late spring to summer.



Upland Sandpiper

Bartramia longicauda

Biome: Prairie Grassland

Diet: Insects

Habitat: Prairies

Threats: Species of Greatest Conservation Need, loss of habitat

The upland sandpiper is about 1 foot tall. Other sandpiper species live near water, but the upland sandpiper lives in a prairie habitat. Upland sandpipers migrate to South America for the winter and arrive in Minnesota in April or May.

Greater Prairie Chicken

Tympanuchus cupido

Biome: Prairie Grassland

Diet: Plants and insects

Habitat: Open prairies

Threats: Minnesota Species of Special Concern, loss of habitat

The greater prairie chicken nests in tall grass and is well known for its displays during the mating season. Its predators are red-tailed hawks and great-horned owls. The greater prairie chicken's habitat is threatened as it is being lost to agriculture or forest.

Badger

Taxidea taxus

Biome: Prairie Grassland

Diet: Insects and small mammals such as mice and gophers

Habitat: Prairies

The badger is 20 to 35 inches long and lives primarily underground. It can be identified by the white stripe from its nose to the base of its neck. The badger is a nocturnal animal.

Plains Pocket Gopher

Geomys bursarius

Biome: Prairie Grassland

Diet: Plants

Habitat: Prairies

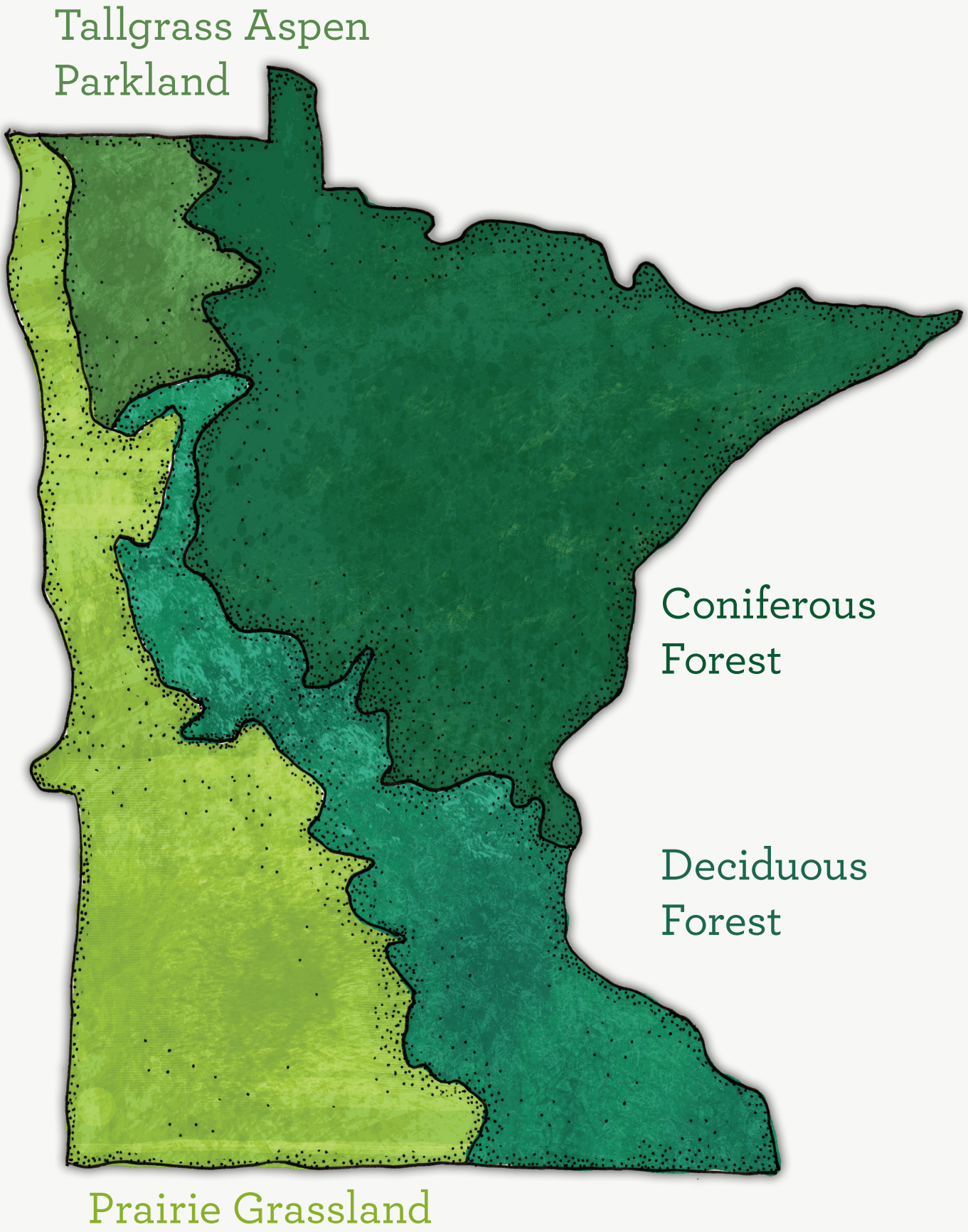
The plains pocket gopher is about 1 foot long and its tail has a white tip. It digs underground tunnels in the spring and fall and lives mostly underground. The plains pocket gopher lives in areas with sandy soil.

Minnesota Biomes Table

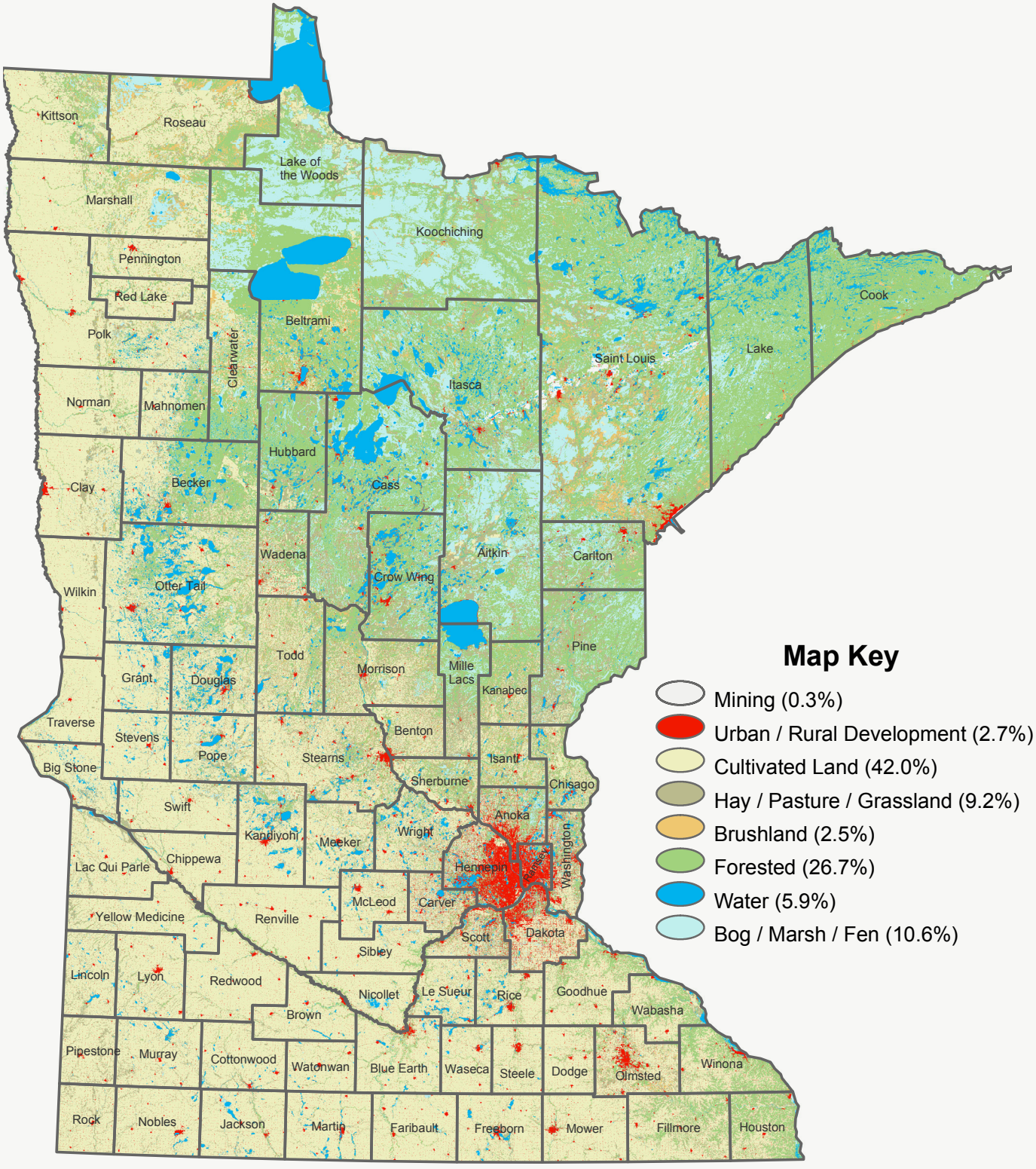
"Biome" is a term used to describe a biological community. Usually, biomes occur over large areas and include many similar plant communities and the animals that live in them. The table below shows examples of conditions within Minnesota's biomes.

	Average Annual Precipitation	*Average Annual Temperature*	*Vegetation Examples*	*Animal Examples*	*Average Growing Season Length*
Tallgrass Aspen Parkland Biome	20" – 22"	35° – 44° F	-Aspen -Heart-leaved Willow -Winegrass Sedge -Small White Lady's Slipper -Little Bluestem	-Sharp-tailed Grouse -Sandhill Crane -American Bittern -Canadian Toad -American Elk	90-130 days
Coniferous Forest Biome	21" – 32"	36° – 41° F	-Black Spruce -Northern White Cedar -Balsam Fir -Red Pine -Fly Honeysuckle	-Wood Frog -Boreal Chickadee -Compton's Tortoise Shell Butterfly -Gray Wolf -Moose	90 – 100 days
Deciduous Forest Biome	24" – 35"	39° – 45° F	-Northern Red Oak -American Basswood -Sugar Maple -Prickly Gooseberry -Rue Anemone	-Eastern Hognose Snake -Cerulean Warbler -Eastern Pipistrelle Bat -Gray Fox -Eastern Spotted Skunk	100 – 130 days
Prairie Grass-land Biome	18" – 33"	37° – 45° F	-Big Bluestem -Blazing Star -Purple Prairie Clover -Prairie Dropseed -Leadplant	-Great Plains Toad -Greater Prairie Chicken -Upland Sandpiper -Pocket Gopher -Badger	130 – 180 days

For a fun way to learn about Minnesota's biomes, plants, and animals, check out the Junior Park Naturalist Program at a state park near you, or call the DNR's Information Center at (651) 296-6157 (metro area) or 1-999-646-6367 (toll free).


Tallgrass Aspen
Parkland
Coniferous
Forest
Deciduous
Forest
Prairie Grassland

1990s CENSUS OF THE LAND

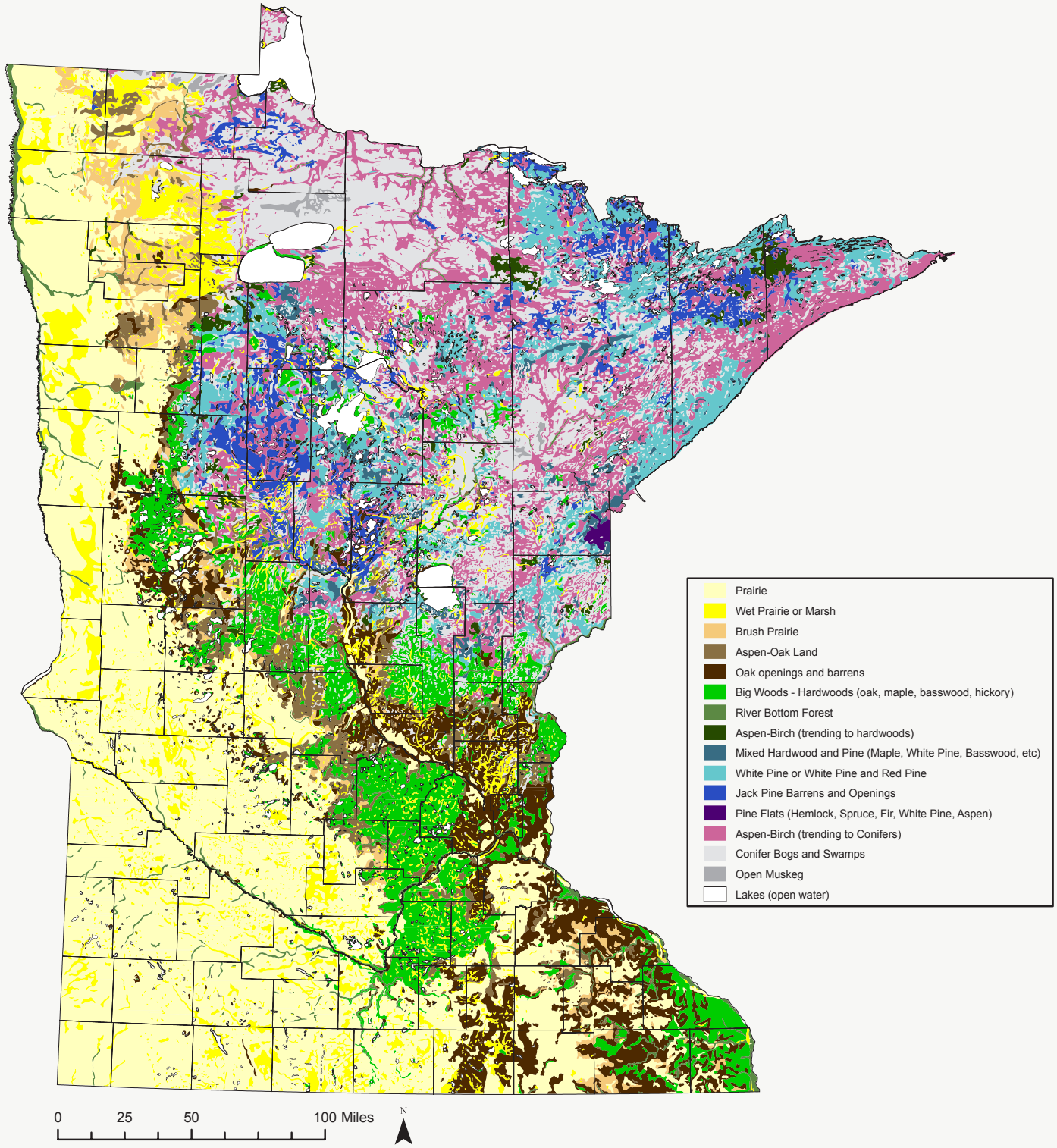


Data Source: Mn Dept. of Natural Resources; this data set integrates six different source data sets to provide a generalized overall view of Minnesota's land use / cover.

Metadata: http://www.lmic.state.mn.us/chouse/metadata/luse8.html

Map Production: Mn Land Management Information Center; 3/11/05 jch

The Natural Vegetation of Minnesota at the Time of the Public Land Survey: 1847-1907



This map was compiled from Minnesota Department of Natural Resources Geographic Information System digitized data, available on the DNR's web site at http://deli.dnr.state.mn.us/. The digitized data files were created from the Original Vegetation of Minnesota, a map compiled in 1930 by F.J. Marschner from the U.S. General Land Office Survey Notes and published in 1974 under the direction of M.L. Heinselman of the U.S. Forest Service by the North Central Forest Experiment Station in St. Paul, Minnesota.
Map compiled by DNR Natural Heritage and Nongame Research Program, June, 2005

Lesson 3: Minnesota's Changing Climate

What defines Minnesota's Climate?

Age Level:	Grades 9-12
Time Needed:	50-75 minutes
Materials:	Normal Annual Precipitation handout (1 per student or projection) Normal Annual Mean Temperature handout (1 per student or projection) Climate Trends in Precipitation-Annual (1 per student or projection) Climate Trends in Temperature-Annual (1 per student or projection) Graphing paper Colored pencils for graphing **optional: selection of graphs showing seasonal and regional climate trends
Student Learning Outcomes:	• Students will define climate, weather and phenology. • Students will define climate change. • Students will discuss what defines the climate and biomes of Minnesota. • Students will graphically represent authentic data from Minnesota's Climatology site. • Students will interpret graphs showing long-term precipitation and temperature trends in MN. • Students will discuss the importance of longitudinal data. • Students will gather their own weather data from their school site and record it in their journal.

Background Information

This lesson will introduce the terms *weather*, *climate* and *phenology*. These terms are essential to understanding climate change and how it is impacting and will impact biomes. In addition, as discussed in lesson 2, climate is an important and defining characteristic of the biomes of Minnesota. Finally, students will learn about the importance of longitudinal data and how they can participate as "citizen scientists."

The difference between weather and climate is an essential concept to understand when learning about climate change. Minnesota climatologist Mark Seeley defines climate as the "quantitative description of historical weather for a given place over a given interval of time … [climate descriptions] include the physical and biological features of earth's surface, their interactions and atmospheric feedbacks." In other words, climate is not just one instance of snow or rain or heat, but the many weather events over long periods of time (multiple years) that define a particular geographical area as hot and dry, cold and wet, etc.

Weather, on the other hand, is "… the recent, current, and near-future state of the atmosphere. The most common elements include temperature, humidity, precipitation, cloudiness, visibility and wind." Weather is what is going on outside your window right now and one instance of weather does not define a particular area. Another way to think about this is if you were collecting data, weather would be one data point whereas climate would be the entire collection.

According to the USA National Phenology Network; "Phenology refers to recurring plant and animal life cycle stages … such as leafing and flowering, maturation of agricultural plants, emergence of insects, and migration of birds. Many of these events are sensitive to climatic variation and change. …" (http://www.usanpn.org/) Keeping track of the phenology outside your school can be a

I always had an incredible interest in weather. I wanted to be able to predict the weather, understand where the weather came from.

—Will Steger. Interview, August 2010

In pre-spring the weather systems really come and go. The constant sound of wind seems like continual music.

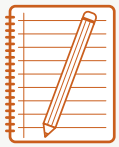
—Will Steger, Ely Homestead, March 4, 1972

As usual, the weather dictated the mood of the day.

—Will Steger, Ely Homestead, September 28, 1971

fun way for students to make connections between the physical factors related to climate and the biotic reactions by flora and fauna. Regardless of where your school is located, students will be able to observe phenology, and it is an excellent way to draw connections between climate and living things.

The major reason that climate change is undeniable is because of not only the sheer volume of evidence that has accumulated, but the varied and longitudinal nature of the evidence. This corroborative and longitudinal evidence comes in the form of tree rings, pollen and ice cores, instrumental records, phenological written observations, as well as now photos and video. Students can play a valuable role themselves as "citizen scientists" by recording their own observations and adding to what we know about the climate and phenology of a particular biome.



Journal Assignment

At the end of this lesson, student journals should contain a definition for weather, climate and phenology, two graphs that show average temperature and precipitation for each of the four biomes, an interpretation of line graphs showing precipitation and temperature trends in the state, and three predictions of possible impacts on Minnesota biomes from an increase in temperature and precipitation. Students should also have at least the annual temperature and precipitation historical trends graph from 1895.

**Note. The line graphs included in this lesson are from the Southern Climate Impacts Planning Program, http://www.southernclimate.org/data.php and show:

- The Historical Climate Trends line graphs provide a comparative seasonal or annual analysis for a specified climate division or state. Long-term averages are taken from NCDC's monthly and annual temperature and rainfall datasets. These long-term averages are depicted in each chart as a horizontal line in the middle of the chart. Five-year moving averages of seasonal (or annual) values are plotted in comparison to the long-term average as red or blue curves for temperature, and green or brown curves for precipitation. When looking at the temperature graphs, a red curve indicates a warmer period than the historical average, while a blue curve is a period that is cooler than the historical average. On the precipitation graphs, a green curve indicates a period that is wetter than the historical average, while a brown curve is drier than the historical average.

- The Monthly Summaries graphs provide monthly temperature and rainfall values for a specified year and region (climate division or state). Long-term averages are included for comparison. This graph provides a quick look back at monthly values to show how temperature and rainfall compared to long-term averages. Climate Divisions are as follows:
    - Northwest-01
    - North Central- 02
    - Northeast- 03
    - West Central- 04
    - Central- 05
    - East Central- 06
    - Southwest- 07
    - South Central- 08
    - Southeast- 09

Activity Description

Introduction

1. Pre-write...
   A. If you were going to describe to someone who has never been to Minnesota, what the climate of Minnesota is like, how would you describe it? Would you compare or contrast it with somewhere else so that they would be able to picture it? Where?
   B. If you were going to descri be to someone what the weather is like today, how would you describe it?
   C. What is the weather like today for the animal or plant you "met" in lesson 2? Look on the map and describe what you think of when you think of the climate of the biome where that animal or plant is found.
2. Share with your neighbor what you wrote. Did you write similar things for A and B?
3. Share examples in Will's journal of observations he has made throughout his life and how learning about the weather at a younger age was what helped him anticipate and survive some of the extreme weather he has encountered in his Arctic and Antarctic adventures.

Activity: What are climate, weather and phenology?

1. Explain to the students that climate, weather, and the effect climate has on living things will be the topics of the day. Use the background information to explain weather, climate and phenology. Make sure students conclude the discussion with clear definitions of all three written in their journal.
2. On the board make four bubbles and write Fall, Winter, Spring, Summer in each bubble. Draw two lines from each bubble with a bubble on the end (see diagram below). In one bubble write weather and in one bubble write phenology. Repeat for each season. Ask the students to describe each season to them in terms of the common weather they might observe and make a concept map off of the weather bubble.
3. Explain to the students the concept of phenology, and ask them to help make a concept map of common phenology of the season you are working on as a group. See the example below.

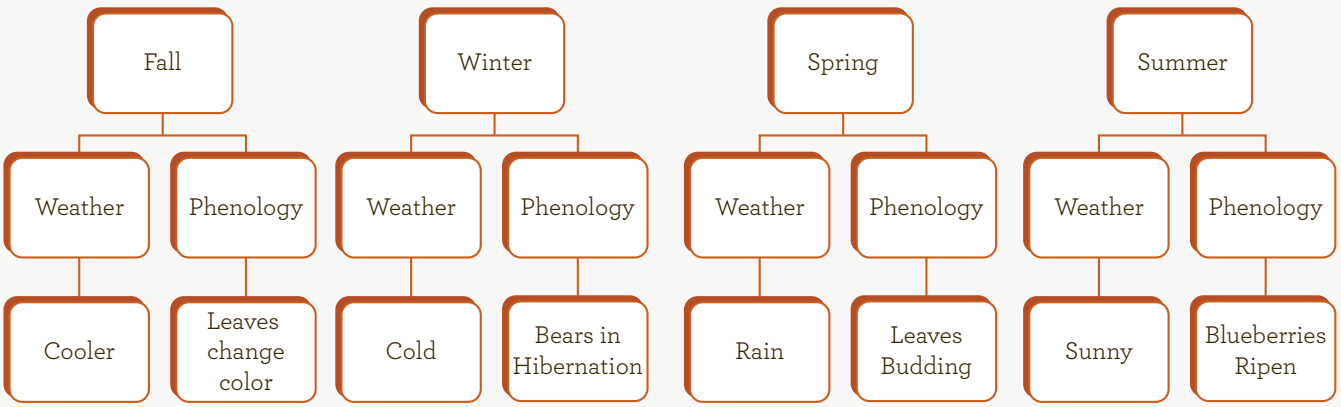


Figure 1: Common Minnesota Seasonal Weather and Phenology

4. In their journals and individually, ask the students to repeat for the other three seasons. If there is time, ask them to share.
5. At this point the students could be led outdoors to do the weather report and phenology activity in the Take It Outside section, or continue to the interpretation of data activity.

Activity: Interpretation and Representation of Data

1. Hand out or project the Minnesota map of *Normal Annual Mean Temperature* and *Normal Annual Precipitation*. Ask the students what the maps show. Point out the different colors and ask what they represent.
2. Hand out the worksheets found on page 68. You may need to guide them through the worksheet together as a group, or if your students are comfortable with graphing you could ask them to make a graph on their own without the graph "blanks." An example graph is provided below.
3. Discuss in small groups or as a class what the graphs tell us sbout Minnesota's biomes and climate, individually and also when combined. Do the students prefer the maps or the graphs as ways of showing the data?
4. Is there a mean temperature and/or precipitation where all biomes could exist? If temperatures and precipitation were to change in each biome, what could that mean for the plants and animals commonly found there? Refer back to the table describing biomes (page 43)

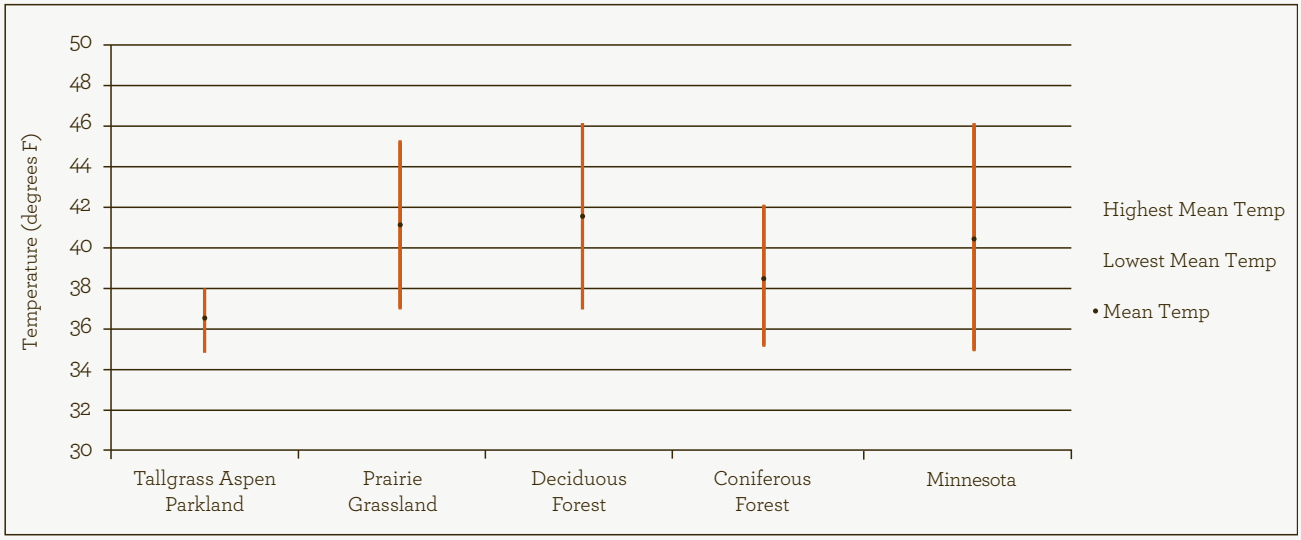


Figure 2: Mean Temperature Range of Minnesota Biomes

Activity: Data Comparison and Trends

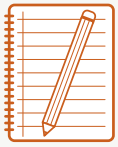
1. Students should have two graphs that compare the average temperature and precipitation of the biomes of Minnesota and the state as a whole.
2. Hand out the two line graphs that show the annual average temperature and precipitation of Minnesota since 1895. Ask students to answer the questions below in their journal.
   a. What are the warmest five years on record?
   b. If you were to only look at the temperature between 1950 and 1970, what would you conclude? How about 1910 to 1930?
   c. Why is longitudinal data (data collected over time) important and valuable?
   d. What is the temperature trend since 1895?
   e. What are the wettest five years on record?
   f. What is the precipitation trend since 1895?
   g. What other data might be useful to have for a better understanding of temperature and precipitation trends in Minnesota?
3. Some of the data that students might find useful include seasonal data and data from different parts of the state.

Make the other graphs included in this lesson available to them and ask them to draw some larger conclusions based on these graphs. Questions to consider include:

a. What season has seen the greatest increase in temperature or precipitation?
b. What region has seen the greatest departure from average temperature or precipitation and how does this relate to the climatological boundaries of each biome?

Concluding Activity: Climate and Biomes

1. If temperatures and precipitation were to increase in each biome, what could that mean for the plants and animals found in each biome?
2. If biomes are based on climatological boundaries, as discussed in lesson 2, what could this mean for the biome boundaries?
3. Ask students to refer back to the table describing the biomes again. Emphasize the importance of climate in defining each of the biomes. Discuss how a change in temperature of precipitation might affect the animals and plants of a biome and/or the phenology of different species.
4. Ask students to make three predictions of how an increase in precipitation and temperature might affect specific living things in their biome. Write the prediction in their journal.
5. Brainstorm what it could mean for different sectors of state (i.e., the impacts on tourism, agriculture, economy). Make a list they can keep in their notebook.



Journaling Connection

Students will use their journals to record weather observations. Ask the students what information they think would be important to record every day and make a table for students to paste or create in their journal. Include research on historical weather events for the day and common phenology as a part of this.

Take It Outside—Connecting With Your Place

Materials

- Journal and writing utensil
- Thermometer
- Rain gauge
- Beaufort Scale handout
- Anemometer
- Field guides

1. Based on weather reports they look at online or that are clipped from the paper, brainstorm with your students a list of things that would be important to include in a weather report. This list could include precipitation, temperature, wind speed and direction, historical highs and lows, historical average and important historical events.
2. Take your students outside and ask them to make their own weather reports in their journal. Provide thermometers, rain gauge and the Beaufort scale if you do not have an anemometer to measure wind speed. Also ask them to take a photo or draw an image that they might include to represent that day's weather.
3. After students have recorded their weather data, ask them to make a phenological observation.
    a. If they didn't know what day of the year it was, what signs in nature could they use to determine the date or at least the month?
    b. Can they see any birds or insects?
    c. Are there leaves on the trees? What color are they?

Extensions

1. Guide students through creating best-fit lines using the data provided of annual temperature and precipitation. See the resource section below for some very helpful resources on how to guide your students through this process.
2. Continue to make weather observations and phenology with your class. Keep a weather log or journal for the class and maintain it over time so that the data can be used for graphing or, if kept over a period of years, compared to past years.
3. Find phenological data, such as first flowering or arrival of birds, to include with temperature and precipitation data.

Online Classroom Connection

Visit http://classroom.willstegerfoundation.org

1. In the learning module of the online classroom click on "Climate Change Basics" and then "From Ice Age to Today," to learn more about how Minnesota's climate has changed over time and to play thte game.
2. Submit your weather observations and data to the online classroom via the share button.

Best Fit Lines and Understanding Trends Resources
Guiding Students Through Approximating Trends
http://serc.carleton.edu/mathyouneed/graphing/bestfit_inst.html

Understanding Trends
http://serc.carleton.edu/quantskills/methods/quantlit/trends.html

Weather and Climate Resources
Watch Dr. Mark Seeley's talk on weather vs. climate at:
http://vimeo.com/15885303

National Weather Service Weather and Climate Data
http://www.weather.gov/

Minnesota Historical Climate Data
http://climate.umn.edu/doc/historical.htm

Southern Climate Impacts Planning Program: Trends
http://www.southernclimate.org/products/trends.php

Hey—How's the weather?
http://www.dnr.state.mn.us/young_naturalists/weather/

Climate-Minnesota DNR
http://www.dnr.state.mn.us/climate/

Current Conditions
http://www.dnr.state.mn.us/current_conditions/

Paul Douglas Weather Column
http://pauldouglasweather.blogspot.com/

Phenology Resources

Gilbert, Jim. *Jim Gilbert's Minnesota Nature Notes*. Minneapolis: Nodin Press, 2008.

Weber, Larry. *The Backyard Almanac: A 365-day guide to the plants and critters that live in your backyard.* Pfeifer-Hamilton Publishers, 1995.

Minnesota Breeding Bird Atlas Project
http://www.mnbba.org/

Minnesota Phenology Network
http://phenology.cfans.umn.edu/index.htm

National Penology Network
http://www.usanpn.org

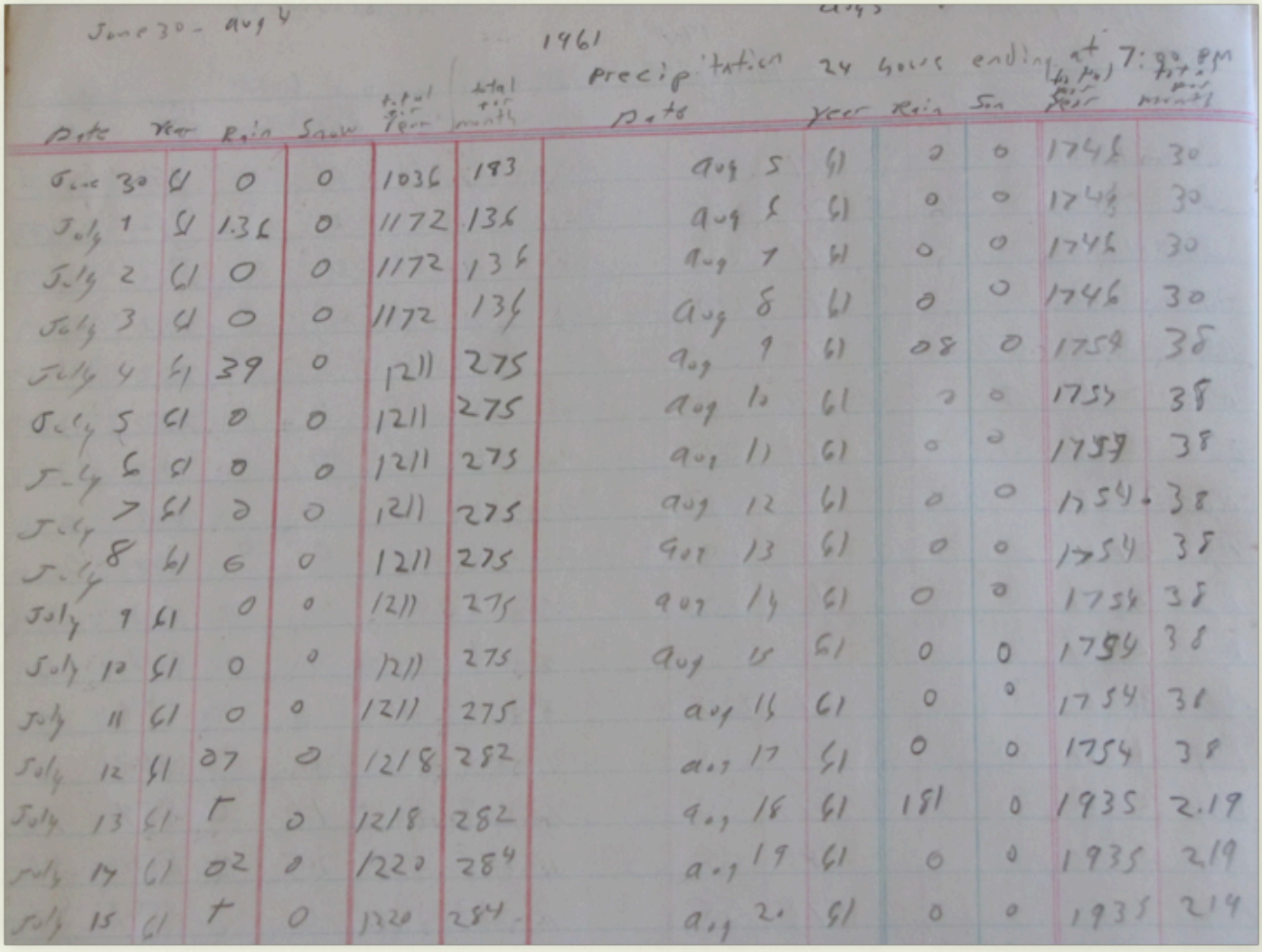
Twin Cities Naturalist Blog
http://www.twincitiesnaturalist.com

USA National Phenology Network
http://www.usanpn.org/

Globe
http:///www.globe.gov

Youth:

When Will Steger was young, he kept detailed charts recording his observations. The chart seen here shows observations of clouds, precipitation and temperatures.



June 30 - Aug 4 1961

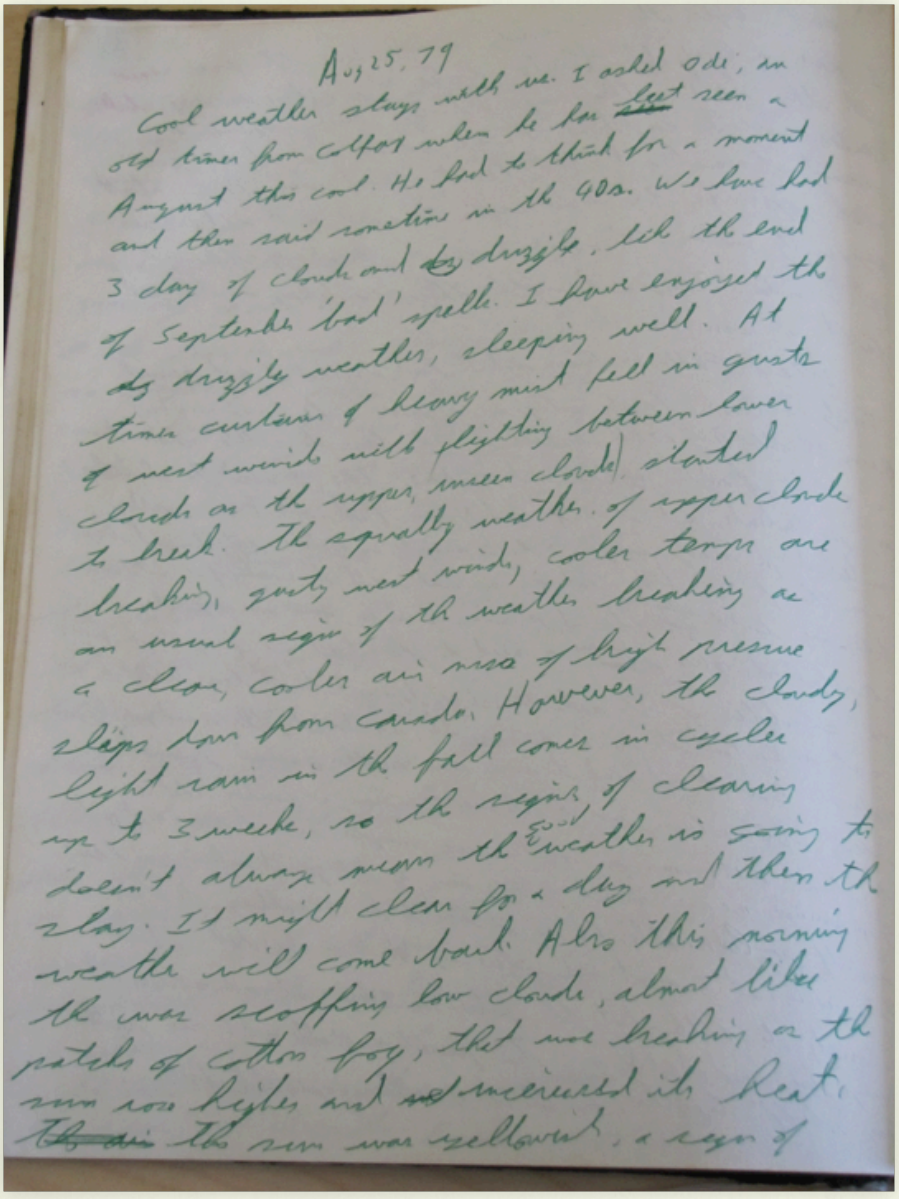
Date	Year	Rain	Snow	total for year	total for month
June 30	61	0	0	1036	183
July 1	61	1.36	0	1172	136
July 2	61	0	0	1172	136
July 3	61	0	0	1172	136
July 4	61	39	0	1211	275
July 5	61	0	0	1211	275
July 6	61	0	0	1211	275
July 7	61	0	0	1211	275
July 8	61	6	0	1211	275
July 9	61	0	0	1211	275
July 10	61	0	0	1211	275
July 11	61	0	0	1211	275
July 12	61	07	0	1218	282
July 13	61	T	0	1218	282
July 14	61	02	0	1220	284
July 15	61	T	0	1220	284

Precipitation 24 hours ending at 7:30 PM

Date	year	Rain	Sno	total for year	total for month
Aug 5	61	0	0	1745	30
Aug 6	61	0	0	1745	30
Aug 7	61	0	0	1745	30
Aug 8	61	0	0	1746	30
Aug 9	61	08	0	1754	38
Aug 10	61	0	0	1754	38
Aug 11	61	0	0	1754	38
Aug 12	61	0	0	1754	38
Aug 13	61	0	0	1754	38
Aug 14	61	0	0	1754	38
Aug 15	61	0	0	1754	38
Aug 16	61	181	0	1935	219
Aug 17	61	0	0	1754	38
Aug 18	61	181	0	1935	219
Aug 19	61	0	0	1935	219
Aug 20	61	0	0	1935	219

Ely Homestead:
August 25, 1979

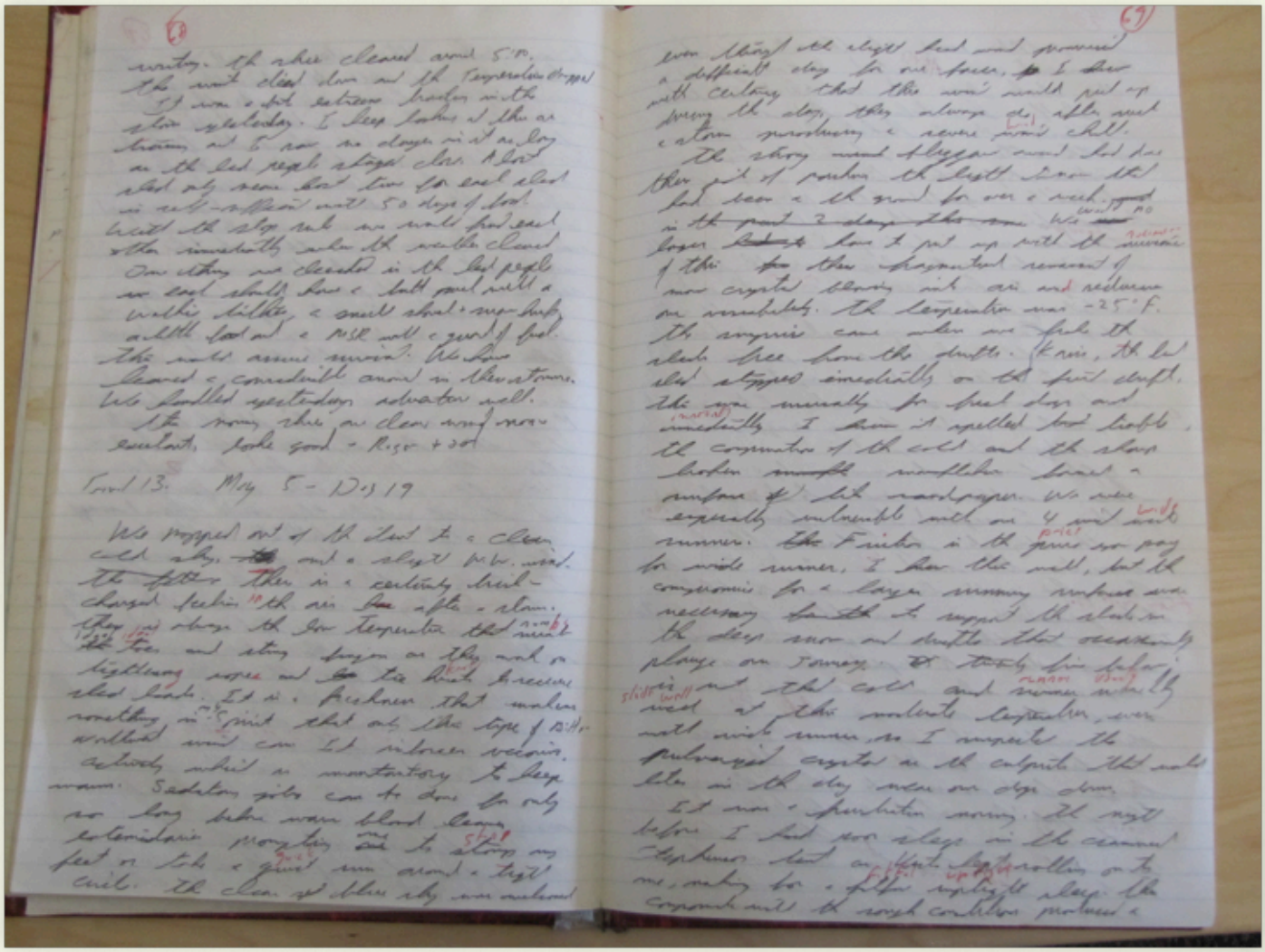
Cool weather stays with us. I asked Ode, an old timer from Colfax when he had last seen an August this cool. He had to think for a moment and then said sometime in the 40s. We have had 3 days of clouds and drizzle, like the end of September bad spells...The squally weather of upper clouds breaking, gusty west winds and cooler temperatures are a typical sign of the weather breaking as a clear, cooler air mass of high pressure slips down from Canada. However, the cloudy, light rain in the fall comes in cycles of up to 3 weeks, so the clearing doesn't always mean that the good weather is going to stay. It might clear for a day and then the weather will come back. Also this morning, there were low clouds, almost like patches of cotton. They were breaking as the sun rose higher and increased its heat. The sun was yellowish, a sign of water vapor. After a period of moisture when the sun comes out, like today, the sun's heat will evaporate the moisture to form clouds and even more rain.

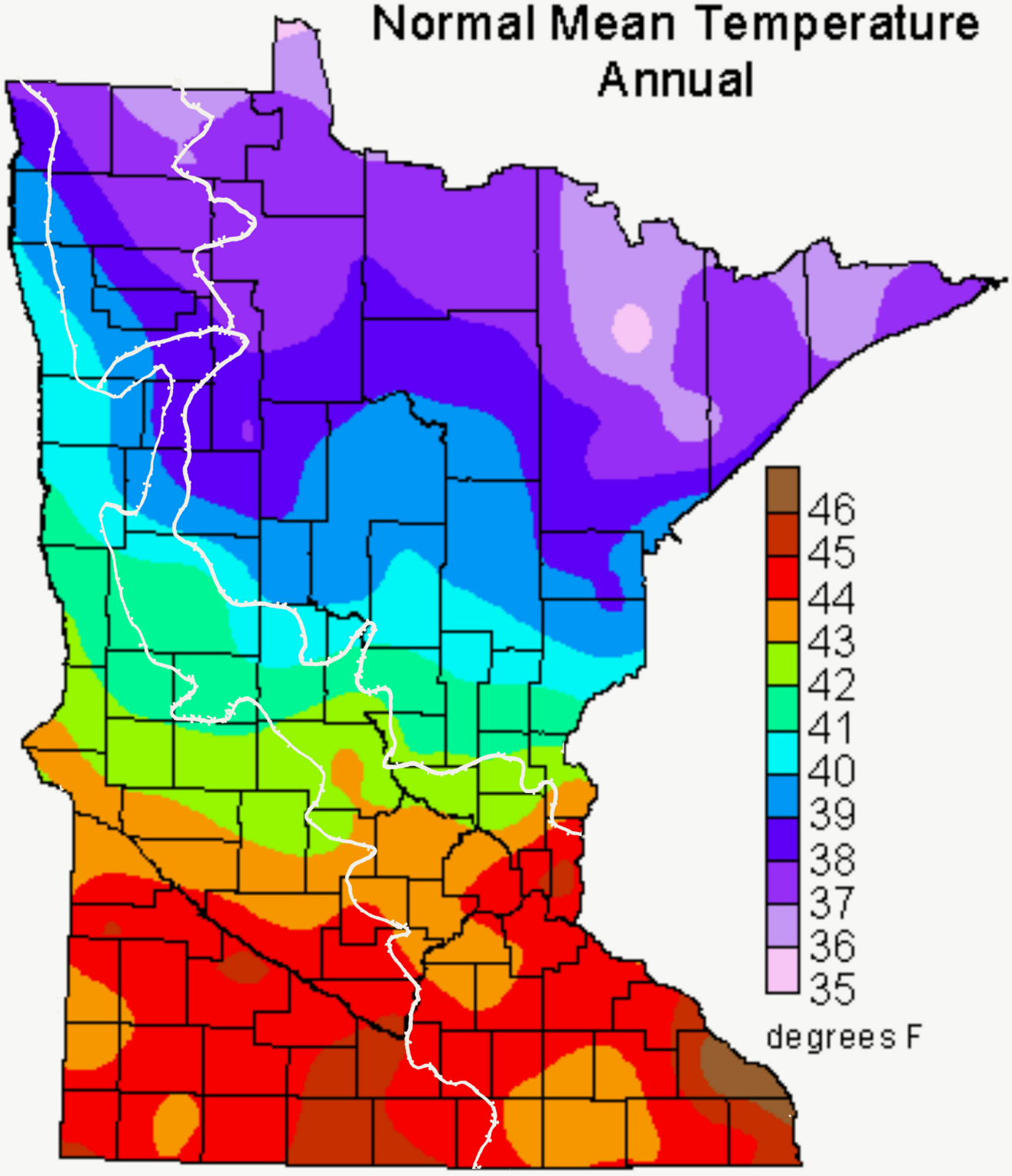

Aug 25, 79
Cool weather stays with us. I asked Ode, an old timer from Colfax when he had last seen a August this cool. He had to think for a moment and then said sometime in the 40s. We have had 3 day of clouds and drizzle, like the end of September 'bad' spells. I have enjoyed the drizzly weather, sleeping well. At times curtains of heavy mist fell in gusts of west winds with flighting between lower clouds as the upper, mean clouds started to break. The squally weather of upper clouds breaking, gusty west winds, cooler temps are an usual sign of the weather breaking as a clear, cooler air mass of high pressure slips low from Canada. However, the cloudy, light rain in the fall comes in cycles up to 3 weeks, so the signs of clearing doesn't always mean the good weather is going to stay. It might clear for a day and then the weather will come back. Also this morning the were scoffing low clouds, almost like patches of cotton boy, that were breaking as the sun rose higher and increased its heat. The sun was yellowish, a sign of

Expedition:

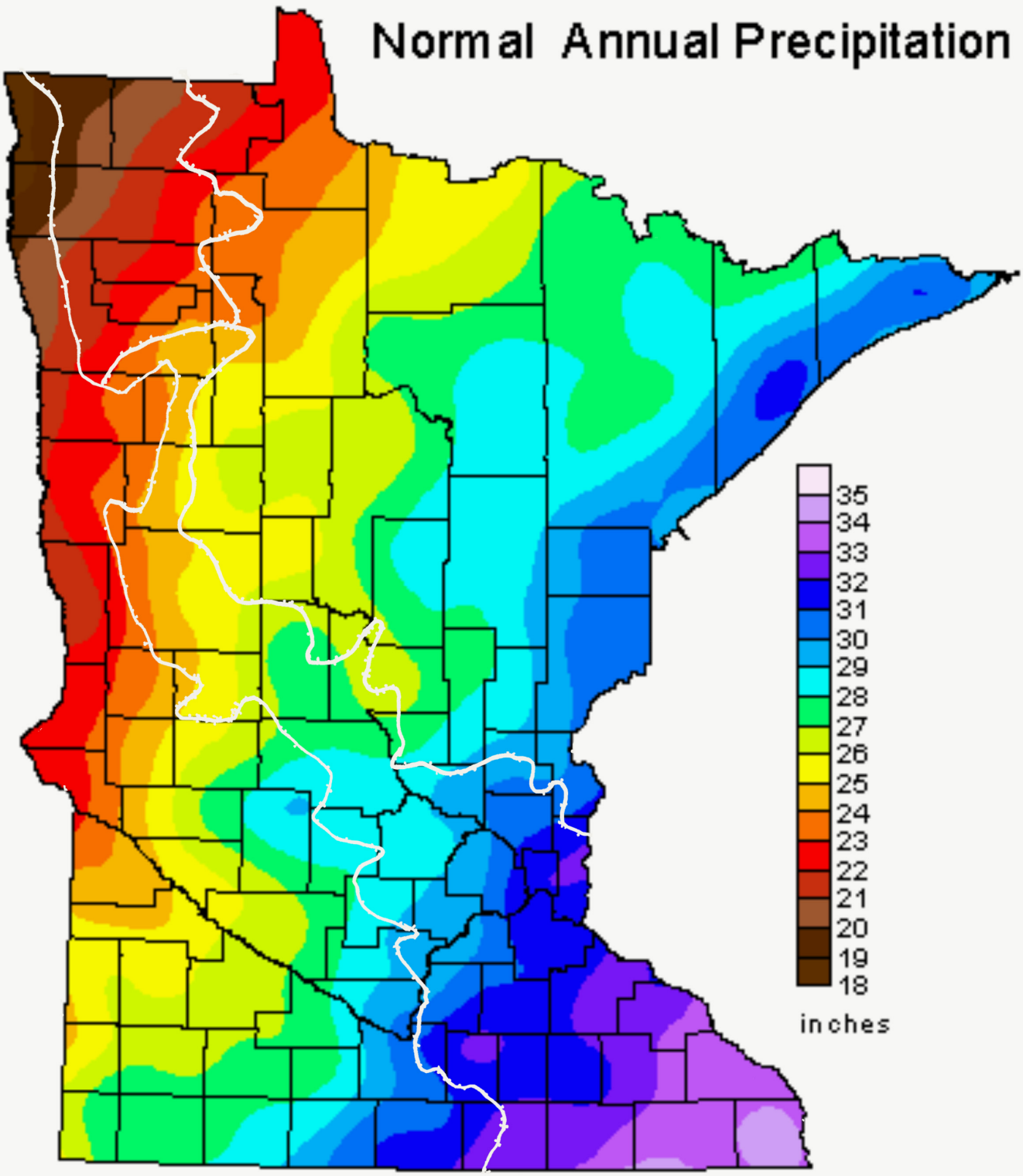
May 5, 1988

The clear, blue sky was welcome, even though I knew with certainty that these winds would pick up during the day; they always do after such a storm, producing a severe windchill. The strong blizzard winds had done their job in packing the light snow that had been on the ground for over a week. We would no longer have to put up with the nuisance of these fragmented remains of snow crystals blowing into the air and reducing our visibility. The temperature was -25F.





State Climatology Office - DNR Waters
May 2003



State Climatology Office - DNR Waters
July 2003

Name _____

Date _____

1. Look at the Normal Annual Mean Temperature Map.What does each color represent?

2. Fill in the following table with the higest and lowest mean temperatures, and mean temperature for each biome and the state as a whole.

Biome	*Highest Mean Temperature*	*Lowest Mean Temperature*	*Mean Temperature*
Tallgrass Aspen Parkland			
Coniferous Forest			
Deciduous Forest			
Prairie Grassland			
Minnesota			

3. Turn your temperature data into a graph that shows the range of mean temperatures for each biome, the mean temperature and compares the range between biomes and the state of Minnesota.
(see attached)

Explain your graph by answering the following questions:

4. What does it show?

5. What conclusions can be drawn?

6. In what ways is this type of graph useful?

7. What can be said about each biome?
   a. Tallgrass Aspen Parkland

   b. Coniferous Forest

   c. Deciduous Forest

   d. Prairie Grassland

8. Look at the Normal Annual Precipitation Map. What does each color represent?

9. Fill in the following table with the highest, lowest and mean annual precipitation for each biome and state as a whole.

Biome	*Highest Annual Precipitation*	*Lowest Annual Precipitation*	*Mean Annual Precipitation*
Tallgrass Aspen Parkland			
Coniferous Forest			
Deciduous Forest			
Prairie Grassland			
Minnesota			

10. Turn your precipitation data into a graph that shows the range of annual precipitation for each biome and compares the range between biomes and the state of Minnesota.
Explain your graph by answering the following questions:

1. What does it show?

2. What conclusions can be drawn?

3. In what ways is this type of graph useful?

4. What can be said about each biome?
    a. Tallgrass Aspen Parkland

    b. Coniferous Forest

    c. Deciduous Forest

    d. Prairie Grassland

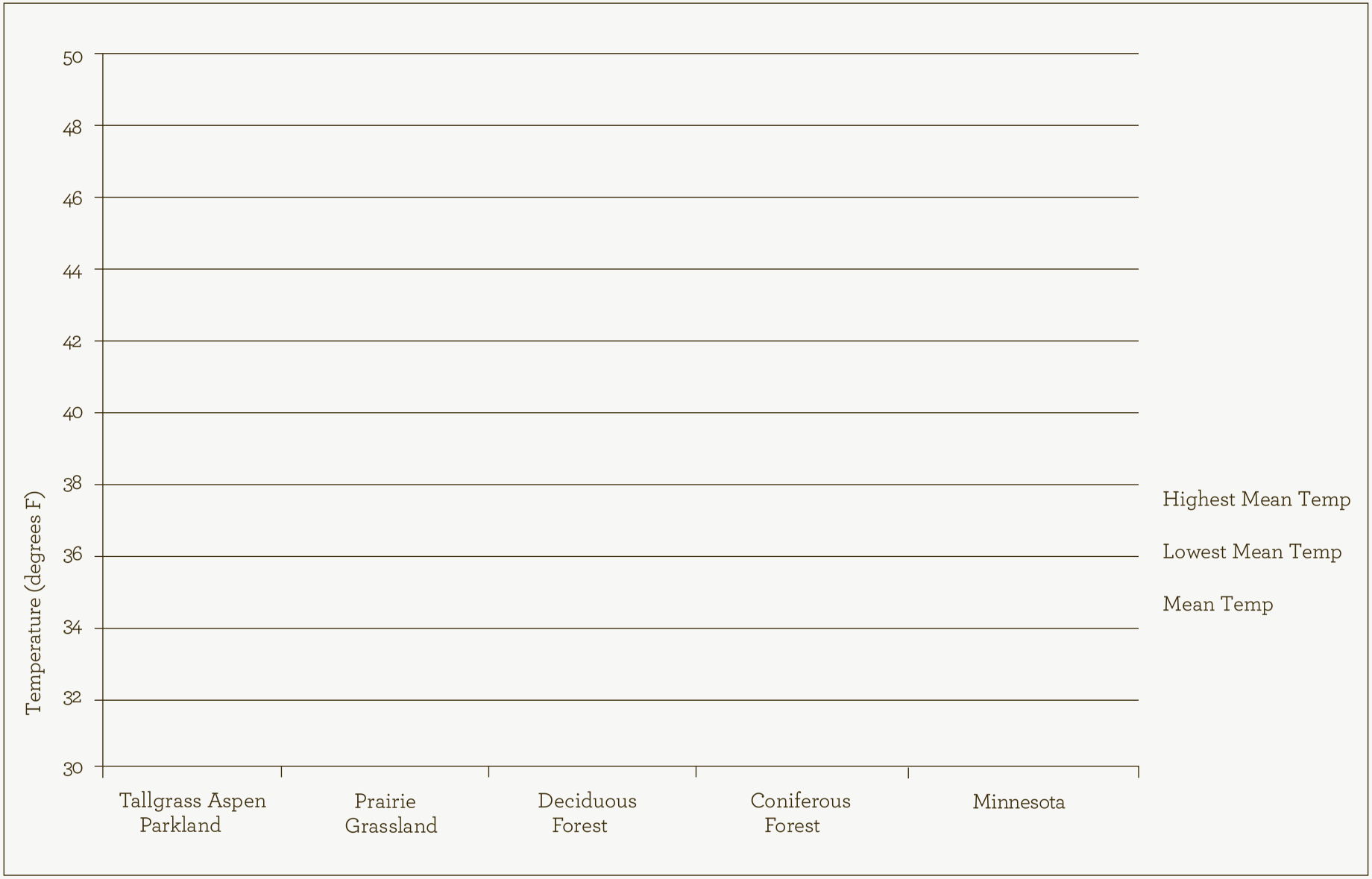
Look at both graphs side by side.
5. What can be said about each biome?
    a. Tallgrass Aspen Parkland

    b. Coniferous Forest

    c. Deciduous Forest

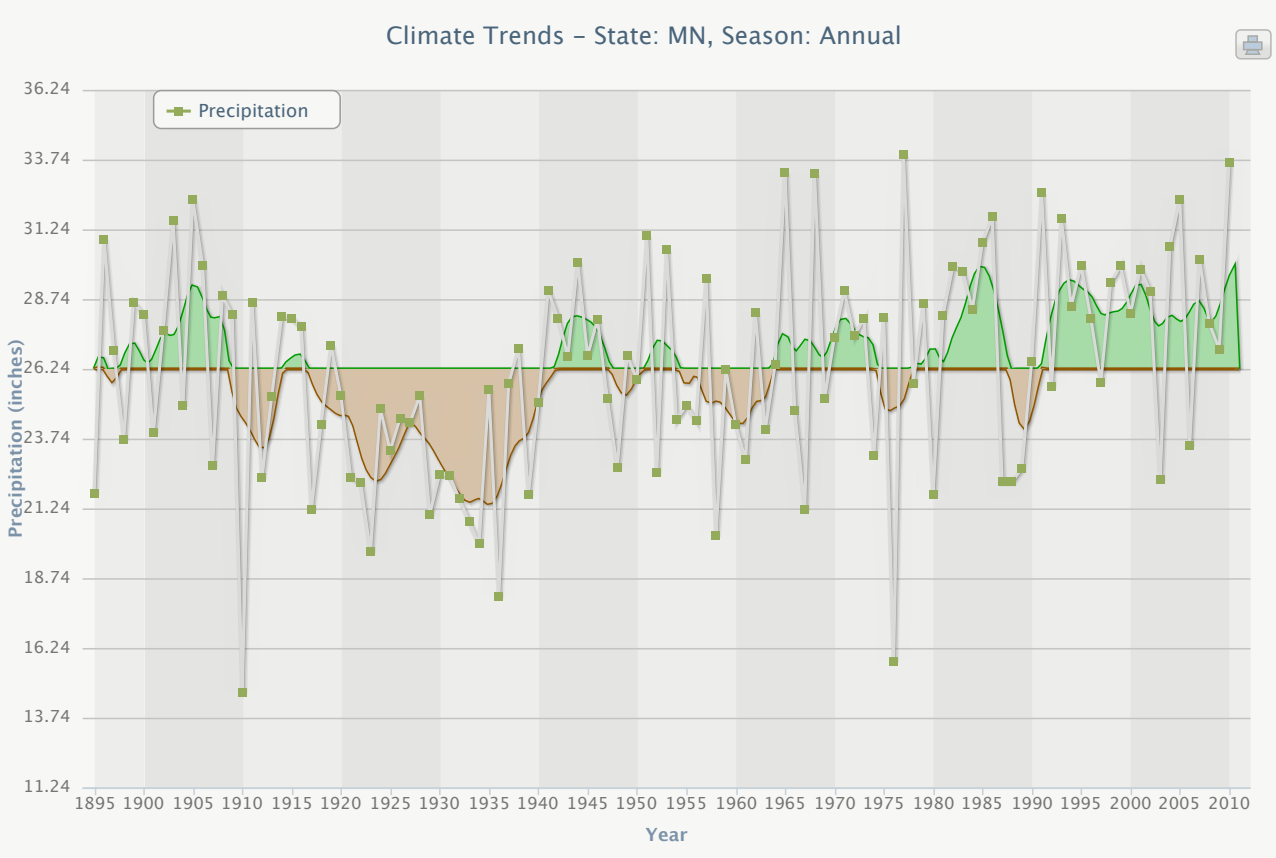
    d. Prairie Grassland

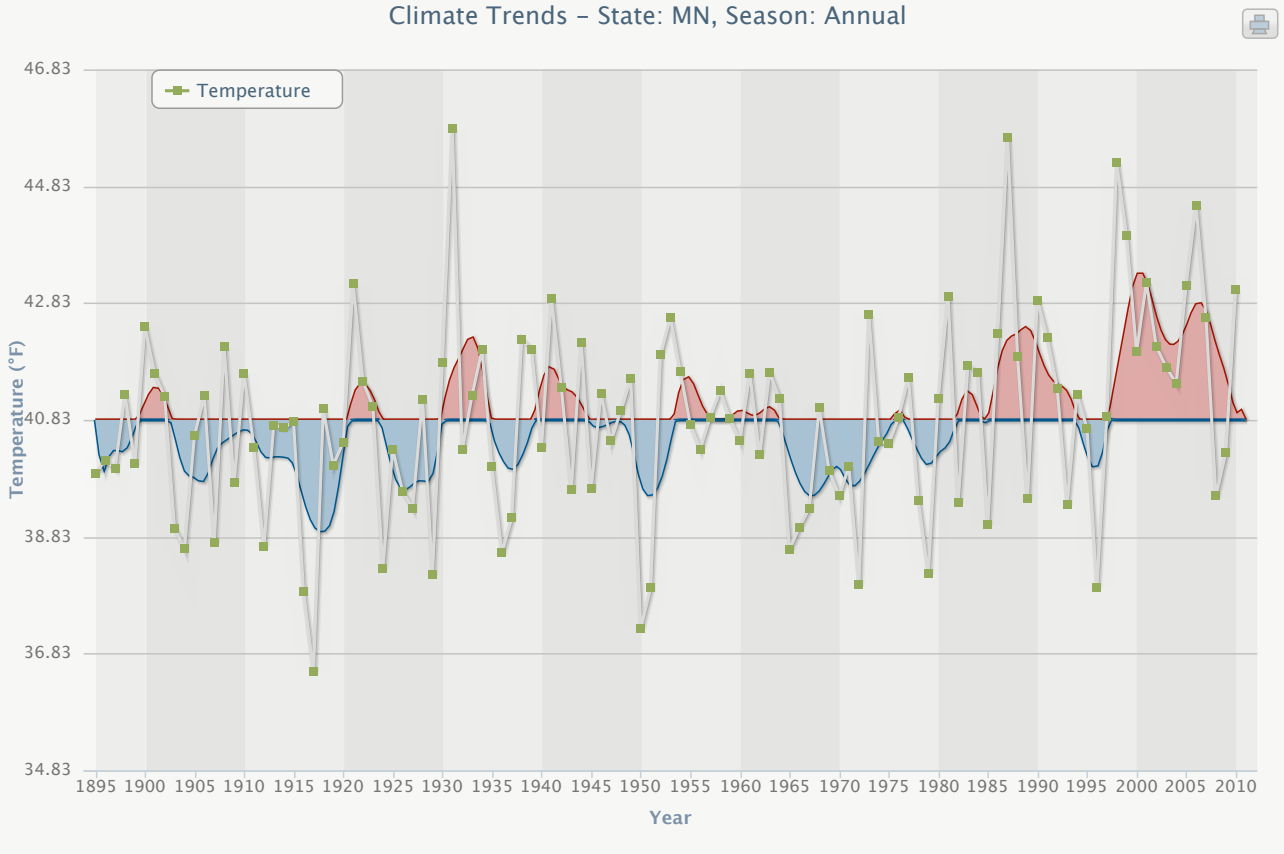
Title_____

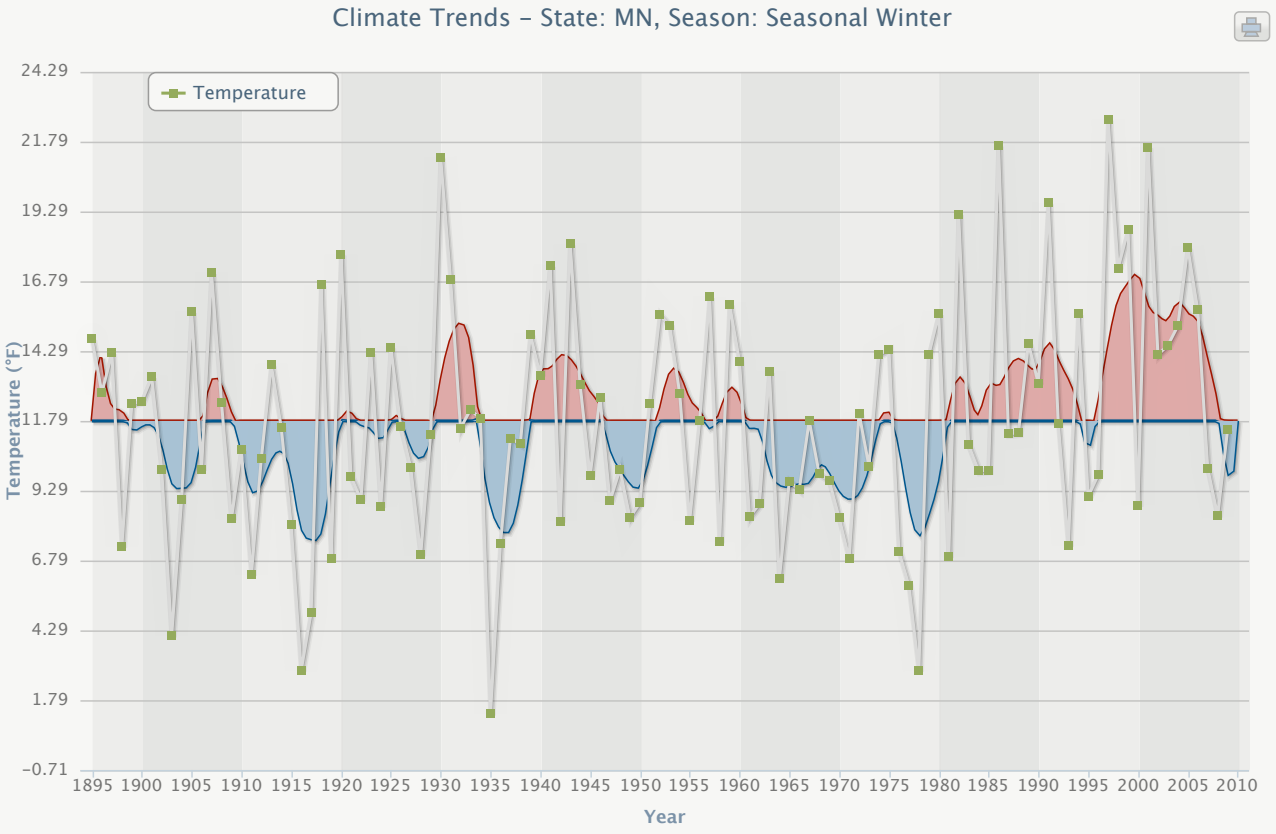

50
48
46
44
42
40
38
36
34
32
30
Temperature (degrees F)
Tallgrass Aspen Parkland
Prairie Grassland
Deciduous Forest
Coniferous Forest
Minnesota
Highest Mean Temp
Lowest Mean Temp
Mean Temp

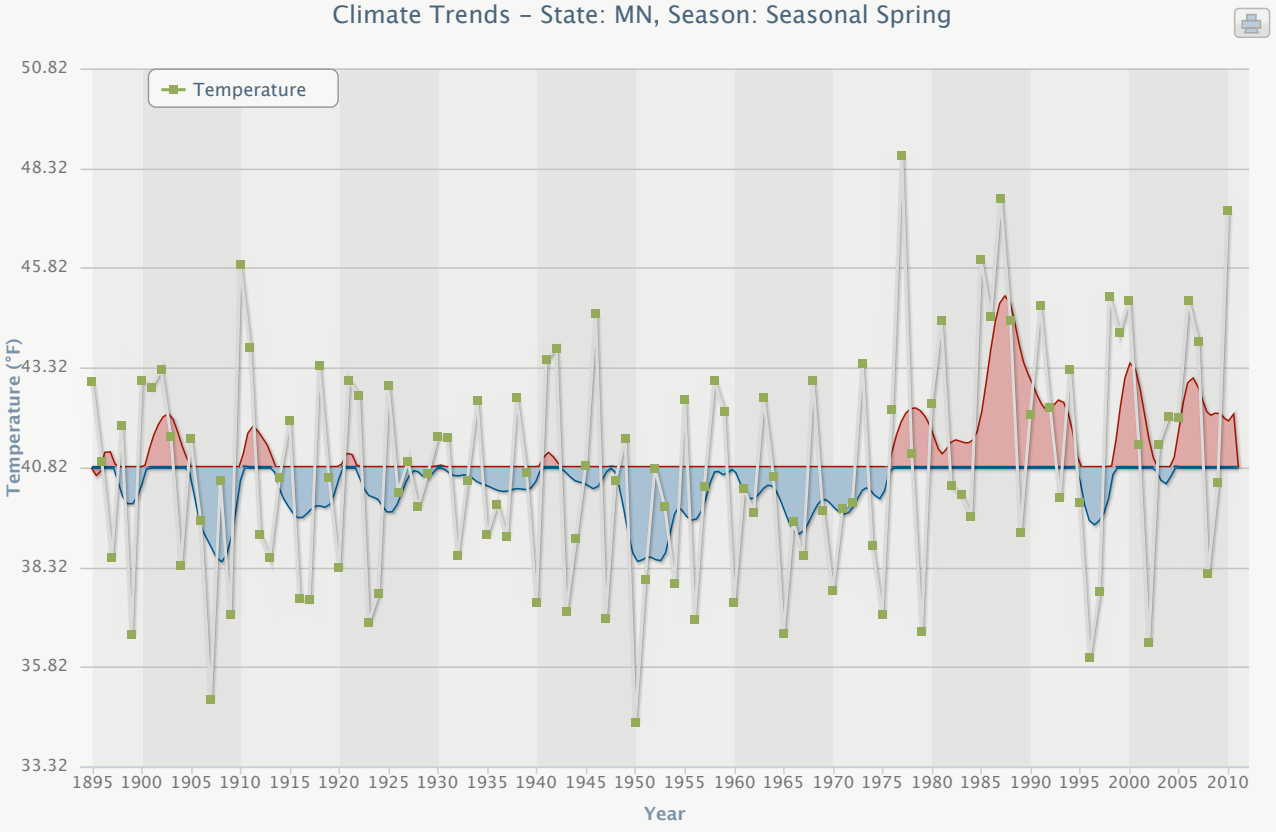
Title_____

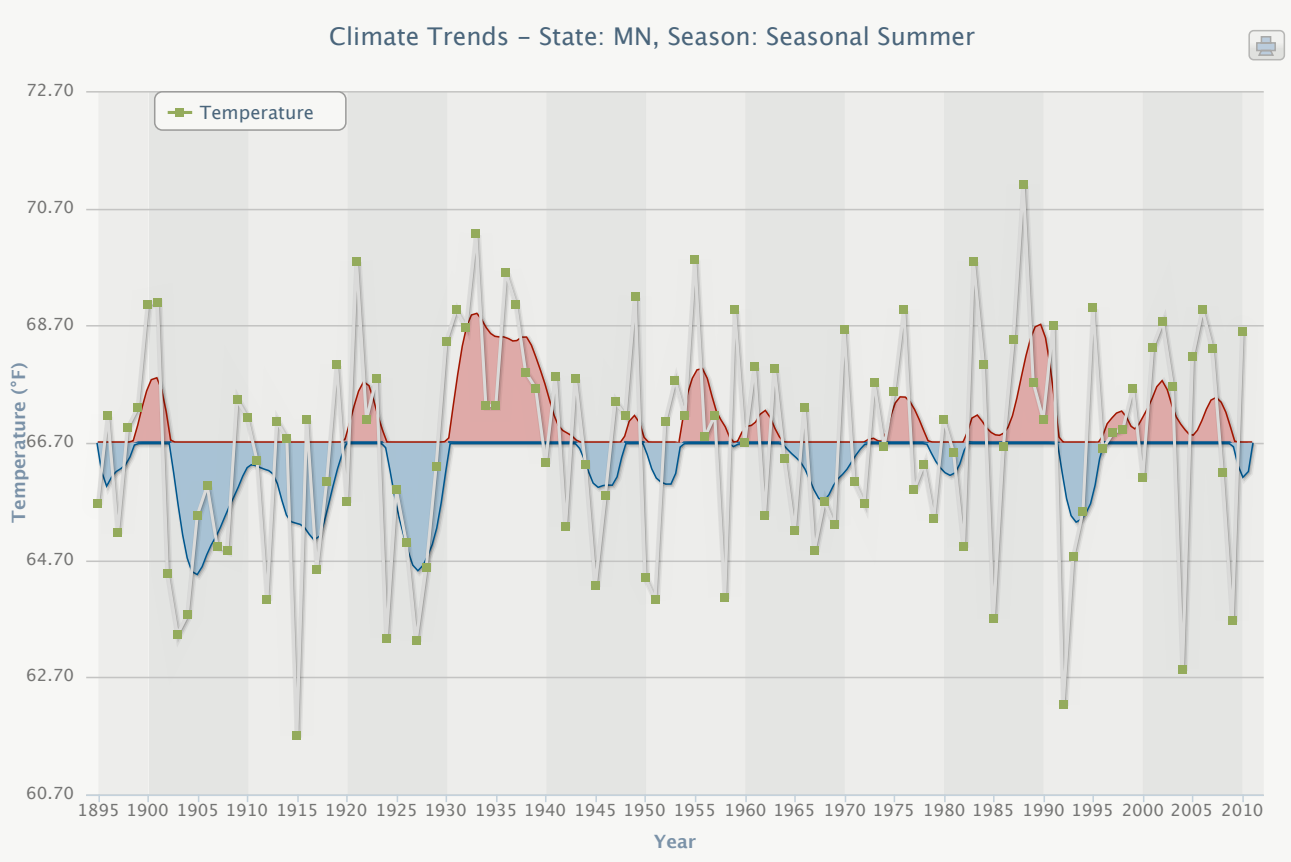

40
35
30
25
20
15
Inches
Tallgrass Aspen Parkland
Prairie Grassland
Deciduous Forest
Coniferous Forest
Minnesota
Highest Ave Precip
Lowest Ave Precip
Mean Precip

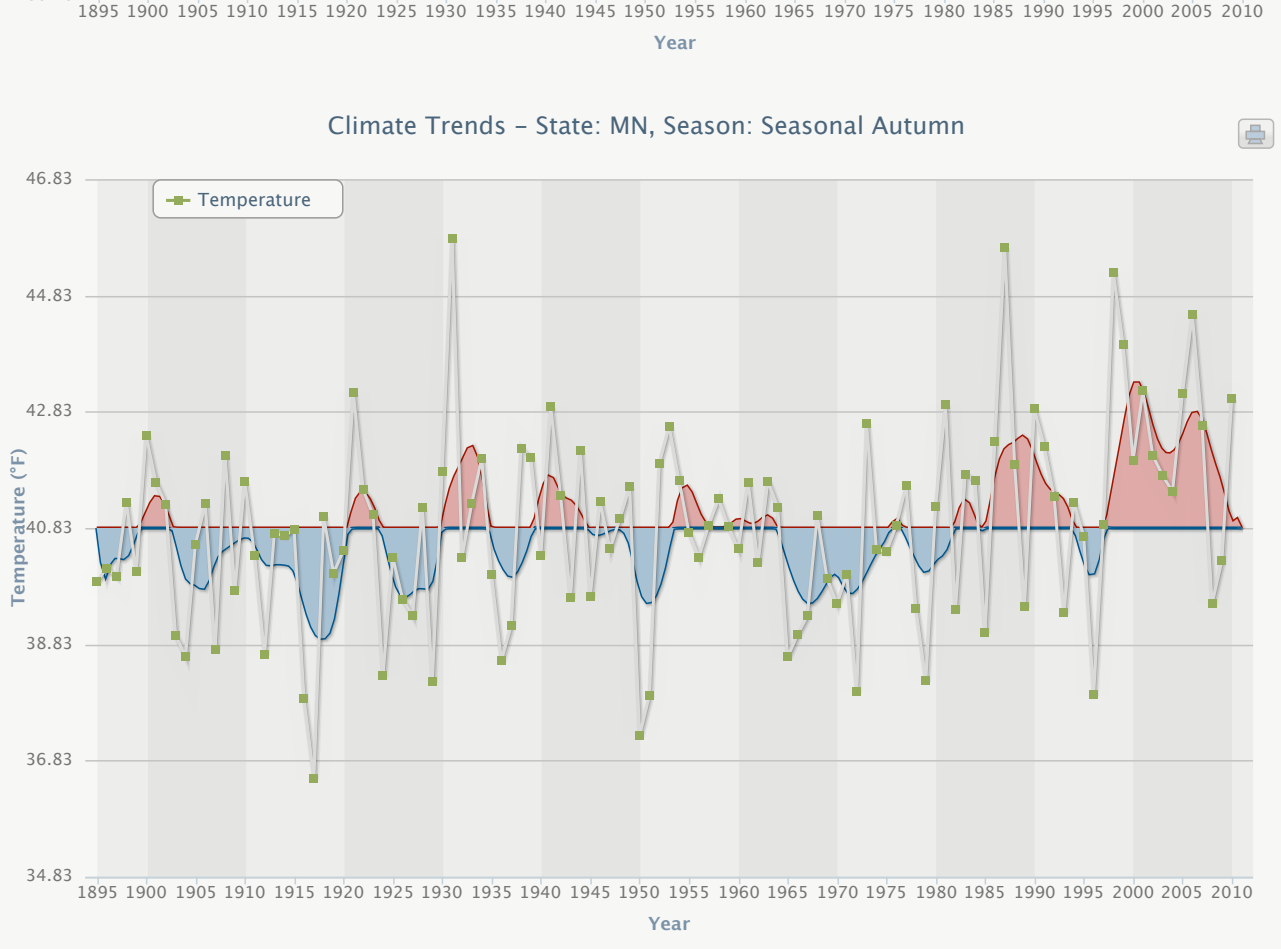

Climate Trends – State: MN, Season: Annual
Precipitation
36.24
33.74
31.24
28.74
26.24
23.74
21.24
18.74
16.24
13.74
11.24
Precipitation (inches)
1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year

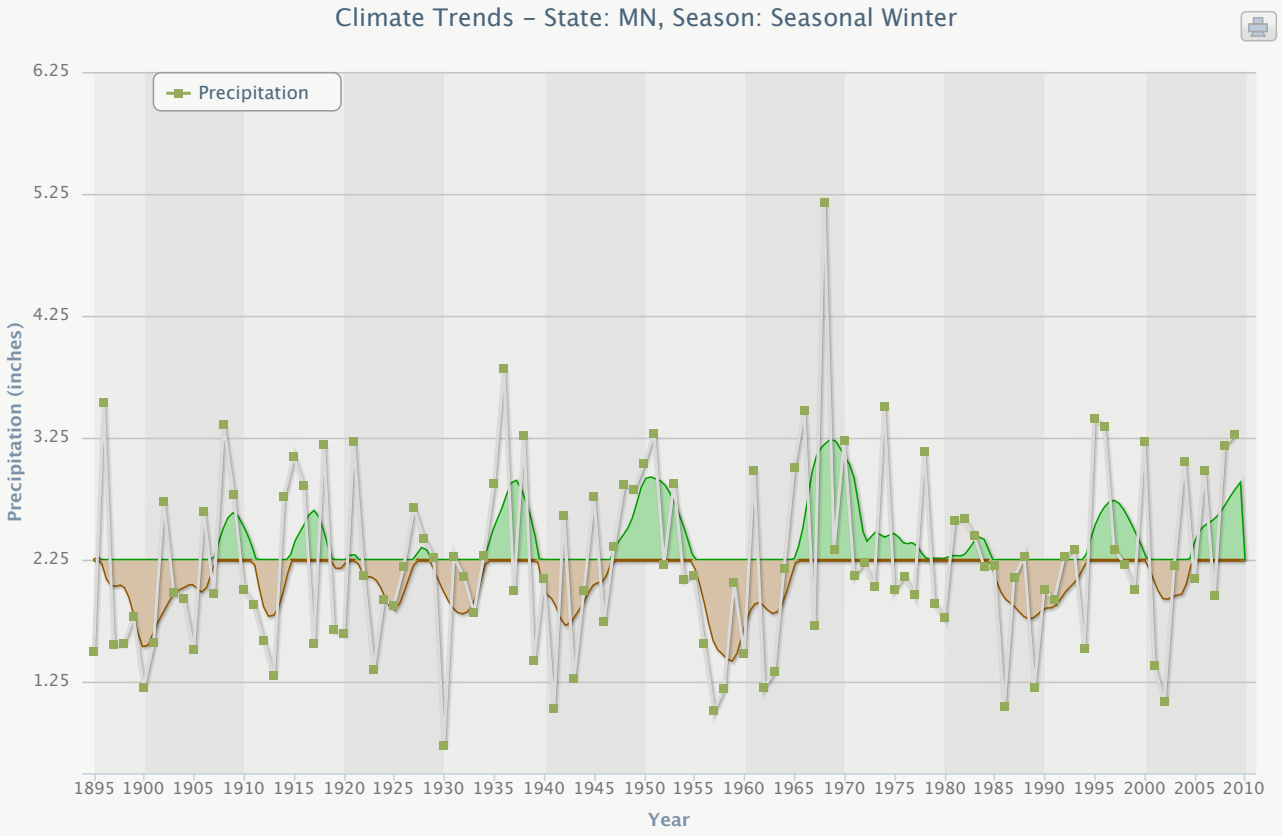

Climate Trends – State: MN, Season: Annual
Temperature
46.83
44.83
42.83
40.83
38.83
36.83
34.83
Temperature (°F)
1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year

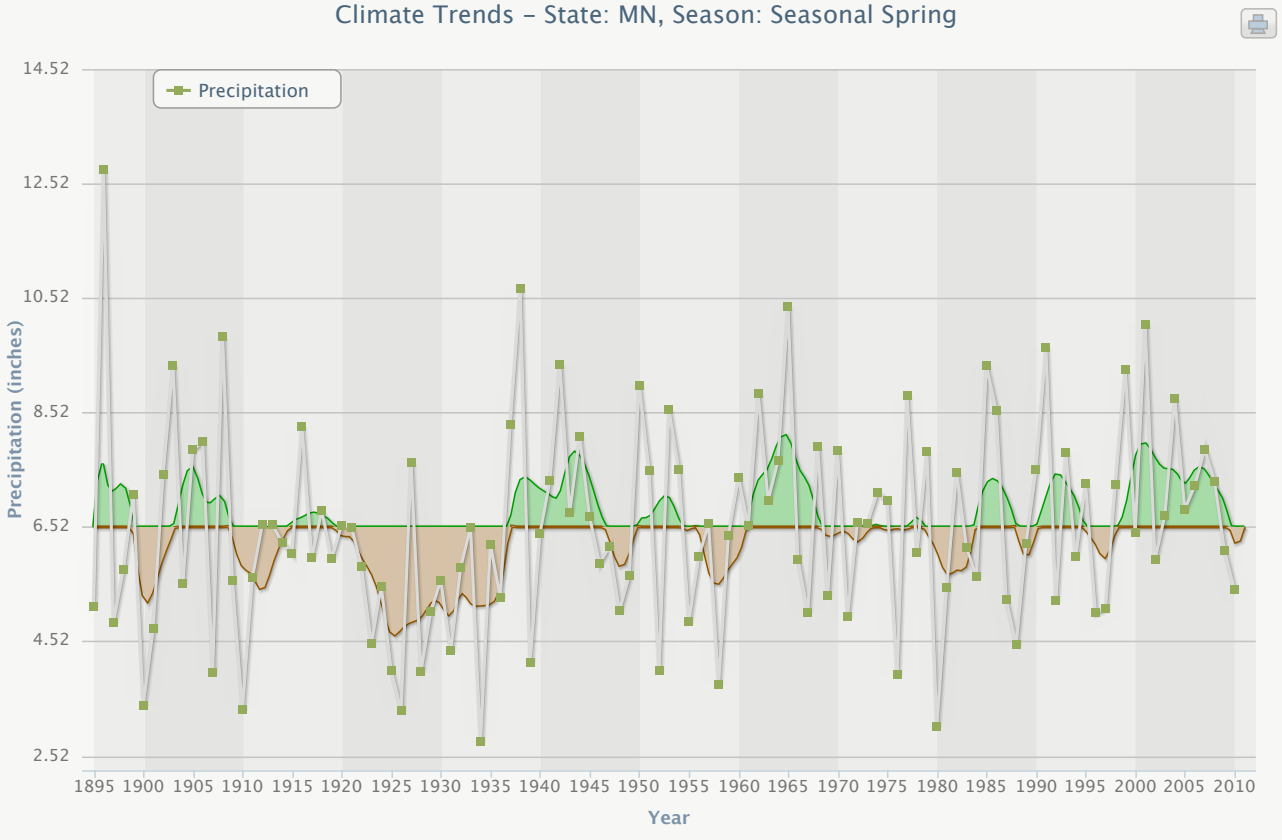

Climate Trends – State: MN, Season: Seasonal Winter
Temperature
24.29
21.79
19.29
16.79
14.29
11.79
9.29
6.79
4.29
1.79
-0.71
Temperature (°F)
1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year

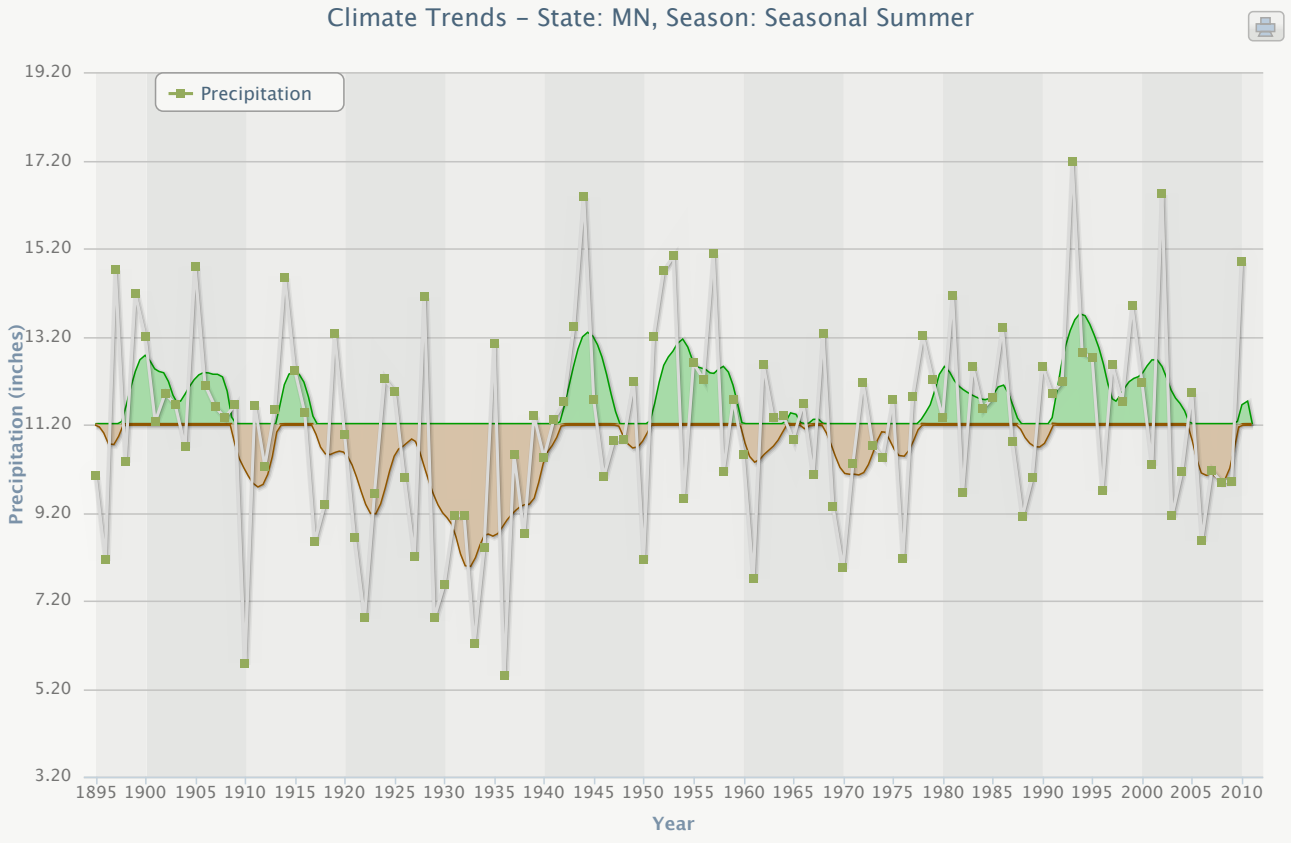

Climate Trends – State: MN, Season: Seasonal Spring
Temperature
50.82
48.32
45.82
43.32
40.82
38.32
35.82
33.32
Temperature (°F)
1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year

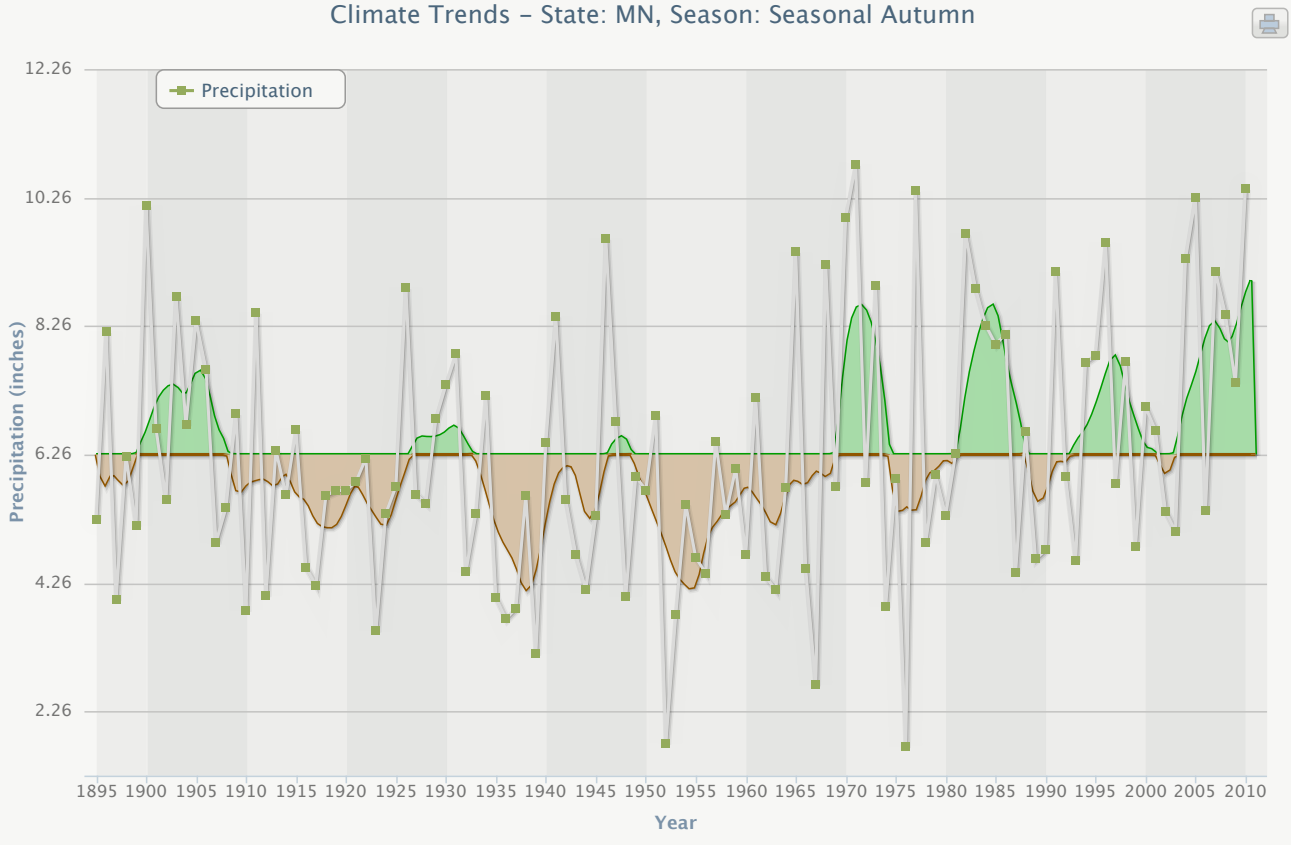

Climate Trends – State: MN, Season: Seasonal Summer
Temperature
72.70
70.70
68.70
66.70
64.70
62.70
60.70
Temperature (°F)
1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year


Climate Trends – State: MN, Season: Seasonal Autumn
Temperature
46.83
44.83
42.83
40.83
38.83
36.83
34.83
Temperature (°F)
1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year


Climate Trends – State: MN, Season: Seasonal Winter
Precipitation
6.25
5.25
4.25
3.25
2.25
1.25
Precipitation (inches)
1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year

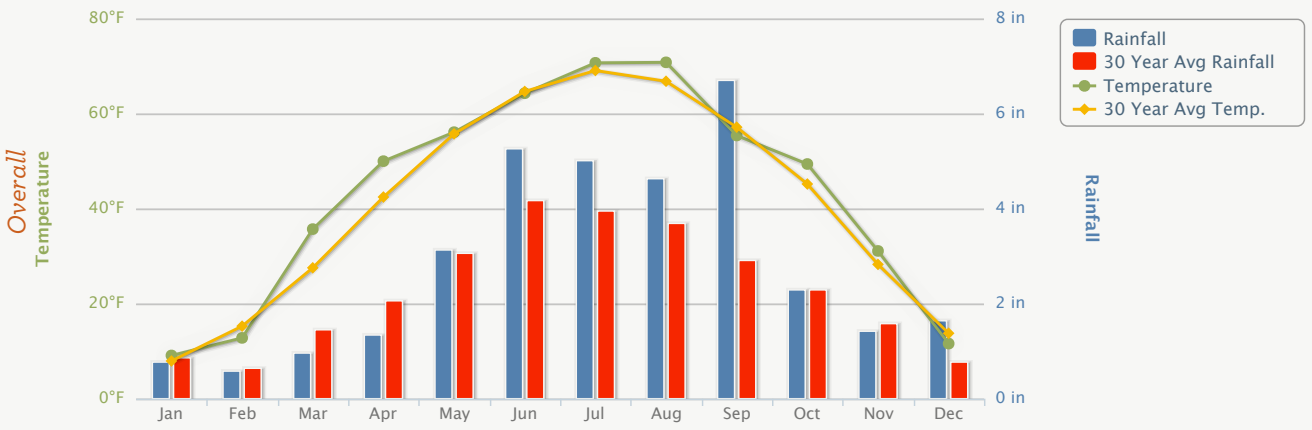

Climate Trends – State: MN, Season: Seasonal Spring
Precipitation
14.52
12.52
10.52
8.52
6.52
4.52
2.52
Precipitation (inches)
1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year


Climate Trends – State: MN, Season: Seasonal Summer
Precipitation
19.20
17.20
15.20
13.20
11.20
9.20
7.20
5.20
3.20
Precipitation (inches)
1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year


Climate Trends – State: MN, Season: Seasonal Autumn
Precipitation
12.26
10.26
8.26
6.26
4.26
2.26
Precipitation (inches)
1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010
Year

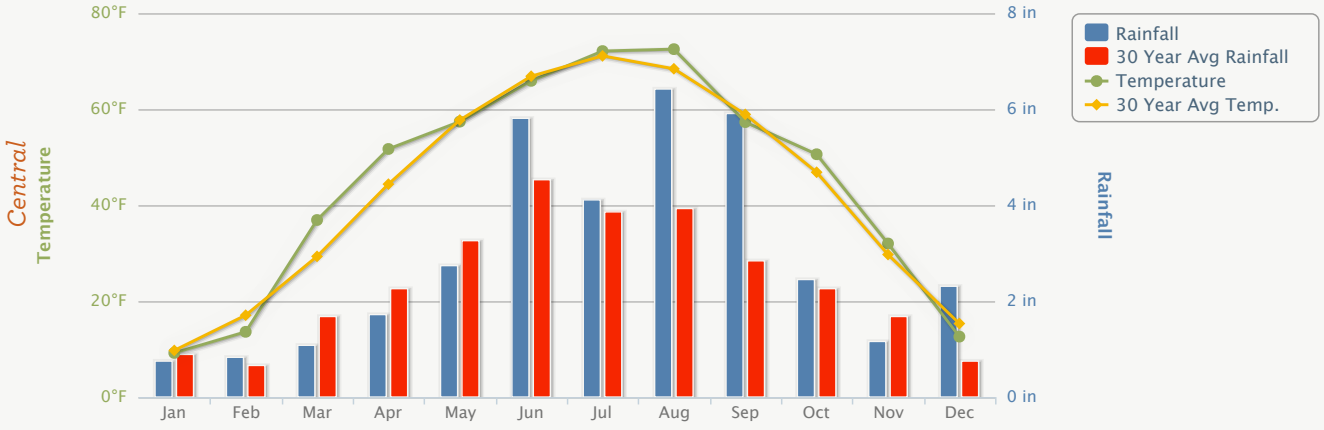
Average Monthly Temperature and Rainfall

Year = 2010 State = MN



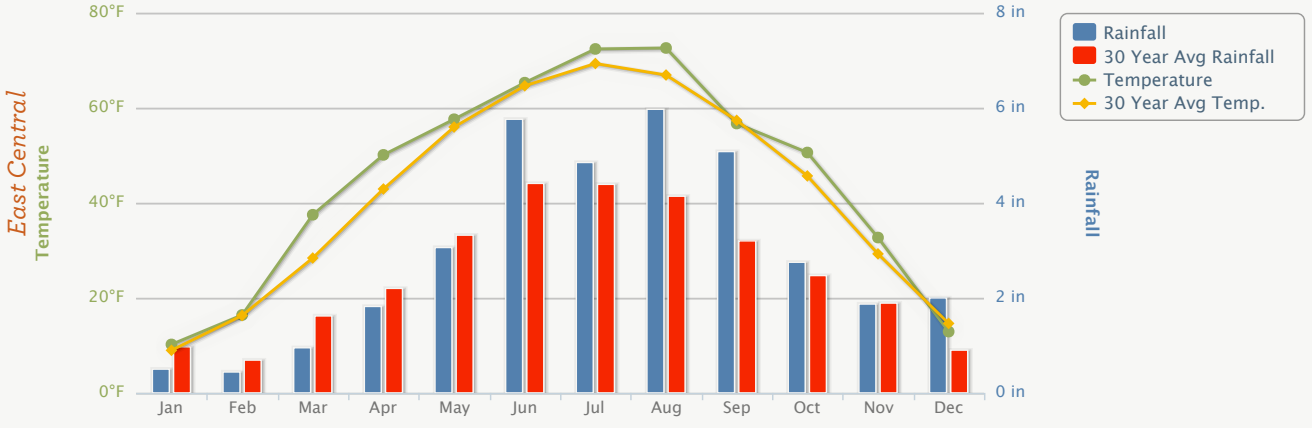
Average Monthly Temperature and Rainfall

Year = 2010 State = MN Climate Division = 05



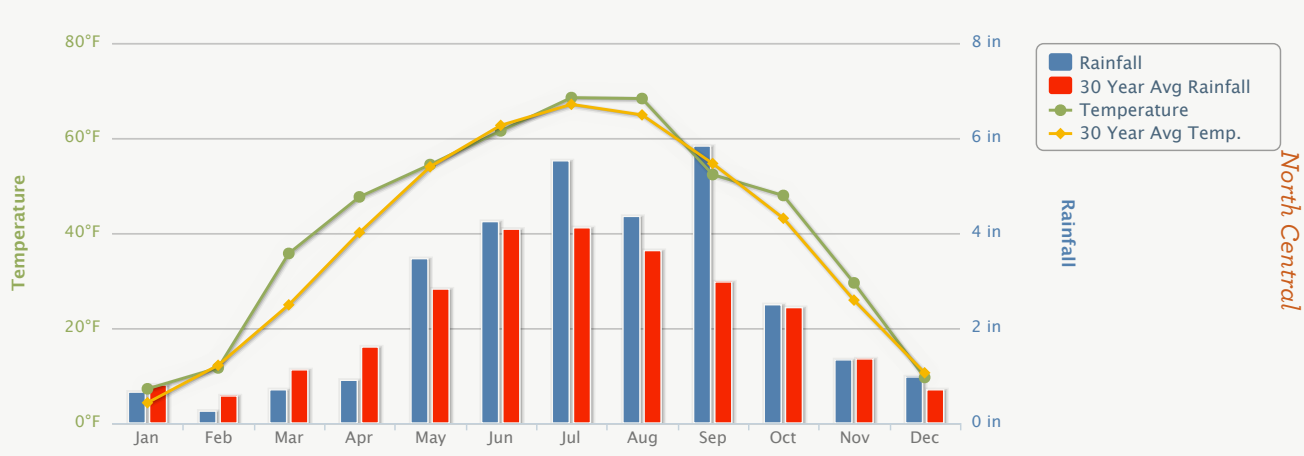
Average Monthly Temperature and Rainfall

Year = 2010 State = MN Climate Division = 06



Average Monthly Temperature and Rainfall

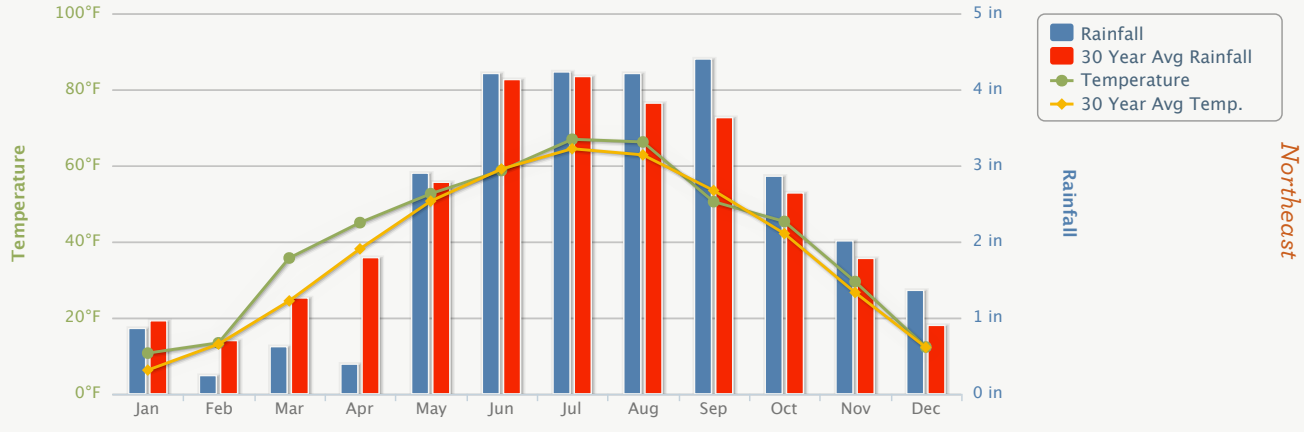
Year = 2010 State = MN Climate Division = 02



North Central

Average Monthly Temperature and Rainfall

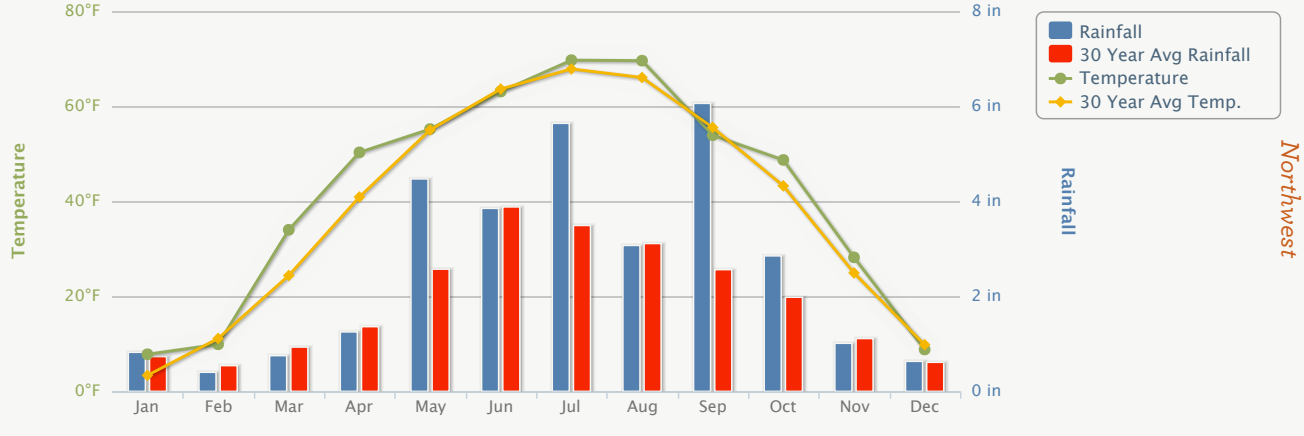
Year = 2010 State = MN Climate Division = 03



Northeast

Average Monthly Temperature and Rainfall

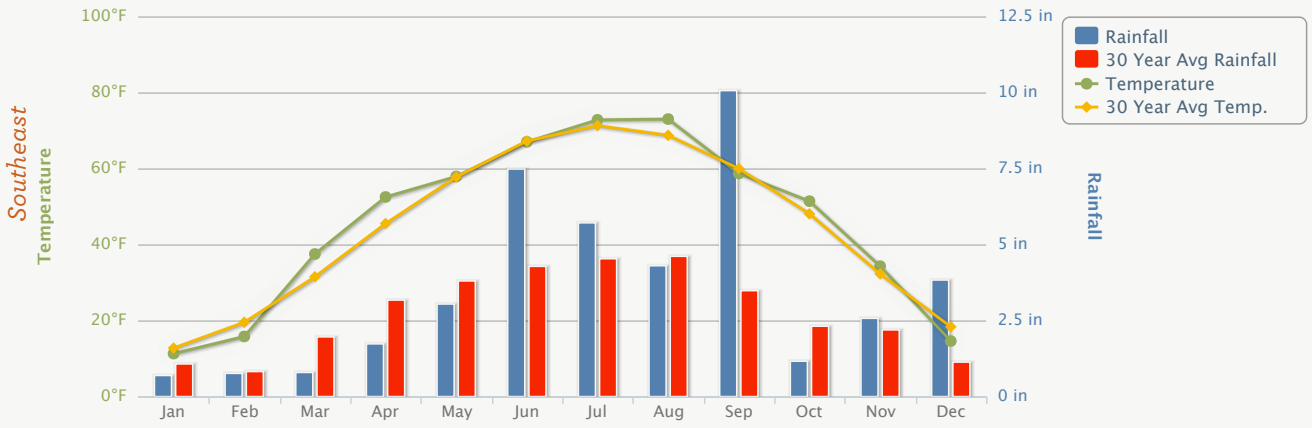
Year = 2010 State = MN Climate Division = 01



Northwest

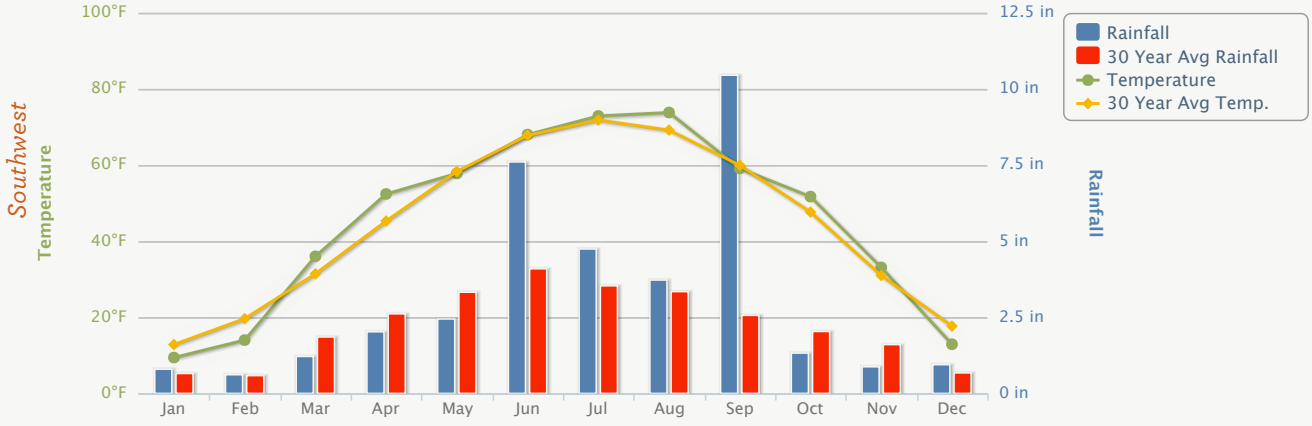
Average Monthly Temperature and Rainfall

Year = 2010 State = MN Climate Division = 09



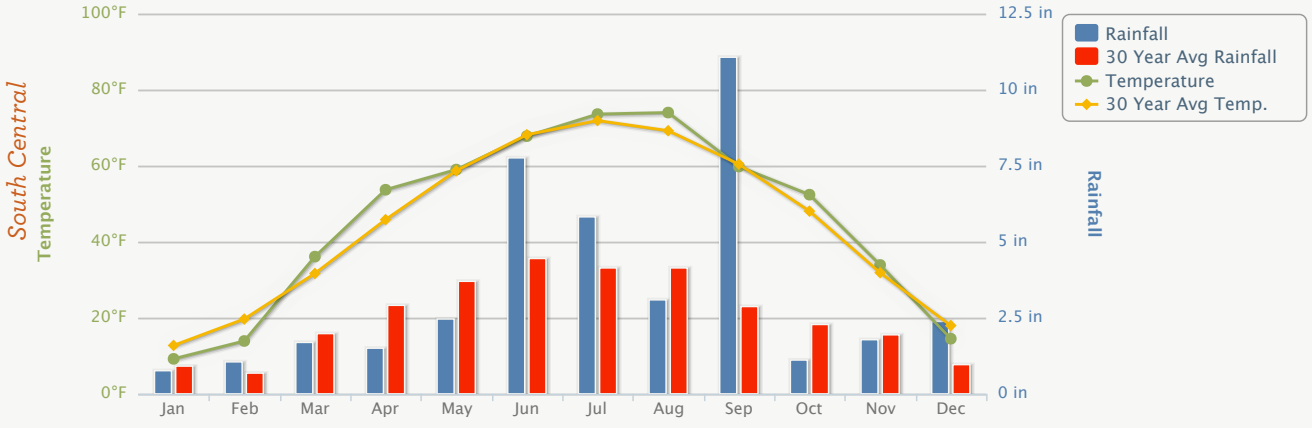
Average Monthly Temperature and Rainfall

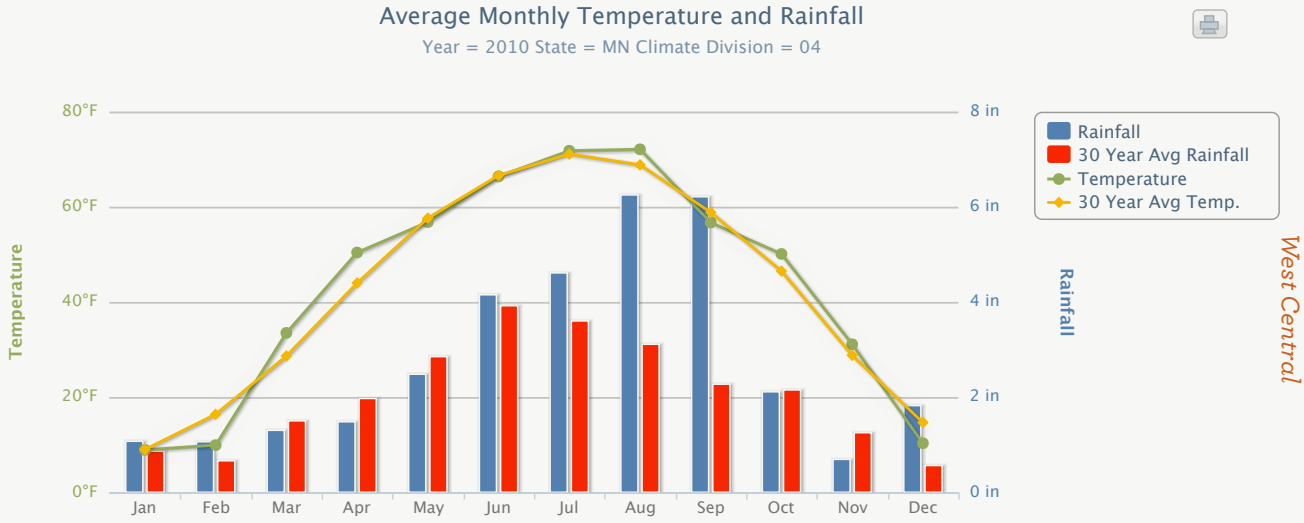
Year = 2010 State = MN Climate Division = 07



Average Monthly Temperature and Rainfall

Year = 2010 State = MN Climate Division = 08




Average Monthly Temperature and Rainfall
Year = 2010 State = MN Climate Division = 04
80°F
60°F
40°F
20°F
0°F
Temperature
8 in
6 in
4 in
2 in
0 in
Rainfall
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Rainfall
30 Year Avg Rainfall
Temperature
30 Year Avg Temp.
West Central

Lesson 4: Minnesota's Changing Climate

What is climate change and what does it mean for Minnesota?

Age Level:	Grades 9-12
Time Needed:	50 minutes
Materials:	Enough sets of climate change fact worksheets (8/set) that each student receives two sets Implications of Climate Change for Minnesotans handout Journals Pencils Drawing utensils
Student Learning Outcomes:	• Students will explain the causes of climate change. • Students will explain the implications of climate change. • Students will predict how climate change might impact or is impacting the area where they live. • Students will describe five key climate change implications for Minnesotans.

Background Information

Note: This lesson may be considered a nice introduction to climate change, or a review for those that have already learned about it. Educators wishing to go more in depth on climate change in their classroom should visit http://www.willstegerfoundation.org/curricula-resources to download other Will Steger Foundation lessons focusing on climate change and climate solutions.

In this lesson, students will be introduced to the basics of climate change. After learning some of the basics, students will take on the role of one sector or population that is experiencing or will potentially experience the impacts of climate change.

Important points to communicate include:

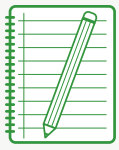
1. The earth's atmosphere that surrounds our planet is made up of gases called greenhouse gases. Greenhouse gases include carbon dioxide, methane, nitrous oxide and water vapor.
2. Greenhouse gases act like a blanket around the planet. They allow heat from the sun to enter the atmosphere. Some of this heat is absorbed and some of it is reflected back. Some of the heat is reflected into space, and greenhouse gases hold some of it in. A simple example of the greenhouse effect is when heat enters a car through its windshield and gets trapped inside, causing the ca r to heat up.
3. The greenhouse effect is a natural process that makes the earth habitable.
4. The greenhouse gas carbon dioxide (CO_2) has increased from 280 parts per million before 1870 and the industrial revolution, to over 390 parts per million today (2012). This information was determined by researchers by taking ice cores from Antarctica. The researchers measured the amounts of carbon dioxide trapped in air bubbles at different heights on the core which corresponded to periods of time. Since 1958, carbon dioxide measurements have been taken from on top of Mauna Loa, a Hawaiian volcano.
5. The burning of fossil fuels as well as land use changes from deforestation and land clearing, release carbon dioxide into the atmosphere. Fossil fuels are burned in the process of electricity production, industrial processes and the driving of vehicles. Fossil fuels include natural gas, oil and coal.
6. Throughout the history of the planet Earth, there have been increases and decreases in global average temperature. Although there have been

> The melting and freezing of the ice cap has been a natural cycle for millions of years that drastically changed the weather and topography of our landforms. It is a very delicate balance that recently accounted for the past ice ages. The major problem mankind now faces is that through pollution of the atmosphere and destruction of the natural environment, the atmosphere is warming at an alarming rate.
>
> —Will Steger, Greenland Training Expedition for Trans-Antarctic Expedition; June 12, 1988

periods of natural warming in the past, scientists are especially concerned about what is happening today because there is a change in temperature that has been rapid within the last 100 years, rather than over hundreds or thousands of years.
7. This increase in temperature has an effect on Minnesota's climate as a whole, and has enormous implications for Minnesota. The results have been and continue to be experienced across Minnesota's biomes in all living communities of organisms, including humans.
8. There are climate change solutions and students can be part of the solution. Later in this unit students will have the opportunity to learn about and develop their own solutions.

There are some important implications of climate change for the Midwest and for Minnesotans, as described below and found in the report, *Global Climate Change Impacts in the United States* (United States Global Change Research Program).

1. During the summer, public health and quality of life, especially in cities, will be negatively affected by increasing heat waves, reduced air quality, and increasing occurrence of insect-transmitted and waterborne diseases.
2. Significant reductions in Great Lakes water level, which are projected under higher emission scenarios, lead to impacts on shipping, infrastructure, beaches and ecosystems.
3. The likely increase in precipitation in winter and spring, more heavy downpours, and greater evaporation in summer would lead to more periods of both floods and water deficits.
4. While the longer growing season provides the potential for increased crop yields, increases in heat waves, floods, droughts, insects and weeds will present increasing challenges to managing crops, livestock, and forests.
5. Native species are very likely to face increasing threats from rapidly changing climate conditions, pests, diseases, and invasive species moving in from warmer regions.



Journal Assignment

At the end of this lesson, student journals should contain notes on what climate change is and the list of key implications for the Midwest and Minnesotans.

Activity Description

Introduction

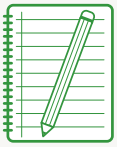
1. Ask students to look back in their journals at the definition they wrote of climate. Thinking about their definition of climate, ask students to write or draw what comes to mind when they hear "climate change."
2. Discuss as a class what they wrote or drew.

Activity: What is climate change?

1. Share the key points included in the introduction by handing out climate change fact cards included with this lesson to groups of four. Give each group member two cards to read in sets of 1 and 2, 3 and 4, 5 and 6, etc.
2. Ask each group member to read their cards and then to create a visual they think would be helpful to explain the information on the two cards. Alternatively, ask the students to find visuals through an Internet search to share.
3. Ask them to read aloud their cards and share their visual with their group in their numbered order.
4. Groups should discuss what the cards mean and make a list of any questions they might have in their journals.
5. Discuss as a class each card and questions that came up. Show the visuals created or found for each set of cards as you discuss them.

Concluding Activity: What are the key implications of climate change for Minnesotans?

1. Think back to "*What defines Minnesota's biomes?*" lesson 2. Review what is unique about the biome where your school is located as far as climate, flora and fauna and other defining factors. Students can look back in their journals to review.
2. Share the five climate change implications for Minnesotans either by projecting them (see included handout), reading them out loud, or handing them out to the class.
3. Ask the students to look at the implications and then look back in their journals at the graphs they looked at in Lesson 3. Does the data already recorded indicate that the predictions described in the key issues are possible?
4. Discuss which implications might impact the biome where you live the most and why. Think about what you know about the other biomes. What implications may be most important or impactful to them?
5. If you haven't already, hand out the list of implications and ask students to paste it in their journal. Ask them to choose one that concerns them the most and to write in their journal about how they think it could impact their lives.



Journaling Connection

Ask students to think about the implications of climate that were discussed. Ask them to write a journal entry that discusses how climate change may affect them directly, or ask them to choose one issue that is of particular concern to them and explain why.

Take It Outside—Connecting With Your Place

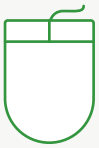
Materials

- Journals
- Colored pencils

1. Take the students outside with their journals. Make sure that they remember or have listed in their journal the key implications described.
2. Ask them to look around them and draw a picture of what they see.
3. Ask them to label different parts of their picture where they predict climate change impacts will be seen or are already being seen as they relate to the key issues described. For example, if you can see agricultural fields, they may label them and write that the growing season may be longer or there may be more flooding, or any plant life seen may be labeled "will bloom earlier."

Extensions

The Will Steger Foundation's Global Warming 101 Lessons provide an opportunity to explore climate change causes and impacts more deeply. Download lessons at:
http://www.willstegerfoundation.org/educator-resource-binder



Online Classroom Connection

Visit http://classroom.willstegerfoundation.org

1. Scan journal entries and pictures the students have drawn and upload them to the online classroom.
2. Click on "Climate Change Basics" and then "Climate Closeup: Temperature" in the learning module of the online classroom to play a game to extend learning on climate change.

Dispatch from 2007 Baffin Island Expedition:

From what I've seen personally, from all the interviews that we did tenting and living with the Inuit people as we've traveled, basically what's happening in the Arctic regions is that global warming is being played out on the sea ice. As the extra energy is absorbed into the ocean from human induced global warming, this is warming the ocean. 80% of the excess energy goes into the ocean and that, in turn, starts melting the ice. We're seeing later freeze-ups and earlier break-ups. In other words, what we're seeing is the winter season, the ice season, which is so important for hunting and traveling, is starting to diminish. What used to be about an 8 month season in Baffin now is, in some areas, reduced to around 6 months...Also we could tell on the glaciers that we saw and the mountains and mountain passes that we've crossed, the glaciers have definitely receded.

Fact #1

The earth's atmosphere that surrounds our planet is made up of gases called greenhouse gases. Greenhouse gases include carbon dioxide, methane, nitrous oxide and water vapor.

Fact #2

Greenhouse gases act like a blanket around the planet. They allow heat from the sun to enter the atmosphere. Some of this heat is absorbed and some of it is reflected back. Some of the heat is reflected into space, and some of it is held in by greenhouse gases. A simple example of the greenhouse effect is when heat enters a car through its windshield and gets trapped inside, causing the car to heat up.

Fact #3

The greenhouse effect is a natural process that makes the earth habitable.

Fact #4

The Greenhouse Gas carbon dioxide (CO_2) has increased from 280 parts per million before 1870 and the industrial revolution, to over 390 parts per million today. This information was determined by researchers by taking ice cores from Antarctica and measuring the amounts of carbon dioxide trapped in air bubbles at different heights on the core that correspond to periods of time. Since 1958, carbon dioxide measurements have been taken from on top of Mauna Loa, a volcano in Hawaii.

Fact #5

The burning of fossil fuels releases carbon dioxide into the atmosphere, as well as land use changes from deforestation and land-clearing. Fossil fuels are burned in the process of electricity production, industrial processes and the driving of vehicles. Fossil fuels include natural gas, oil and coal.

Fact #6

Throughout the history of the planet Earth, there have been increases and decreases in global average temperature. Although there have been periods of natural warming in the past, scientists are especially concerned about what is happening today because there is a change in temperature that has been rapid in the last 100 years, rather than over hundreds or thousands of years.

Fact #7

This increase in temperature has an effect on Minnesota's climate as a whole, and has enormous implications for Minnesota. The results have been and continue to be experienced across Minnesota's biomes in all living communities of organisms, including humans.

Fact #8

There are climate change solutions and students can be part of the solution. Later in this unit students will have the opportunity to learn about and develop their own solutions.

Implications of Climate Change for Minnesotans

1. During the summer, public health and quality of life, especially in cities, will be negatively affected by increasing heat waves, reduced air quality, and increasing insect and waterborne diseases.

2. Significant reductions in Great Lakes water level, which are projected under higher emission scenarios, lead to impacts on shipping, infrastructure, beaches and ecosystems.

3. The likely increase in precipitation in winter and spring, more heavy downpours, and greater evaporation in summer would lead to more periods of both floods and water deficits.

4. While the longer growing season provides the potential for increased crop yields, increases in heat waves, floods, droughts, insects and weeds will present increasing challenges to managing crops, livestock and forests.

5. Native species are very likely to face increasing threats from rapidly changing climate conditions, pests, diseases and invasive species moving in from warmer regions.

Lesson 5: Minnesota's Changing Climate

What does the data show?

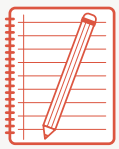
Age Level:	Grades 9-12
Time Needed:	50-75 minutes
Materials:	6 sets of materials related to climate change in Minnesota (details in table on p. 88) A box or other container to hold each set of materials
Student Learning Outcomes:	• Students will make their own interpretations of authentic figures representing different impacts of climate change in Minnesota. • Students will make the connection between a 3-D object and what a figure represents. • Students will divide two statements about each graph into true or false categories. • Students will brainstorm how climate change could affect their biome. • Students will develop their own true/false statements about scientific figures and exchange with another student. • Students will share their results. • Students will discuss the importance of corroborative data in support of climate change science.

Background Information:

One of the key outcomes of this lesson is that the evidence for climate change can be illustrated through many different phenomena that are already occurring. This is important because it is the sum of this "corroborative data" that makes the reality of climate change undeniable.

In this activity, groups of four students will be given a set of materials in a box. Each set should contain two 3-D objects (or photos if no objects are available), two figures, and two sets of true/false statements that correspond to each figure. There are six sets of materials; each set is related to a common theme. The table above shows the themes of each set of materials. Depending on the number of students in your class and group size, you may need to replicate sets between groups. The figures will introduce students to different ways that data is represented and will demonstrate different impacts climate change may have on the state of Minnesota.

> Sometimes when you explore, you find things that you know and then sometimes you find other things that you can figure out and sometimes there's a total unknown. When you don't know something, what I usually do when I go back is go to a library and look it up in a book or ask somebody a question.
>
> —Will Steger in field trip with elementary students, 1995



Journal Assignment

At the end of this lesson, student journals should contain a list of key messages determined through an exploration and discussion of the figures shared.

Educator Prep:

It is important that the materials for this activity are sorted and organized correctly and together. Beginning on page 92 there are 12 figures with corresponding explanations and true/false statements and a template to be copied. These materials are also available online at: http://classroom.willstegerfoundation.org/handouts, if you would like to print them out in color. Each set of materials needs to be cut out into: figures, individual true/false statements, and figure explanations. The true/false statements for a given set of three materials can be put in an envelope and the set of figure explanations in another envelope. These envelopes, along with the corresponding two figures and two 3-D objects should be put in a box. There are six sets of two figures that are in some way related. The following table shows which figures should be clustered together, their common theme, a suggested 3-D object or photo, and one possible connection to an implication of climate change for Minnesotans as discussed in Lesson 4. All of the materials may be laminated for long-term usage.

Figure and Theme	*3-D Object/Photo*	*Possible Connected Key Implication*
Climate Change and Ice		
Minnesota Average Ice Out Date (p. 87)	Ice cube	5: more heat-tolerant aquatic species could move in
ICE OUT day of year (p. 89)	Ice Fishing Postcard	See above
Climate Change and Seasons		
Fewer Days of Snow Falling (p. 91)	Snowflake	2: fewer days of snowfall could mean lower lake levels in the spring
Extreme Heat Becomes More Frequent (p. 93)	Fan	1: dangerous heat waves could affect public health
Climate Change and Temperature		
Side by side comparison of Average Temperature Increase Since 1895 (p. 95)	MN in Winter Postcard	All
Temperature Increase in North vs. South Minnesota (p. 97)	Thermometer	5: species may move north with warming temperatures
Climate Change and Water		
Water Supply Sustainability Index (p. 99)	Water bottle	3: more floods and water deficits
Regional air temperature and average ice cover of Lake Superior (p. 101)	Ice Skates	2: impacts beaches, ecosystems, great lakes shipping, etc.
Climate Change and Fossil Fuels		
The Midwest Burns More Fossil Fuels (p. 103)	Power plant photo	The cause for all
Greenhouse Gas Emissions from Minnesota (p. 105)	Car/Bus	See above
Climate Change and Plant Life		
Observed and Projected Changes in Plant Hardiness Zones (p. 107)	Vegetable	4
Interactions between global warming and other drivers (p. 109)	Plastic worm	5: native species threatened by invasives

Activity Description

Introduction

1. Ask the students to name the five implications of climate change for Minnesotans. They can look back in their journals to review this.
2. Ask the students to write in their journals for five minutes about what issue they might be interested in studying if they were a scientist. Ask them to describe where and how they might do their research and what questions they might have based on what they've learned so far.

Activity: Data exploration

1. Hand out a box that contains a set of materials to each group of three to five students. Make sure the data sets are face down and only the 3-D objects, or photos if objects are not available, are visible.
2. Students should begin by taking out the 3-D objects without looking at the other papers in the box. In their group, they should brainstorm a list of how each of the objects might relate to climate change in Minnesota and write the list in their journals.
3. After the students have finished brainstorming their lists, they should remove the papers that are left in the box. Each student or pair of students should take a figure out and spend some time looking over it. They should think about what 3-D object the figure might be connected to and they should prepare to explain what the figures mean to the other members of their group.
4. Each student will explain their figure to their group and how the object is connected.
5. Students should look in the envelope labeled "figure explanations." Read each explanation and as a group decide which explanation fits with each figure.
6. Ask students to remove the envelope of true/false statements and take turns reading a statement and aligning it with the graph where they think it belongs. Explain that they don't need to worry if it is true or false yet.
7. Once they have lined up the statements as a group read through them again and decide if they are true or false.
8. Ask how each set of figures might be related to one of the five key issues for Minnesotans facing climate change that they learned about in lesson 4. Record their ideas in their notebook.
9. Ask the groups to look at their completed sets, discuss what they think are common themes and come up with a title for their data set.

Activity: Make Your Own Interpretations

1. Ask students in groups or individually to develop their own set of true and false statements for each figure. Review their statements for accuracy.
2. Exchange figures and statements with another group and ask them to line up the true and false.

Concluding Activity: Collect the Evidence

1. Ask each group to share what they learned from their figures either in an oral presentation or through a poster.
2. Looking at the evidence they "collected" as a whole, make a list of key messages and discuss how the data becomes more compelling when it is part of the larger collection of "corroborative data."

Journaling Connection

Ask the students to create a concept map that shows the connections between the five implications of climate change for Minnesotans and the figures they looked at in their group and/or the other groups

Take It Outside

Ask the students to think about the research that went into the figures they studied. Is there a particular experiment they could design and do in the schoolyard, their backyard or nearby nature area?

Extensions

1. Ask students to develop a report based on the key messages that can be drawn from each set.
2. Ask students to develop their own sets of figures and true/false statements. Exchange with other classmates.

Online Classroom Connection

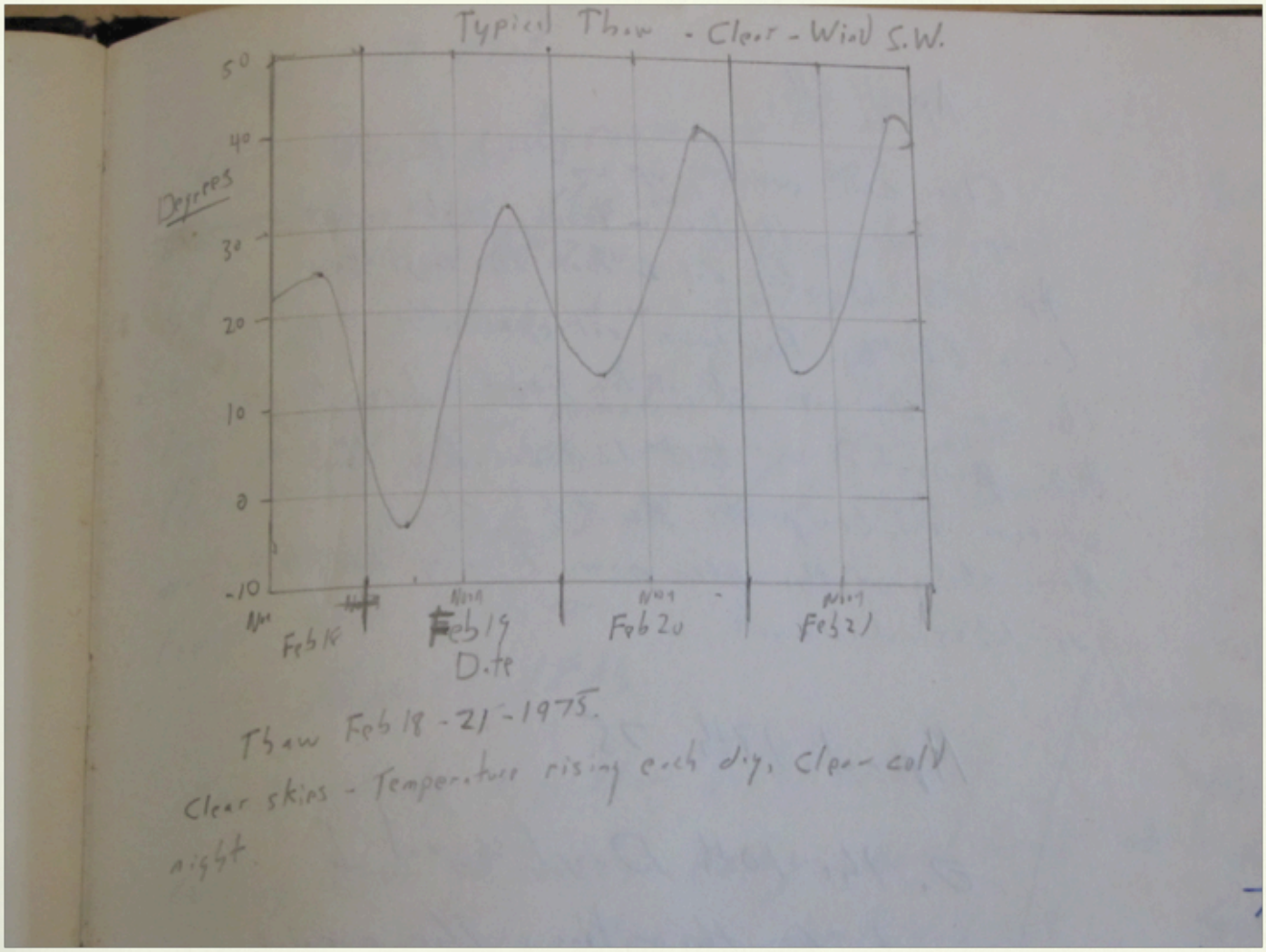
Visit http://classroom.willstegerfoundation.org
Visit the Climate Change Basics section. Watch the videos and use some of the interactives.

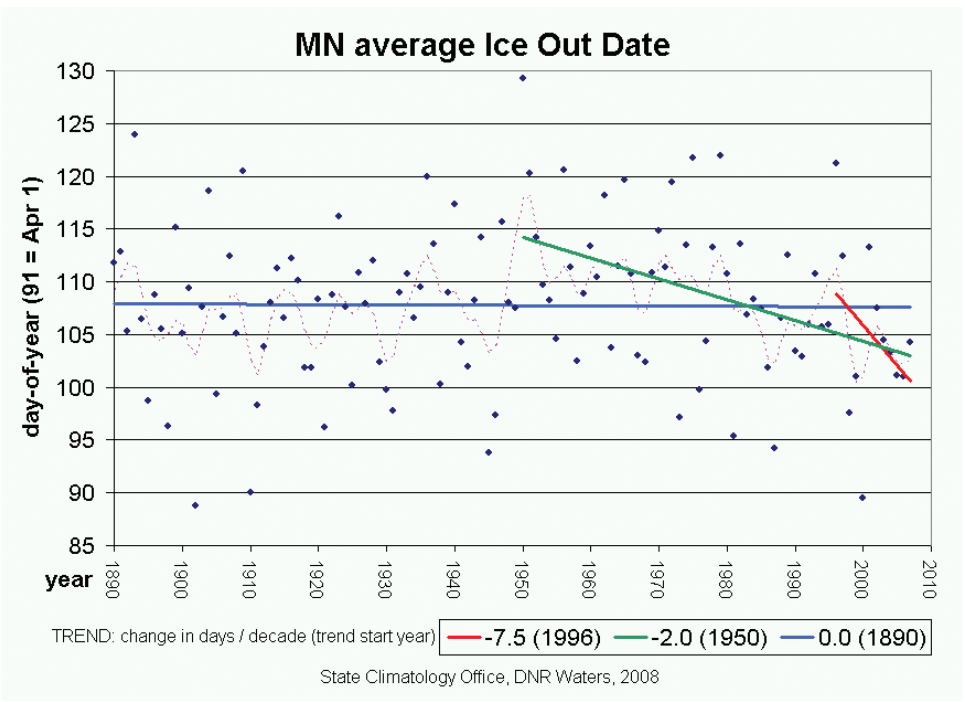
Resources

Southern Climate Impacts Planning Program: Trends
http://www.southernclimate.org/products/trends.php

United States Global Change Research Program. (2011, March 1). Global Climate Change Impacts in the United States: Midwest Chapter. Retrieved from http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/regional-climate-change-impacts/midwest

Will Steger used graphs to interpret the data he gathered from his observations. In this example, he records the changes in temperature over the course of a February thaw in 1975.

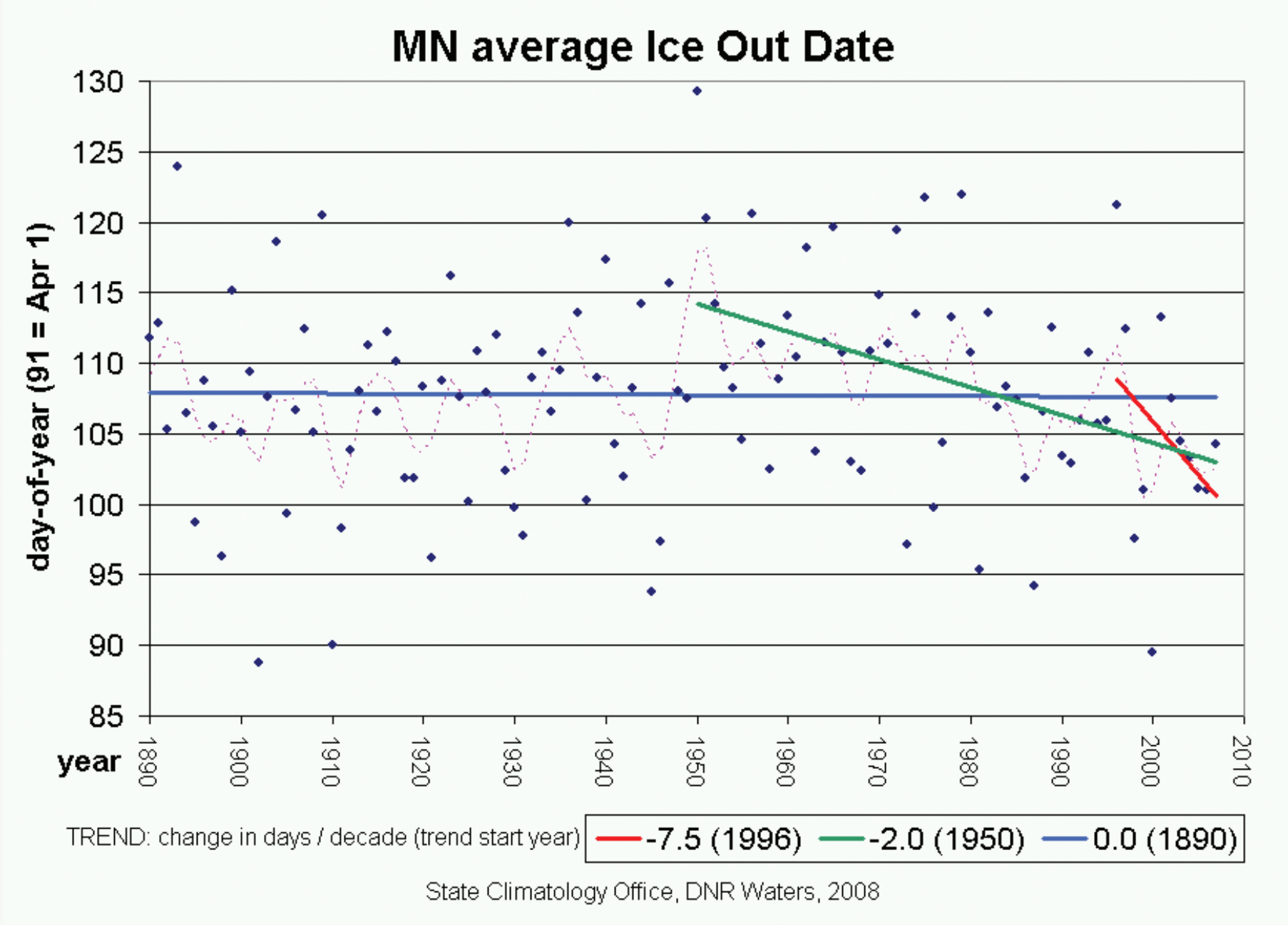


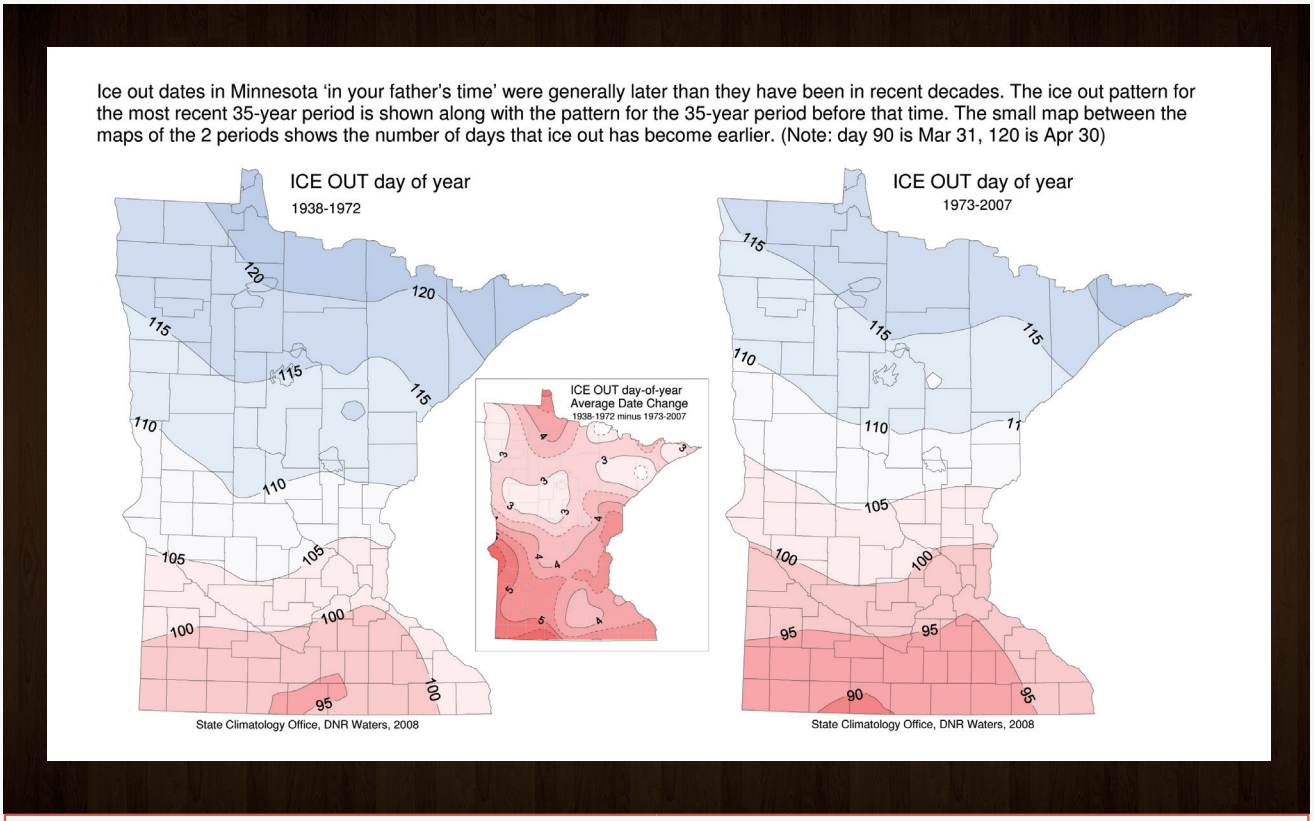


Ice out, like snow, is one of the many results of both temperature changes and humidity changes since both represent heat changes. Lake ice out has been getting earlier in the last few decades. The rate at which it has been getting earlier is greater in recent record than for longer periods.

Zandlo, Jim. (last modified 2008) Climate Change and the Minnesota State Climatology Office: Observing the Climate. Retrieved from http://climate.umn.edu/climateChange/ climateChangeObservedNu.htm

TRUE STATEMENTS	FALSE STATEMENTS
The latest day the ice was recorded to go out was in 1950.	On the y-axis, 91 is the same as May 1.


MN average Ice Out Date
day-of-year (91 = Apr 1)
130
125
120
115
110
105
100
95
90
85
year
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
TREND: change in days / decade (trend start year)
-7.5 (1996)
-2.0 (1950)
0.0 (1890)
State Climatology Office, DNR Waters, 2008

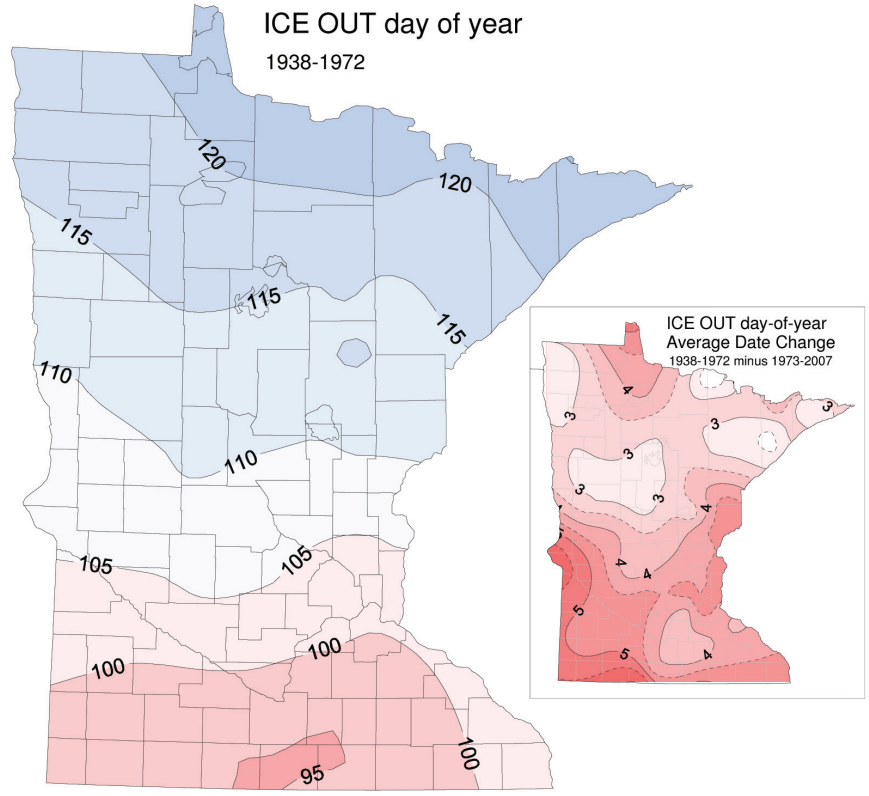


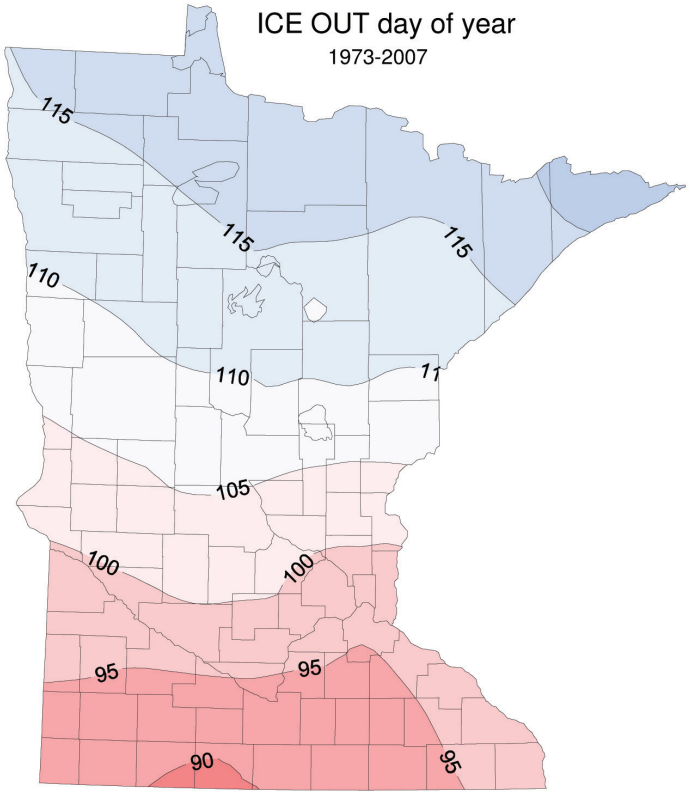
A comparison of ice-out dates in Minnesota between 1938-1972 and 1973-2007.
(Note: Day 90 is March 31, 120 is April 30)

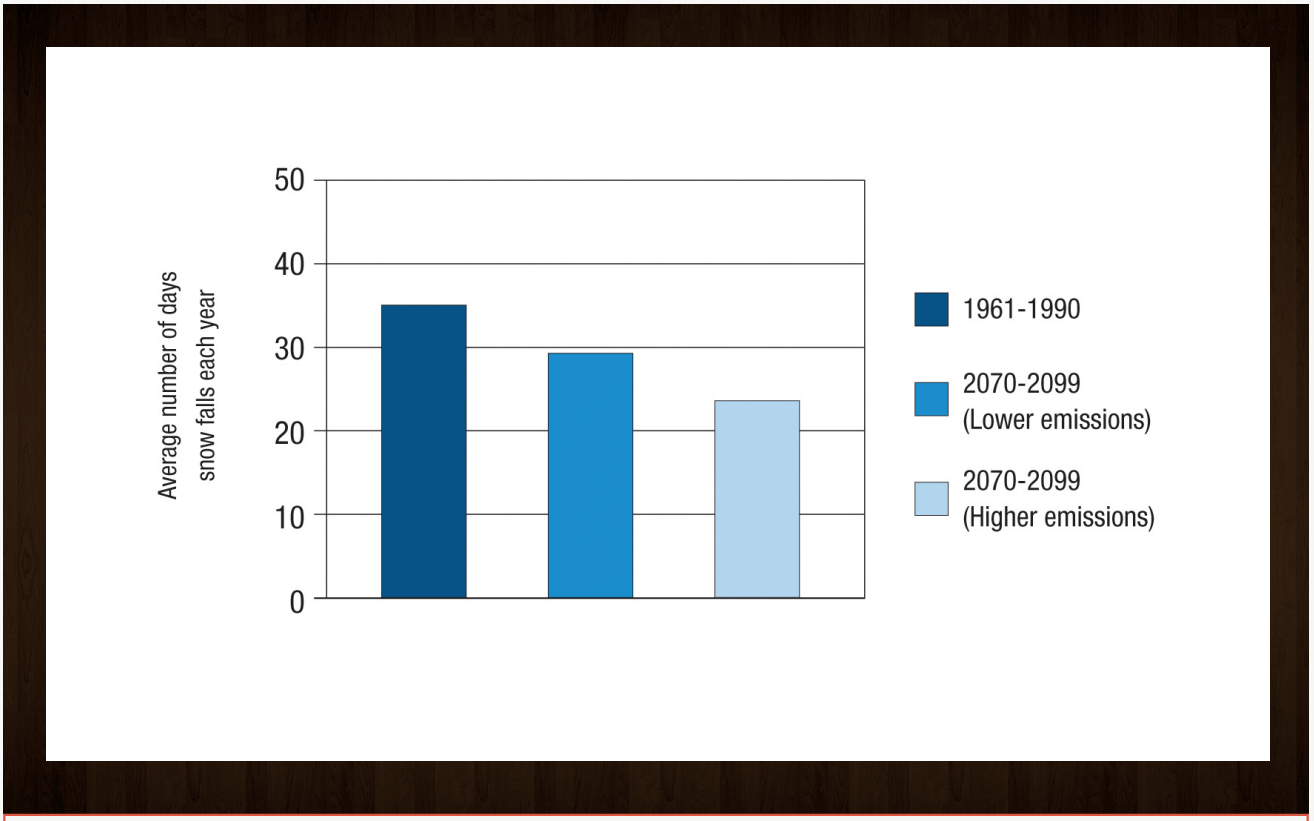
Zandlo, Jim. (last modified 2008) Climate Change and the Minnesota State Climatology Office: Observing the Climate. Retrieved from http://climate.umn.edu/climateChange/climateChangeObservedNu.htm

TRUE STATEMENTS	FALSE STATEMENTS
Ice out in the southwest corner of the state has been about 5 days earlier in recent decades.	The northern part of the state has seen 115 days of ice in recent decades.

Ice out dates in Minnesota 'in your father's time' were generally later than they have been in recent decades. The ice out pattern for the most recent 35-year period is shown along with the pattern for the 35-year period before that time. The small map between the maps of the 2 periods shows the number of days that ice out has become earlier. (Note: day 90 is Mar 31, 120 is Apr 30)





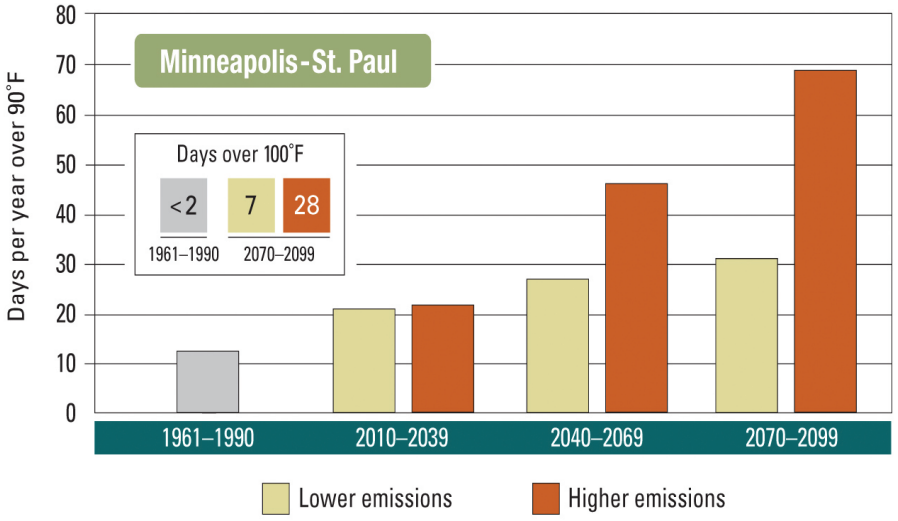


Fewer Days of Snow Falling

Union of Concerned Scientists. (2009). Confronting Climate Change in the US Midwest: Minnesota. Chicago, IL.

TRUE STATEMENTS	FALSE STATEMENTS
Even if emissions decrease, Minnesota is predicted to have shorter winters.	This graph shows that historically Minnesota has an average of 25 days of snowfall per year.

1961-1990
2070-2099 (Lower emissions)
2070-2099 (Higher emissions)
50
40
30
20
10
0
Average number of days snow falls each year

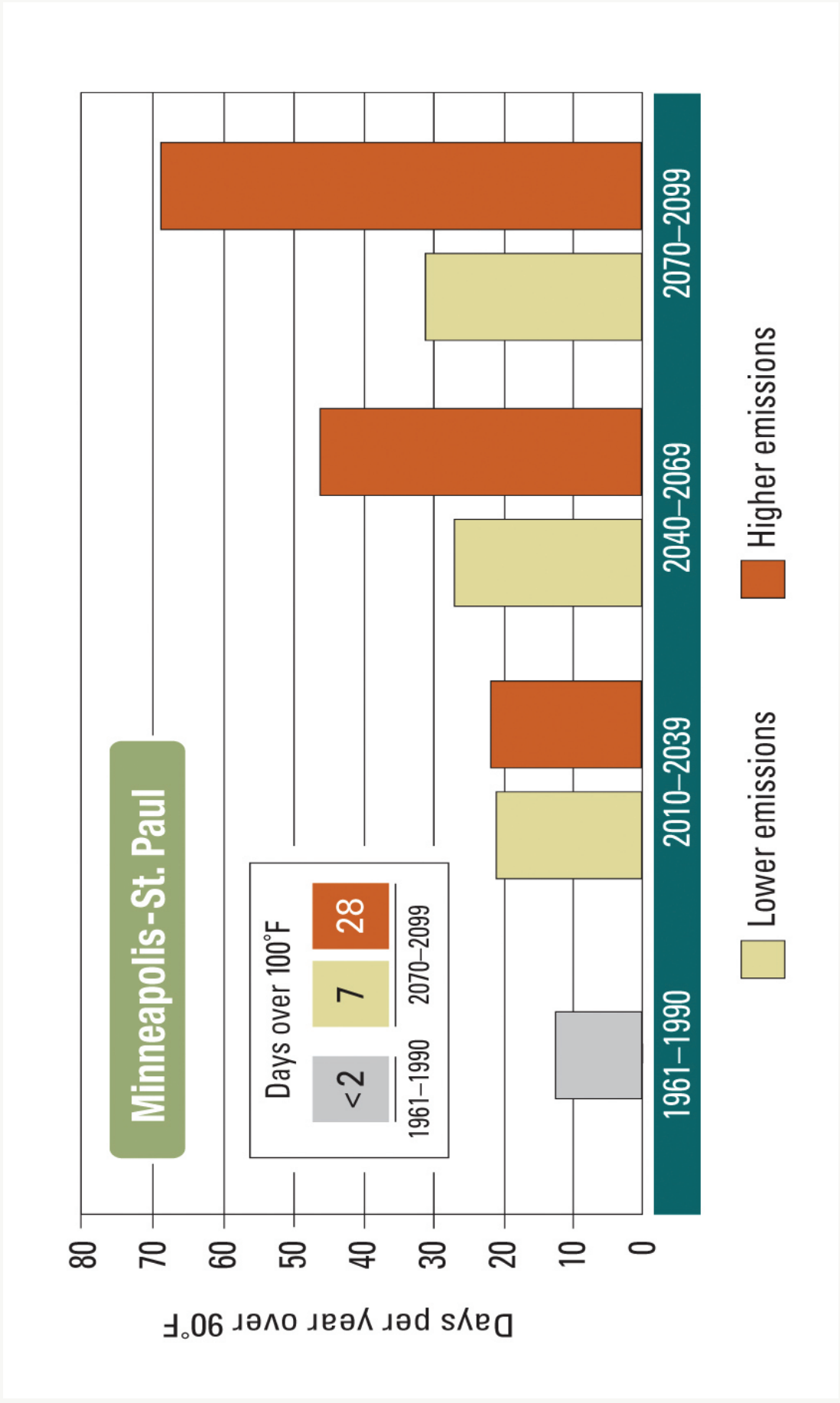


Extreme Heat Becomes More Frequent

This figure shows how models predict the temperature of the Twin Cities could change if we continue to emit large quantities of carbon dioxide (higher emissions scenario), or if we make some changes and cut our emissions (lower emissions scenario).

Union of Concerned Scientists. (2009). *Confronting Climate Change in the US Midwest: Minnesota.* Chicago, IL.

TRUE STATEMENTS	FALSE STATEMENTS
Under the higher-emissions scenario, the Twin Cities could experience almost an entire summer of days above 90 degrees F by the end of the century.	This bar graph shows how precipitation will change in the Twin Cities.


Minneapolis-St. Paul
Days over 100°F
<2
7
28
1961–1990
2070–2099
Days per year over 90°F
80
70
60
50
40
30
20
10
0
1961–1990
2010–2039
2040–2069
2070–2099
Lower emissions
Higher emissions

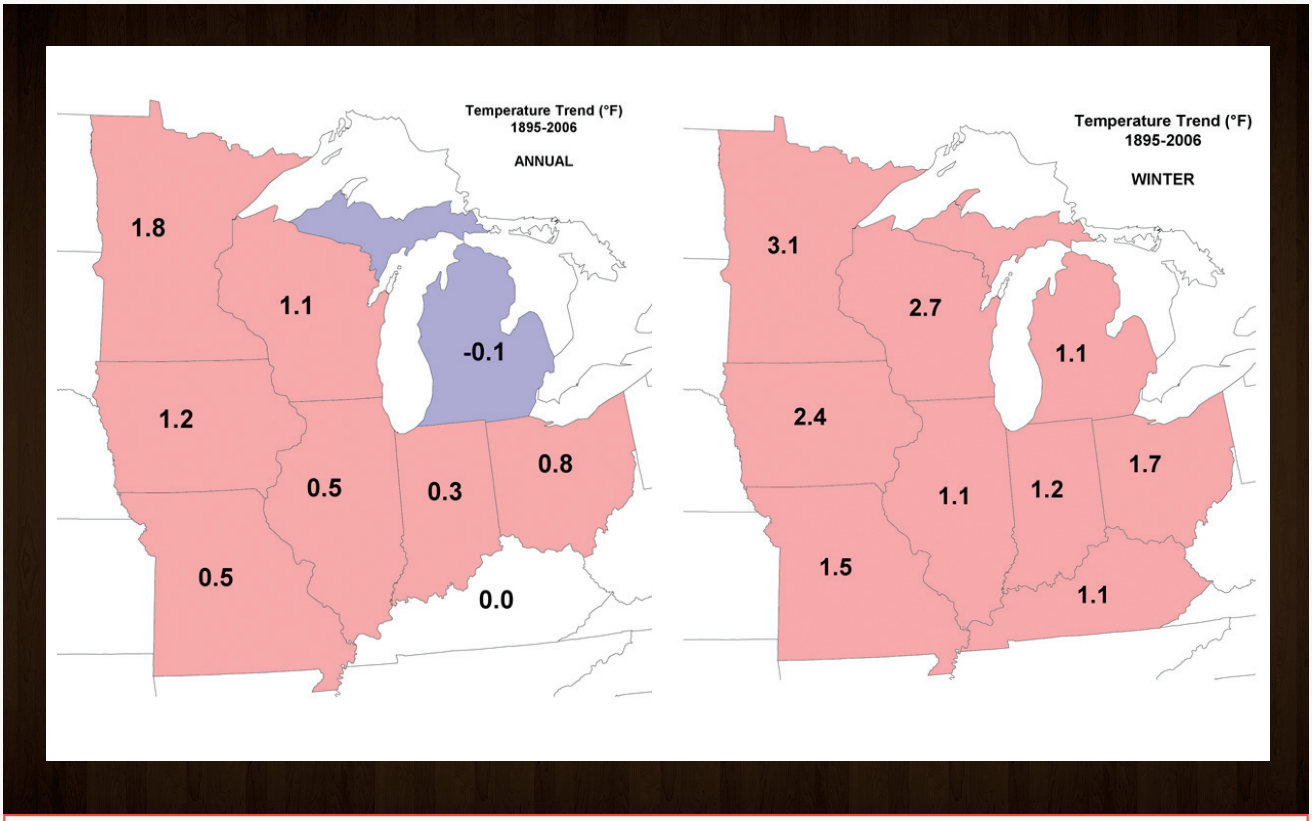
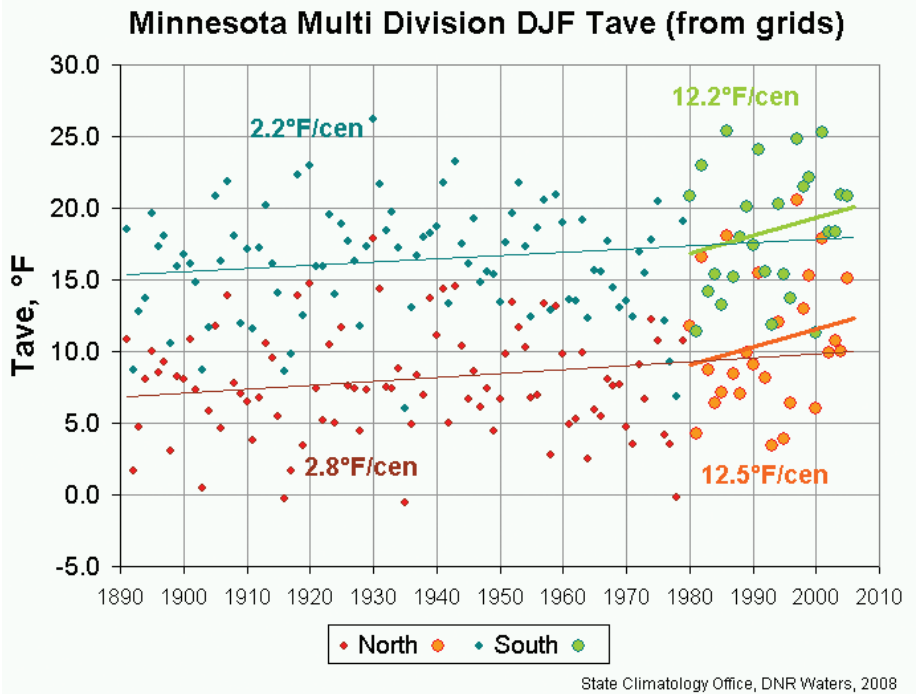


Figure 1. Annual average change in temperature, 1895-2006 (°F)
Figure 2. Average annual temperature change, winter, 1895-2006 (°F)

Minnesota Pollution Control Agency. (2010). Adapting to Climate Change in Minnesota: Preliminary Report of the Interagency Climate Adaptation Team, pp. 4-5. Retrieved from www.pca.state.mn.us/index.php/download-document.html?gid=15414

TRUE STATEMENTS	FALSE STATEMENTS
Temperature in Minnesota has increased an average of 1.8 degrees since 1895.	Minnesota winters have gotten colder since 1895.

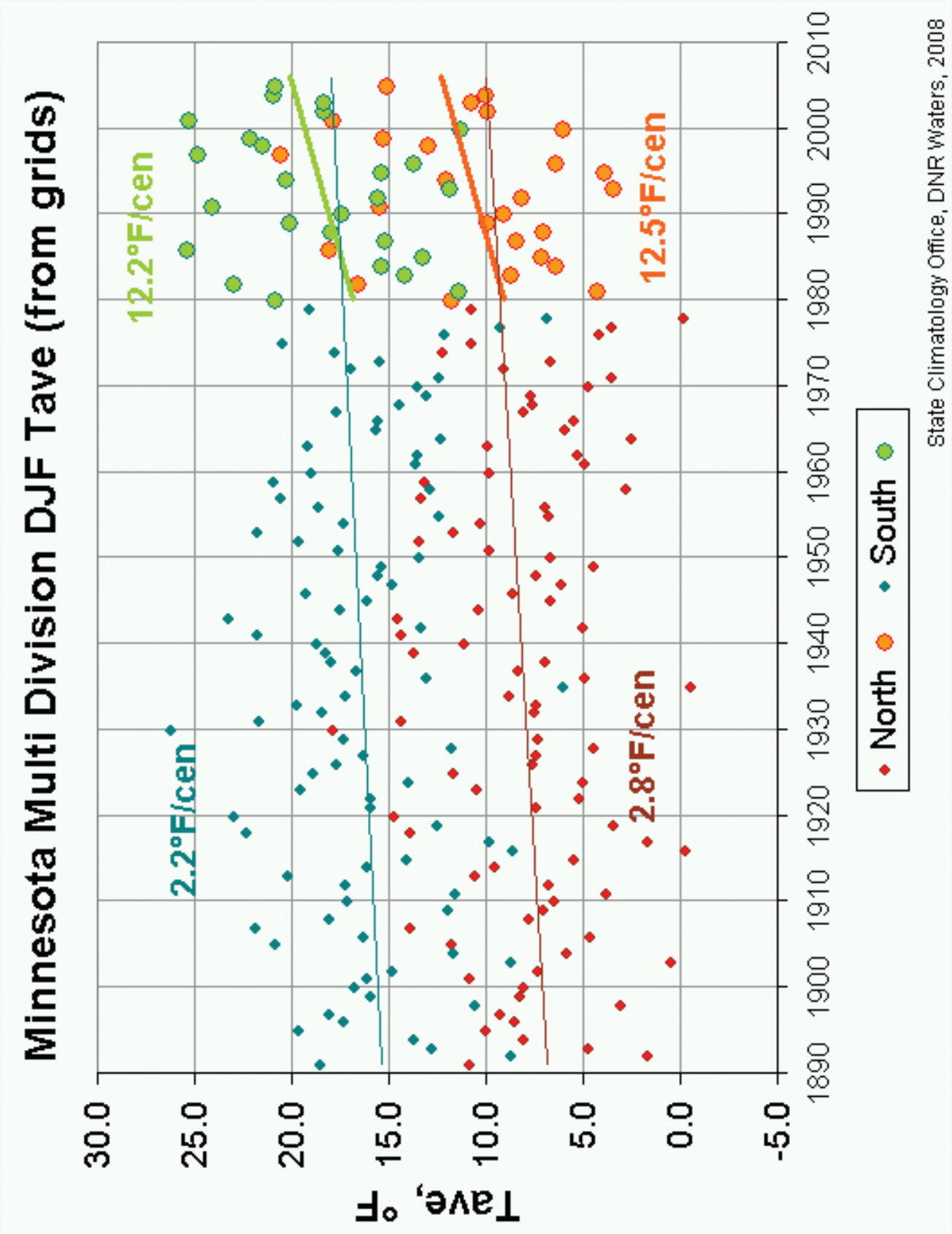
Temperature Trend (°
1895-2006
WINTER
1.7
1.1
1.2
1.1
2.7
1.1
3.1
2.4
1.5
Temperature Trend (°F)
1895-2006
ANNUAL
0.8
-0.1
0.3
0.0
1.1
0.5
1.8
1.2
0.5

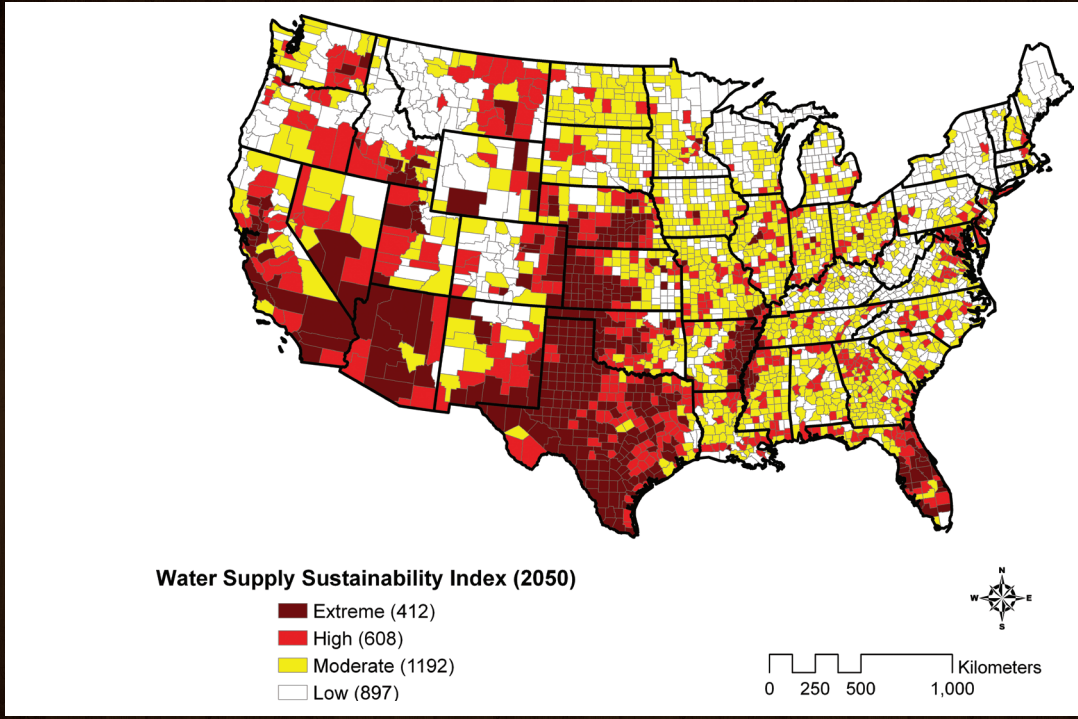


From the beginning of the record in 1891 to the early 1980s, Minnesota's average annual temperature did not change; its trend was essentially zero. Since the early 1980s the temperature has risen slightly over 1 degree F in the south to a little over 2 degrees F in much of the north; the trend has been upward.

Zandlo, Jim. (last modified 2008) Climate Change and the Minnesota State Climatology Office: Observing the Climate. Retrieved from http://climate.umn.edu/climateChange/climateChangeObservedNu.htm

TRUE STATEMENTS	FALSE STATEMENTS
If the graph ended in 1980, there would be no indication of warming in Minnesota.	The temperature on the y axis is in Celsius.

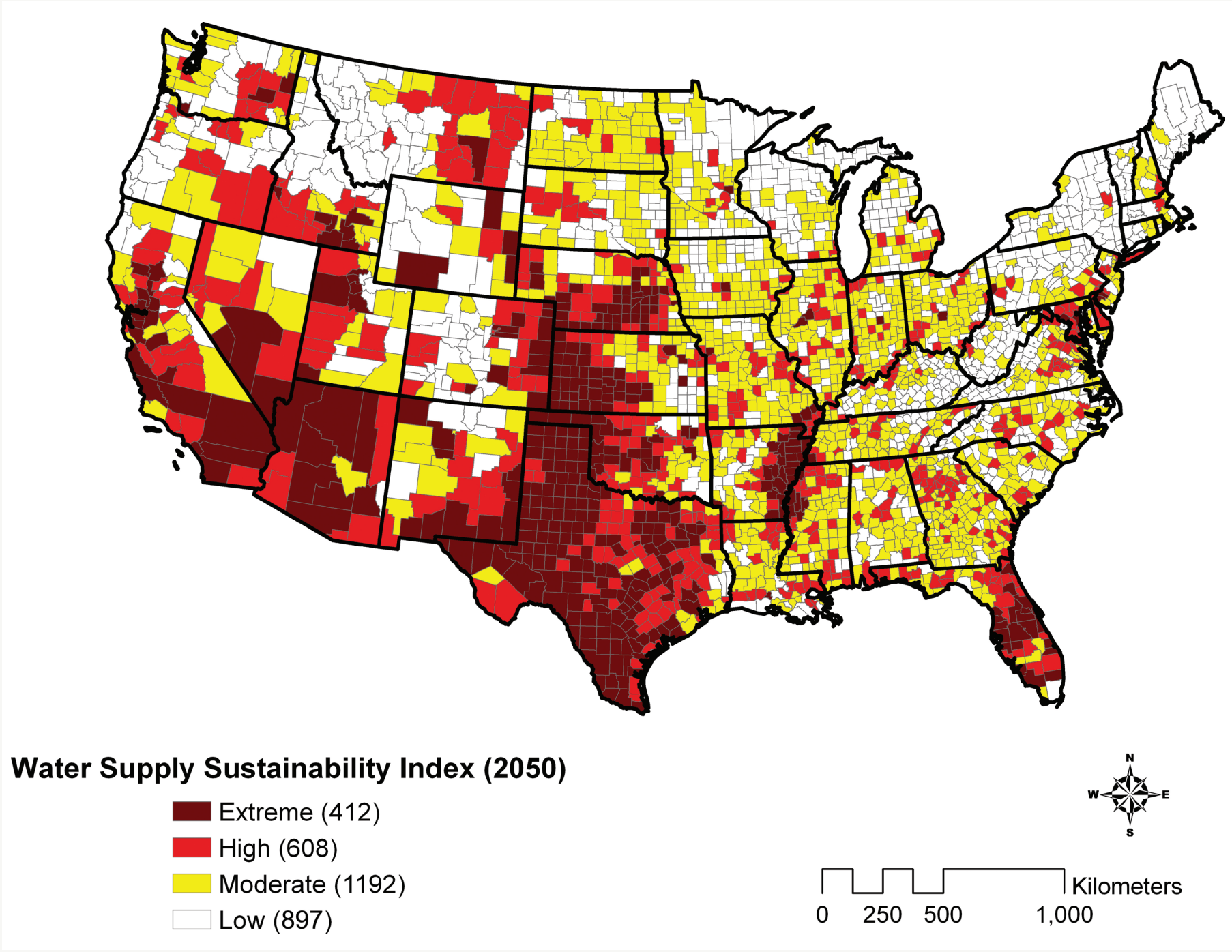

Minnesota Multi Division DJF Tave (from grids)
Tave, °F
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
12.2°F/cen
2.2°F/cen
12.5°F/cen
2.8°F/cen
North
South
State Climatology Office, DNR Waters, 2008



Water Sustainability Index in 2050, with available precipitation computed using projected climate change.
(The numbers in parentheses are the numbers of counties in each category.)

Natural Resources Defense Council. (2010). Evaluating Sustainability of Projected Water Demands Under Future Climate Scenarios. Lafayette, CA: Tetra Tech, Inc.

TRUE STATEMENTS	FALSE STATEMENTS
Those at the highest risk in Minnesota are generally found in urban areas.	Those at the most risk are found in the northern parts of the country.


Water Supply Sustainability Index (2050)
Extreme (412)
High (608)
Moderate (1192)
Low (897)
N
W
E
S
Kilometers
0
250
500
1,000

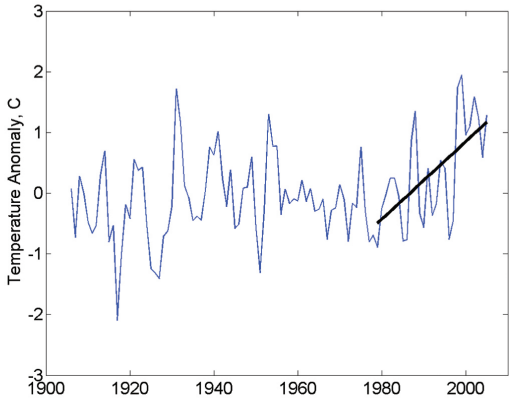


Figure A

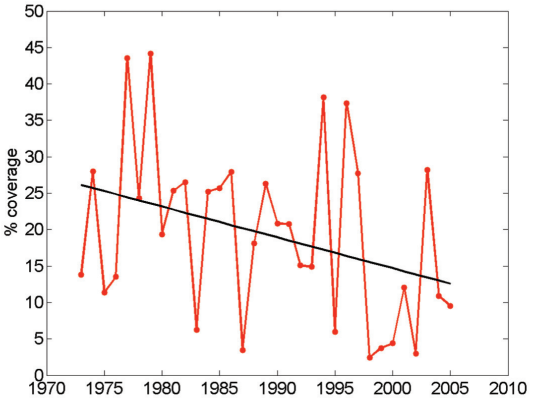


Figure B

Regional air temperature and average ice cover of Lake Superior:
a) mean July-September air temperatures from GISS sites on Lake Superior (available from http://data.giss.nasa.gov/gistemp/) and b) ice cover metric [Assel, 2003; 2005b] in percent.

Austin, J.A., and S.M. Colman. 2008. "A century of temperature variability in Lake Superior." Limnol. Oceanogr. 53, 2724–2730.

TRUE STATEMENTS	FALSE STATEMENTS
Since 1980, Lake Superior ice cover has declined almost 10 percent.	There is no correlation between ice cover and temperature.

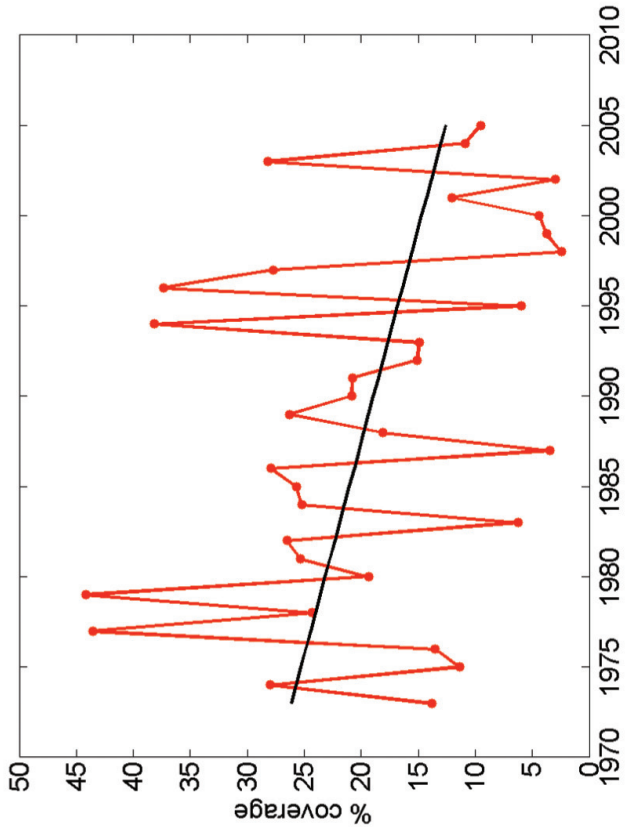


Figure B

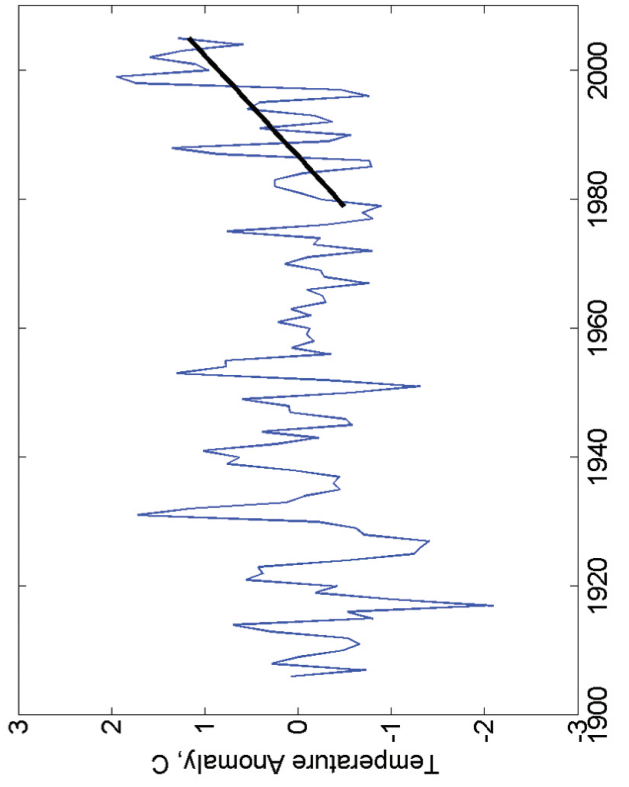
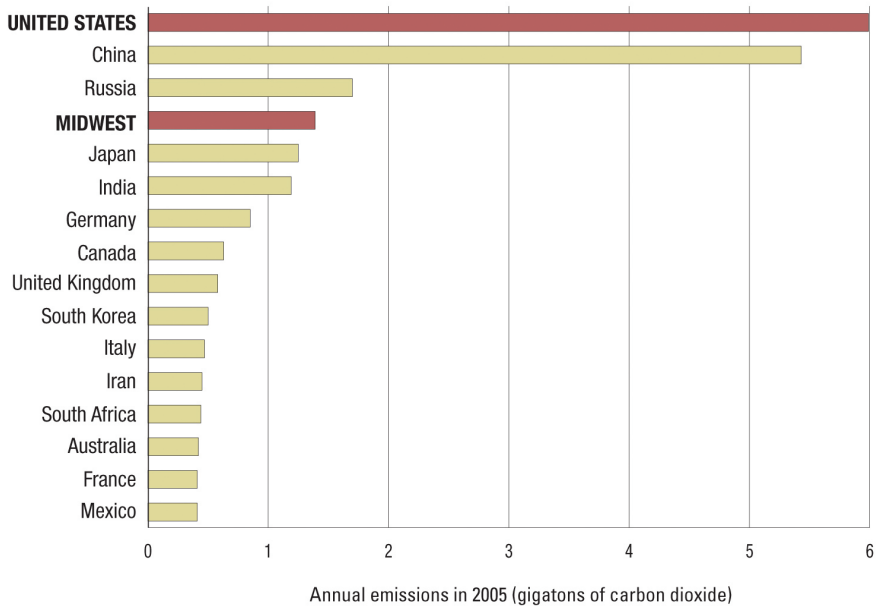


Figure A



The Midwest Burns More Fossil Fuels Than Entire Nations

Union of Concerned Scientists. (2009). Confronting Climate Change in the US Midwest: Minnesota. Chicago, IL.

TRUE STATEMENTS	FALSE STATEMENTS
The total combined emissions from the eight Midwest states (Illinois, Indiana, Iowa, Michigan, Missouri, Ohio, and Wisconsin) would make the Midwest the world's fourth largest polluter if it were a nation.	China emitted more carbon dioxide than the United States in 2005.

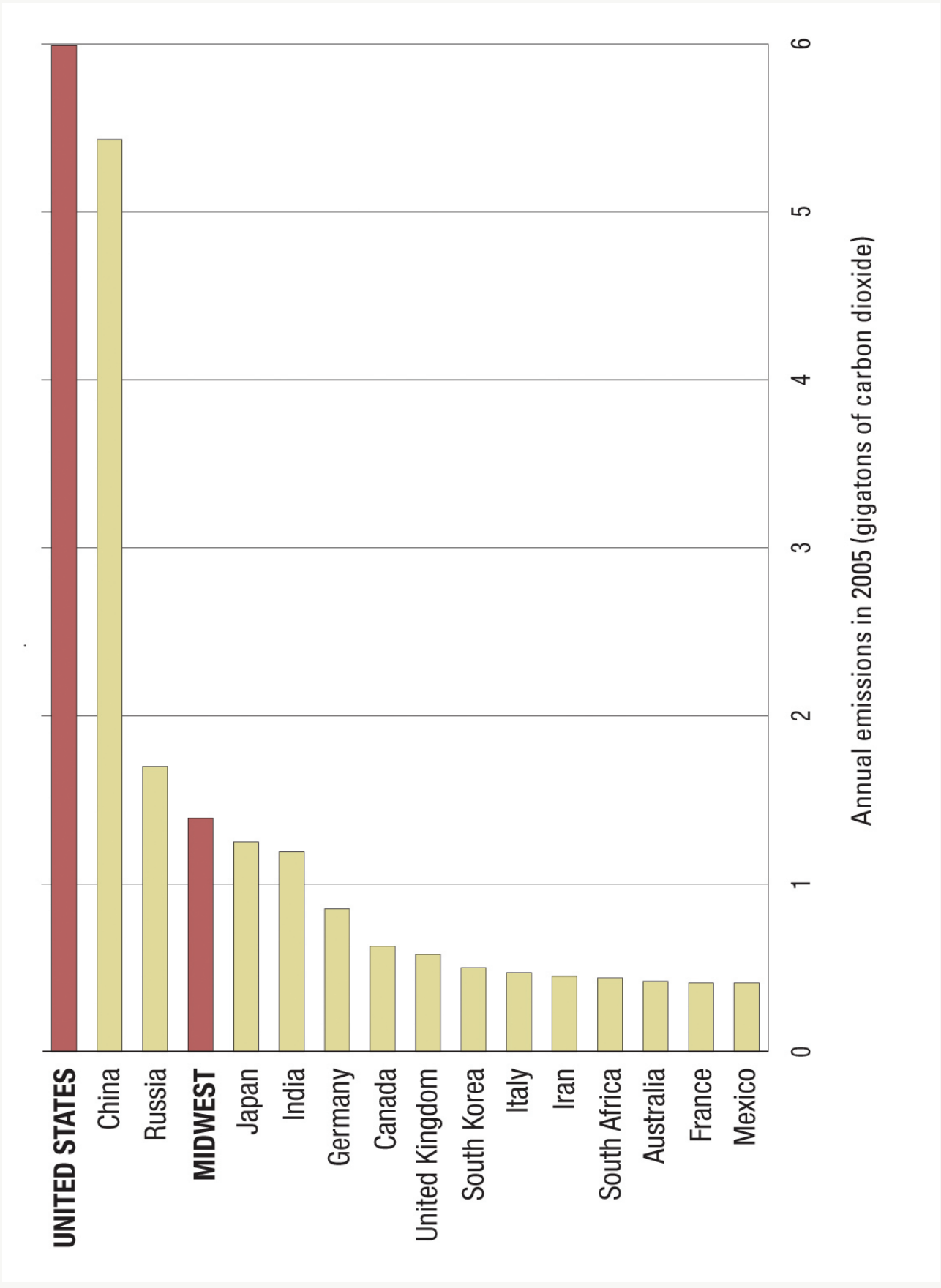
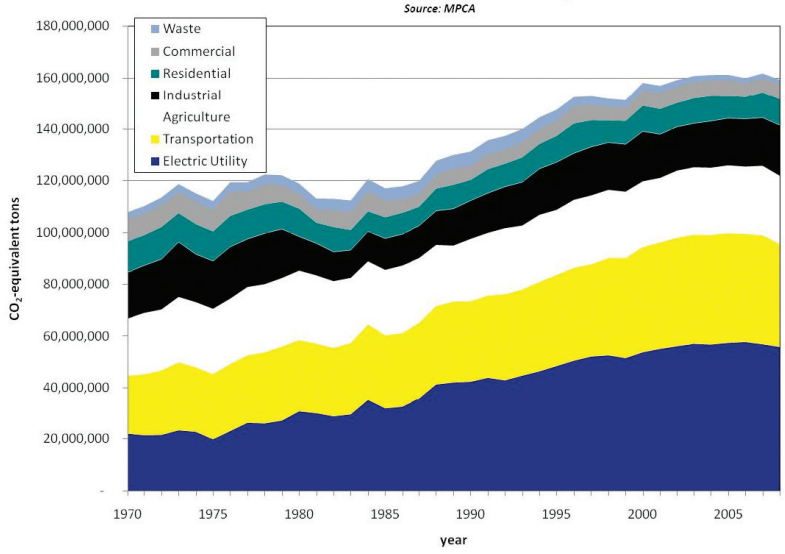

UNITED STATES
China
Russia
MIDWEST
Japan
India
Germany
Canada
United Kingdom
South Korea
Italy
Iran
South Africa
Australia
France
Mexico
0
1
2
3
4
5
6
Annual emissions in 2005 (gigatons of carbon dioxide)

Figure 2

Greenhouse Gas Emissions from Minnesota by Economic Sector

Source: MPCA



Greenhouse Gas Emissions from Minnesota by Economic Sector

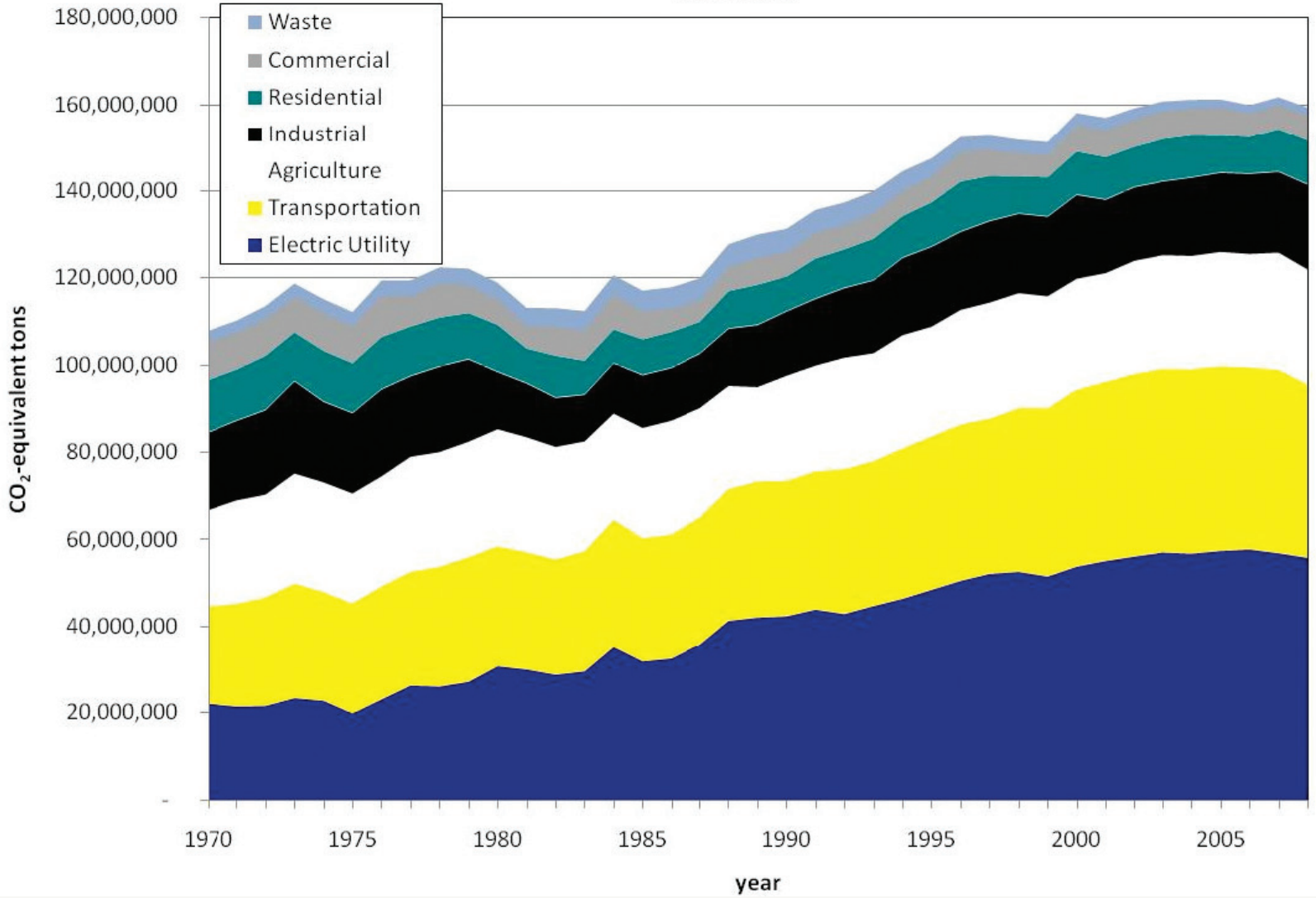
Minnesota Department of Commerce, and Minnesota Pollution Control Agency. (2011) Annual Legislative Proposal Report on Greenhouse Gas Emission Reductions and Biennial Greenhouse Gas Emissions Report to the Minnesota Legislature. Minn. Statt. 216H.07, subd. 3 and 4.

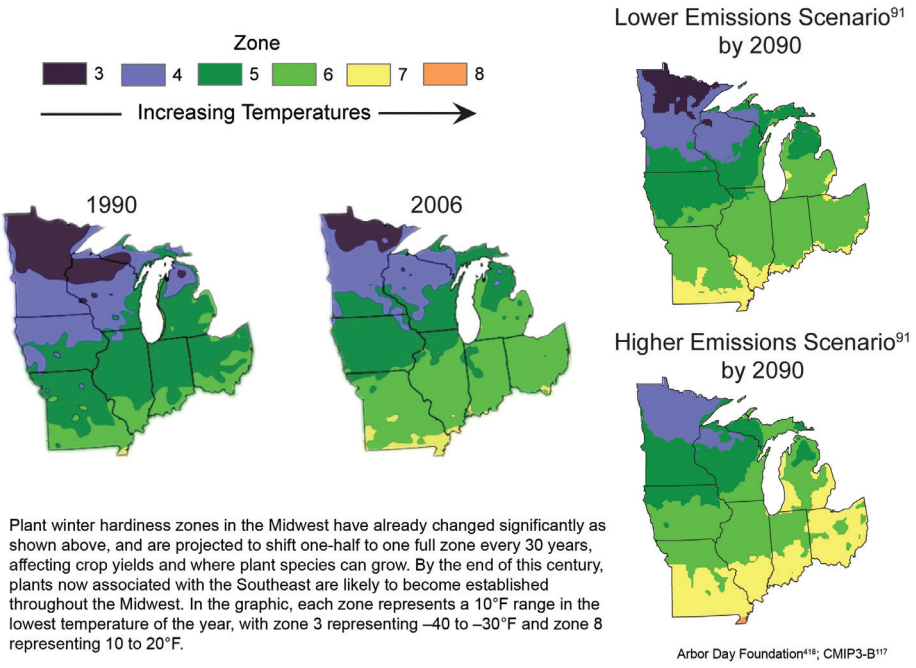
TRUE STATEMENTS	FALSE STATEMENTS
The long-term trend shows increasing greenhouse gas emissions.	The waste sector accounts for the majority of the greenhouse gas emissions from Minnesota.

Figure 2

Greenhouse Gas Emissions from Minnesota by Economic Sector

Source: MPCA



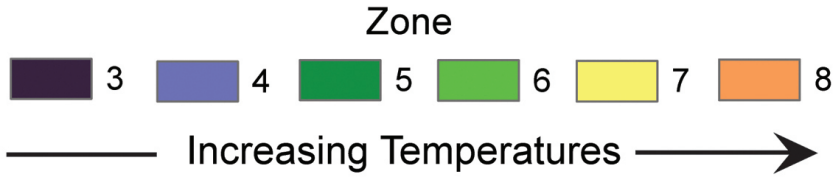


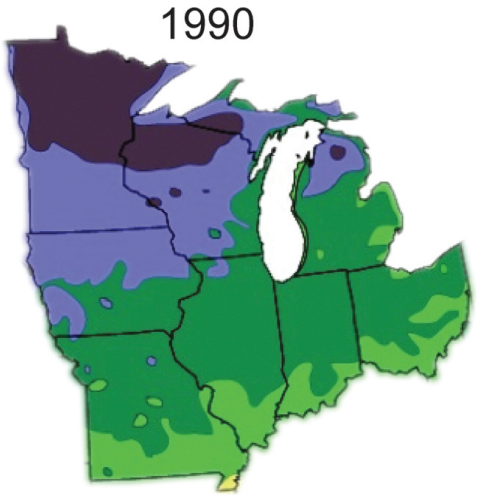
Observed and Projected Changes in Plant Hardiness Zones

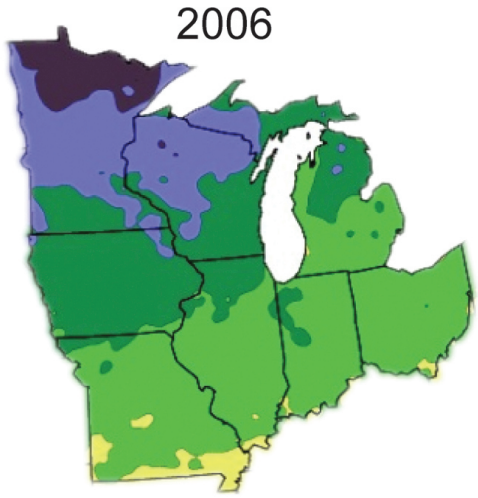
Each zone represents a 10 degree F range in the lowest temperature of the year, with zone 3 representing -40 to -30 degree F and zone 8 representing 10 to 20 degrees F.

U.S. Global Change Research Program. (2009). Global Climate Change Impacts in the United States. New York, NY: Cambridge University Press.

TRUE STATEMENTS	FALSE STATEMENTS
By the end of this century plants now associated with the Southeast are likely to become established throughout the Midwest.	Minnesota will see little change in plant zones under these projections.

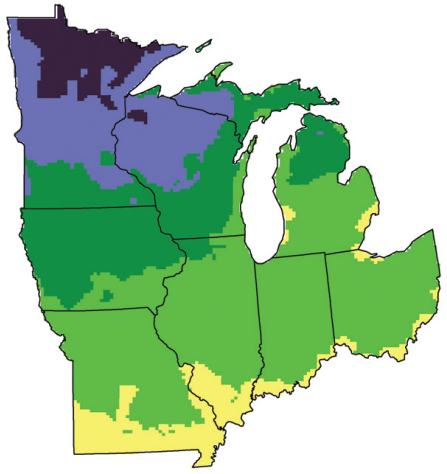




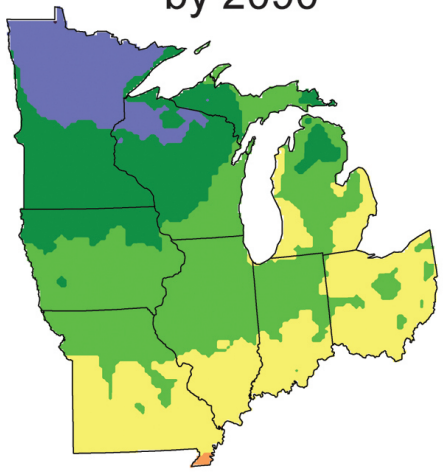


Plant winter hardiness zones in the Midwest have already changed significantly as shown above, and are projected to shift one-half to one full zone every 30 years, affecting crop yields and where plant species can grow. By the end of this century, plants now associated with the Southeast are likely to become established throughout the Midwest. In the graphic, each zone represents a 10°F range in the lowest temperature of the year, with zone 3 representing –40 to –30°F and zone 8 representing 10 to 20°F.

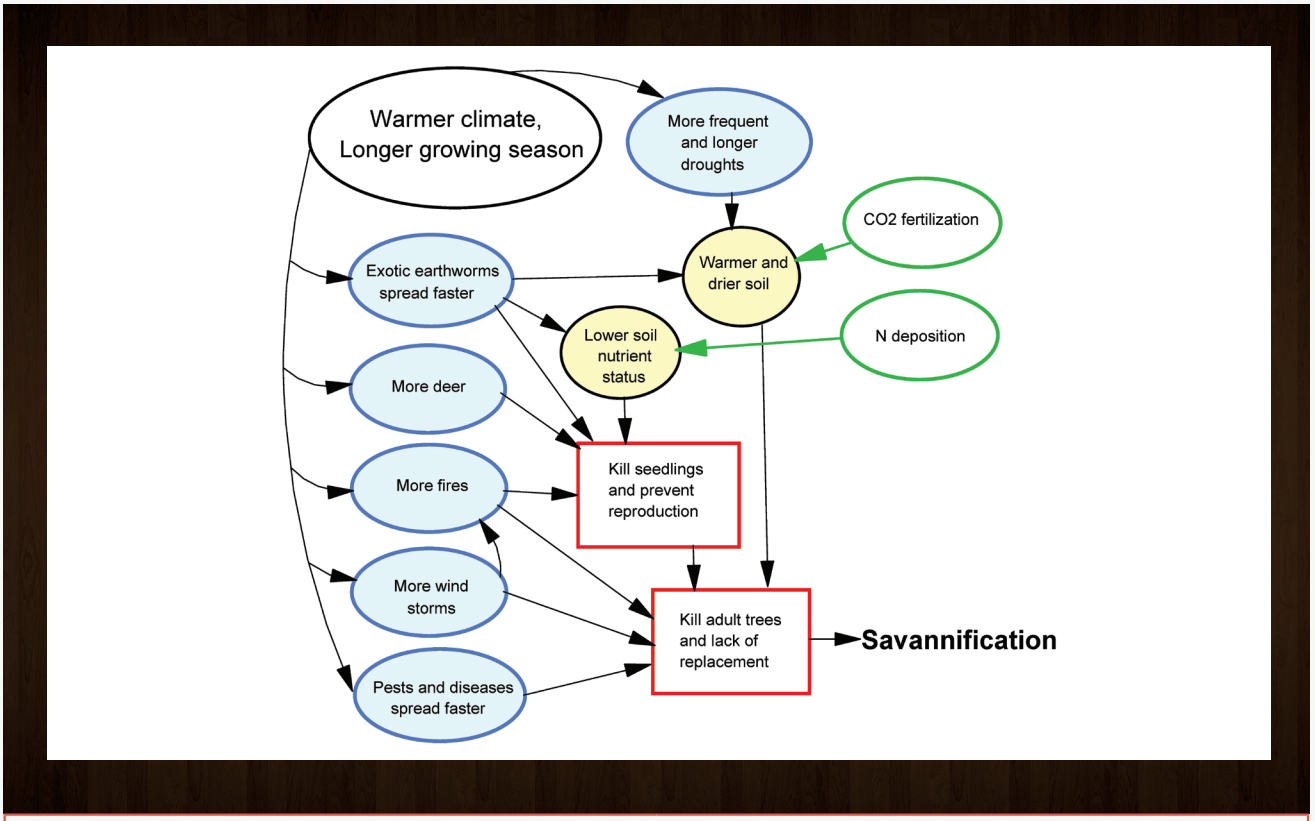
Lower Emissions Scenario[91] by 2090



Higher Emissions Scenario[91] by 2090



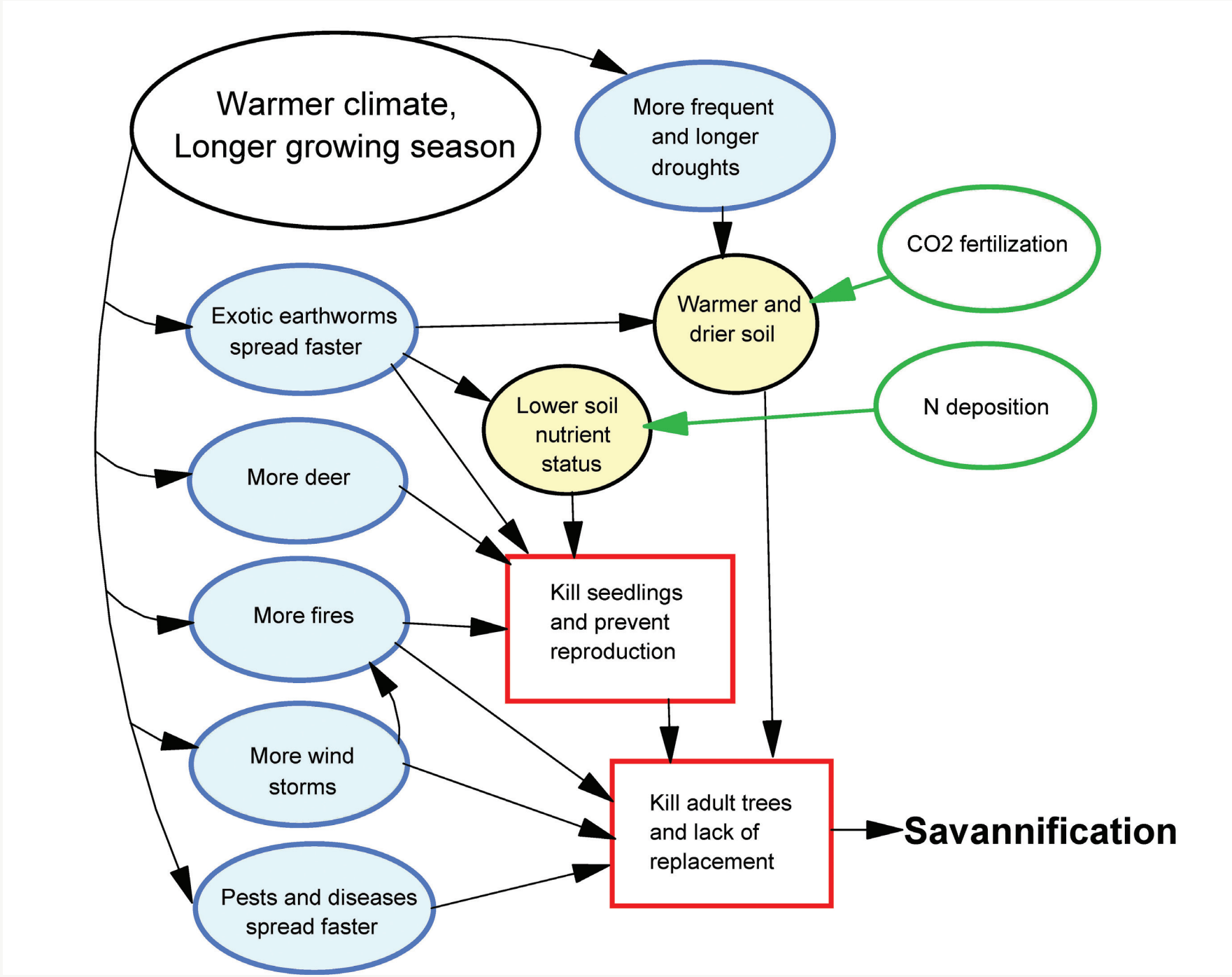
Arbor Day Foundation[418]; CMIP3-B[117]



This chart shows interactions between global warming and other drivers of change affecting the prairie-forest border of central North America, and other impacts on trees. Blue ovals represent drivers with potential negative impacts on trees that are likely to be enhanced by a warmer climate. Yellow ovals represent basic resources that may be changed by a warmer climate or by its interactions with other drivers. Green ovals represent drivers that may counteract negative impacts on trees to some extent. Red rectangles show the results of drivers on trees and their reproduction.

Frehlich, L.E., and Reich, P.B. 2009. "Will environmental changes reinforce the impact of global warming on the prairie-forest border of central North America?" Frontiers In Ecology.

TRUE STATEMENTS	FALSE STATEMENTS
A warmer climate could lead to an increase in deer populations.	Earthworms will help fight the impacts of a warming climate.


Warmer climate,
Longer growing season
More frequent and longer droughts
CO2 fertilization
Exotic earthworms spread faster
Warmer and drier soil
Lower soil nutrient status
N deposition
More deer
Kill seedlings and prevent reproduction
More fires
More wind storms
Kill adult trees and lack of replacement
Savannification
Pests and diseases spread faster

TRUE STATEMENTS	FALSE STATEMENTS

Lesson 6: Minnesota's Changing Climate

What can I do?

Age Level:	Grades 3-12
Time Needed:	To be determined by students
Materials:	Poster paper Markers Action Worksheet and Template
Student Learning Outcomes:	• Students will brainstorm appropriate solutions and select one for their group, class or school • Students will develop a climate action plan and begin to implement it

Background Information:

Student action to mitigate the effects of climate can take many forms. Crafting position statements and testifying before the legislature, designing public service announcement posters, videos or podcasts, planting trees to absorb carbon dioxide or starting a compost for school or home food waste to decrease methane gas release are all legitimate actions, especially when student driven.

The most important outcome of this lesson and unit on *Minnesota's changing climate*, is that this final action project is student led and student driven. Making sure students feel that they can part of the solution and that their ideas are valuable is an essential key to helping them not feel overwhelmed by the current and predicted impacts of climate change. In addition, the action projects that they develop are valuable assessments of what they understood and connections that they made about what is causing climate change and how it will impact their lives, biome and Minnesota as whole.

> We need to start communicating ... we need to really get active and do what we can in our own sphere of influence...we need the youth.
>
> —Will Steger at youth event, September 2, 2008

Activity Description

This is only one suggested way to help identify student action projects. Throughout this unit, project ideas may have already been developed or started. As noted earlier, the two most important outcomes are that there is a project so that students feel part of a solution, and that these projects are as student-initiated and driven as possible.

Introduction

1. Divide students into five groups and hand out one key issue to each group. Ask each group to dissect the issue to the root cause.
2. Ask students to glue the issue in the center of a large piece of butcher paper or poster board. From the issue, ask them to break it into smaller and smaller parts to identify the root cause or problem. (See example below)

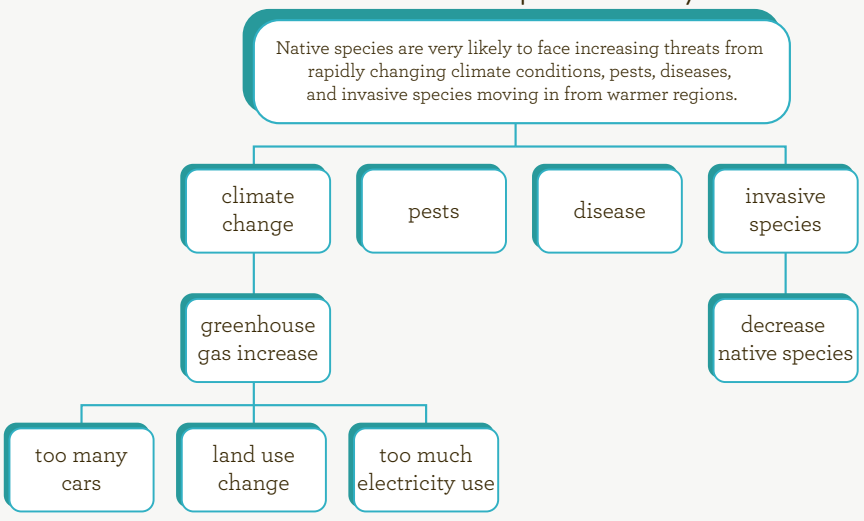


Diagram 1: Native species are very likely to face increasing threats from rapidly changing climate conditions, pests, diseases, and invasive species moving in from warmer regions.

3. Once they have identified a few problems, ask them to turn their poster over and put one problem in the middle of their paper and make a concept map of solutions. Encourage creative thinking and tell them no idea is too crazy at this point. (See example below) This may also be a time to do some Internet research about solutions and project ideas.

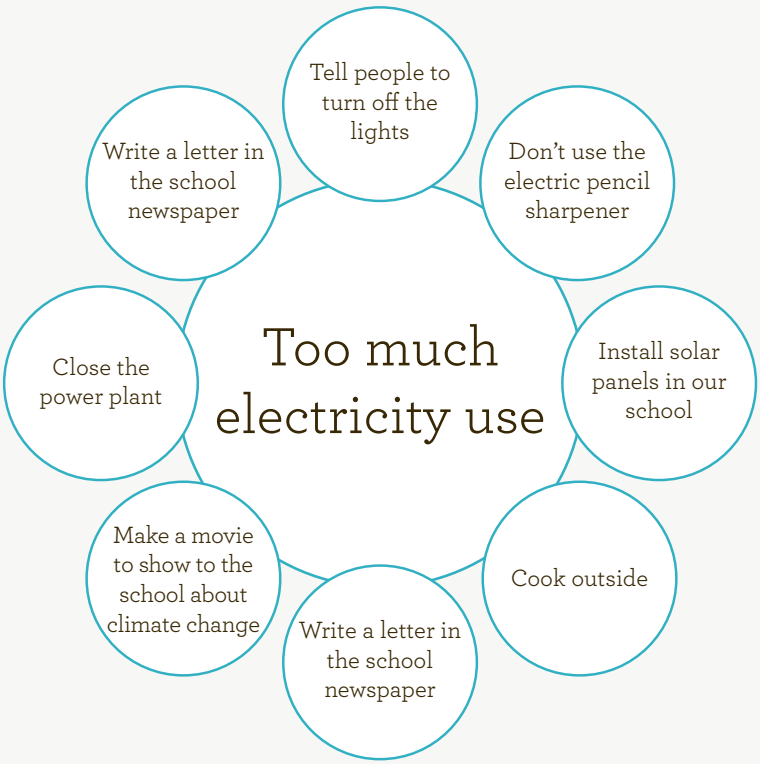
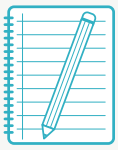


Diagram 2: Too much electricity use

Activity: Developing Action Plans

1. Once the groups have identified solutions. Ask them to post their visuals and have everyone in the class walk around to read the different solutions. Take notes in their journal about which solutions they think are the most interesting and which ones they would be interested in working on.
2. Identify a few solutions through voting ask a class, and ask students to break into interest groups to work on an action plan. Use the attached climate action plan worksheet and template.



Journaling Connection

Ask students to document their "action journey" in their journal. This could be in words, poetry, cartoons, photos pasted in or whatever creative way they can think of.

Take It Outside—Connecting With Your Place

There are many action projects connected with climate change that can happen in your schoolyard or nature area close by. If your students are able to articulate the connection between what they are proposing and climate change, that is the most important part.

Online Classroom Connection

Visit http://classroom.willstegerfoundation.org

Submit your climate action plans, as well as photos and videos of you in action, or email them to education@willstegerfoundation.org

Climate Action Plan Template

Part One: Brainstorming

1. What issue are you most passionate about regarding the impacts of climate change in Minnesota? Why?

2. What do you want to see change at your school and/or what does your school or community need to do to help mitigate or adapt to the impacts of climate change?

3. What connections do you see between your passions and the needs of your school/community?

4. Use the space below to jot ideas for potential projects based on the previous questions and your participation in workshops/discussions:

Part Two: Action Plan

Now that you've done some brainstorming, it's time to get more specific. Here is a step-by-step process that can help you identify a project and develop SMART goals. Use the Project Planning Worksheet to create a strategic and successful action project while referring to the steps below to guide your work.

Step One: Choose a Project Focus

Some potential areas to work on are listed below, but don't limit yourself to these ideas. Get creative, and address the greatest needs in your school or community.

Project ideas include: energy efficiency on campus, climate change curriculum/awareness/eco-literacy education, greening your school cafeteria, organic gardening, composting, recycling, reducing your school's carbon footprint, less dependence on fossil fuel transportation, make your school a bike friendly school, install a rain garden, plant trees and native plants, green financing/purchasing, etc.

The area I will focus on for this action plan is: _____

Step Two: Setting SMART Goals

Something to keep in mind when you're creating your Goals and Objectives is S.M.A.R.T. decision-making. S.M.A.R.T. stands for "Specific, Measurable, Achievable, Realistic, and Timely." You can begin with some pretty lofty goals (such as the desire to make your community 100% carbon neutral), but they have to be broken down into manageable activity chunks that have specific measures of success. For example, rather than have a goal of "Get everyone at school to start recycling," the S.M.A.R.T. way of stating that goal would be to say ... get two recycling bins placed in each classroom and create a student-led pick-up program for this year."

There are two major benefits of having realistic goals with definite measurements of success. One, you'll feel a sense of accomplishment when you've met your goal. The community will also be able to see progress—and will therefore be much more likely to get involved. Two, the people who give you money for your project will prefer those kinds of specific goals. If you need to write a grant or ask the local millionaires' club for a donation, they will ask for specifics to make sure that their money goes toward some tangible achievement.

S.M.A.A.R.T.T.

Specific	can be well-defined and clearly understood by anyone who has basic knowledge of the project
Measurable	can know if a goal is obtainable, when it has been achieved and how far away completion is
Achievable	can be achieved within the current environment
Agreed Upon	agreement with all the stakeholders what the goals should be
Realistic	can be accomplished within the availability of resources, knowledge and time
Timetable	are limited by a timeframe
Tangible	anyone can experience it

Step Three: Building Your Team

As much as you'd love to do this solo, you're going to have to partner with a team, group, and/or organization in order to achieve your goals. You may already have a team you're working with, or you may be starting from scratch; either way, it's helpful to know who you'll be working with. Brainstorm a list of the people that you want to include in your team. This could include students passionate about your issue, students working in related groups, educators/advisors/administrator, facility management, community members, parents, etc.

Step Four: Identifying Potential Roadblocks

Brainstorm a list of potential obstacles you may need to overcome in order to reach your goal (for example: lack of funding, disinterested students, no administrative support, intimidating facilities manager, etc.)

Step Five: Identifying Your Project Resources

What space, money, materials and other resources do you have that will help to achieve your goals?

Consider your assets:
Human assets – individual skills and knowledge of members of your community
Association assets – groups that have come together for a common purpose
Institutions (public or private) – schools, local government, businesses, nonprofits
Built Assets – buildings, public spaces, other infrastructure
Financial Assets – funding potential, grants, investments, etc.

Step Six: Building Support

Who needs to know about this project? How will you share your story and build the support you need?

Step Seven: Making a Project Timeline

Create a realistic and concrete timeline that includes preparation for your project, project implementation, and any wrap-up or follow through that needs to happen.

Step Eight: Implement Your Project

Get out there and DO something great!

Step Nine: Share Your Success!

Report on your accomplishments to your school and community via newspapers, forums and social media, including: http://classroom.willstegerfoundation.org

Part Three: Climate Action Plan Summary

Use the action plan worksheet to fill out this summary.
Full name of lead educator/adult mentor contact: _____
First names of student group members: _____

Email: _____
Phone number: _____
School/grade: _____
What is your project focus? _____

Please list your top three S.M.A.R.T. goals
a) _____
b) _____
c) _____

Include a brief summary of your timeline _____

We would love to share your plan and the outcomes of your project! Please return this form by mail, email or fax with photos or other relevant supporting documents to:
Minnesota's Changing Climate Project
Will Steger Foundation
2810 21st Avenue South, Ste 110
Minneapolis, MN 55407
education@willstegerfoundation.org
Fax# (612) 278-7101

Or upload it on the *Minnesota's Changing Climate* website at:
http://classroom.willstegerfoundation.org

ACTION PLAN WORKSHEET

WILL STEGER FOUNDATION

1 Project Focus: _____

2 Goals/Objectives:	3 Your Team:	4 Road Blocks:	5 Resources/Assets:	7 Timeline of Activities (by month):
Specific Measurable Achievable Realistic Timetable				Nov: Dec: Jan: Feb: Mar: Apr: May: June: Next School Year:

6 Building Support:

Will Steger Foundation 2801 21st Ave S, Suite 110 Minneapolis, MN 55407
Tel: 612-278-7147 Email: info@willstegerfoundation.org
www.willstegerfoundation.org

Lesson 1:

Coggins, David. *Eden Summer Collages*. Cobalt Press, 2008.

Klentschy, Michael. "Science Notebook Essentials." *Science and Children*, November/December: 24-27. 2005.

Lesson 2:

Minnesota DNR. Biomes of Minnesota. Retrieved from http://www.dnr.state.mn.us/biomes/index.html

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Biome Card References

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2010 Project Abstract
For the Period Ending June 30, 2012

PROJECT TITLE: Connecting Youth with Nature (Digital Photography Bridge to Nature)
PROJECT MANAGER: Carrol L. Henderson
AFFILIATION: Minnesota Department of Natural Resources
MAILING ADDRESS: Nongame Wildlife Program, Box 25, 500 Lafayette Road,
CITY/STATE/ZIP: St. Paul, MN 55155
PHONE: 651-259-5104
E-MAIL: Carrol.Henderson@state.mn.us
WEBSITE: www.mndnr.gov
FUNDING SOURCE: Environment and Natural Resources Trust Fund
LEGAL CITATION: ML 2010, Chap. 362, Sec. 2, Subd. 8c

APPROPRIATION AMOUNT: $

Overall Project Outcome and Results
Connecting Youth with Nature has successfully achieved it goals as initially proposed. The working title of the project was changed to the "Digital Photography Bridge to Nature" because there were federal agencies using the name "Connecting Youth with Nature" for other environmental education initiatives. Two statewide coordinators were hired under contract-one for the metropolitan region and one for greater Minnesota. Nine workshop facilitators were hired to deliver 80 Digital Bridge workshops over the course of the project. The kickoff teacher workshop was held on July 10 at Luverne, Minnesota, and was attended by 60 teachers. The keynote speaker was world-reknown National Geographic photographer Jim Brandenburg who grew up in Luverne, Minnesota.

A total of 40 camera kits of 12 cameras each and several field guides were purchased and assembled with additional funds provided by the Nongame Wildlife Program and the DNR Division of Parks and Trails. Additional cameras were purchased for use on "Photo safari" programs in State Parks.

For the 24 month period from July 10, 2010, through June 30, 2012, a total of 84 teacher workshops were carried out for a total of 1147 teachers. The goal of the project was to present 80 workshops reaching 1000 teachers in two years. In addition to facilitating teacher workshops, project facilitators have also gone into classrooms with teachers and taken the students on "photo safaris". A total of ten photos safaris were carried out with teachers with a total of over 500 students.

Workshop facilitators have been providing the camera kits to teachers so they can carry out their photo safaris after attending Digital Bridge workshops. The Nikon digital cameras selected for this project have been holding up very well to such intensive use. Only ten cameras out of 500 have been damaged beyond repair.

Project Results Use and Dissemination
Information on the Digital Photography Bridge to Nature project is available on the DNR website (www.mndnr.gov). Additional publicity on this project has been shared on local and state newspapers, radio, television, and the national Birdwatching magazine.

Environment and Natural Resources Trust Fund (ENRTF)
2010 Work Program

Final Report: September 15, 2012
Date of Work Program Approval: June 9, 2010
Project Completion Date: June 30, 2012

PROJECT TITLE: Connecting Youth with Nature (Digital Photography Bridge to Nature)

Project Manager: Carrol L. Henderson
Affiliation: Minnesota Department of Natural Resources
Mailing Address: Nongame Wildlife Program, Box 25, 500 Lafayette Road,
City / State / Zip: St. Paul, MN 55155
Telephone Number: 651-259-5104
E-mail Address: Carrol.Henderson@state.mn.us
Fax Number: 651-296-1811
Web Site Address: www.mndnr.gov

Location: St. Paul, Minnesota

Total ENRTF Project Budget:	**ENRTF Appropriation:**	**$ 160,000**
	Minus Amount Spent:	**$ 157,301**
	Equal Balance:	**$ 2,699**

Legal Citation: ML 2010, Chap. 362, Sec. 2, Subd. 8c.

Appropriation Language:

Minnesota Session Law, Chapter 362 Sec. 2. MINNESOTA RESOURCES. Subd. 8.Environmental Education, (c) Connecting Youth with Nature

$160,000 is from the trust fund to the commissioner of natural resources to hold teacher training workshops on the use of digital photography as a tool for learning about nature. The equipment must be provided from other funds.

II. PROJECT SUMMARY AND RESULTS: Connecting Youth with Nature has successfully achieved it goals as initially proposed. The working title of the project was changed to the "Digital Photography Bridge to Nature" because there were federal agencies using the name "Connecting Youth with Nature" for other environmental education initiatives. Two statewide coordinators were hired under contract-one for the metropolitan region and one for greater Minnesota. Nine workshop facilitators were hired to deliver 80 Digital Bridge workshops over the course of the project. The kickoff teacher workshop was held on July 10 at Luverne, Minnesota, and was attended by 60 teachers. The keynote speaker was world-reknown National Geographic photographer Jim Brandenburg who grew up in Luverne, Minnesota.

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Workshop facilitators have been providing the camera kits to teachers so they can carry out their photo safaris after attending Digital Bridge workshops. The Nikon digital cameras selected for this project have been holding up very well to such intensive use. Only ten cameras out of 500 have been damaged beyond repair.

III. PROGRESS SUMMARY AS OF APRIL 15, 2011

The total number of workshops delivered so far is 33, and the number of teachers attending those workshops is up to 735. At this rate we will have exceeded our goal of 1000 teachers and will reach our goal of presenting 80 workshops by the end of FY '12.

PROGRESS SUMMARY AS OF SEPTEMBER 15, 2011

As of August 31, a total of 62 workshops have been delivered for this project, and the number of teachers attending those workshops totals 888. Our goal for this project is 80 workshops and 1000 teachers, so it is possible we may reach that goal by January 1, 2012. We continue to get excellent reviews back from teachers on their workshop experience. The camera trunks are in continuous use and this constitutes the second tier of effort to see that the teachers follow up their workshop experience with their own photo safaris with their classes. We have learned that the number of children reached per teacher is approximately 60, so the total number of Minnesota children potentially reached by this effort now exceeds 53,000. In addition to workshops, we are now having our workshop facilitators respond to requests from teachers to join teachers at their schools to assist with their first photo safari efforts to give them more training and confidence for delivering this program in a more effective manner. Four photo safaris have already been done in the Duluth area.

This project is receiving exceptional media coverage, including articles about the Digital Photography Bridge to Nature Project in the Minnesota Volunteer and in Birdwatching magazine.

PROGRESS SUMARY AS OFAPRIL 15, 2012

As of April 15, 2012, a total of 75 workshops and 10 photo safaris have been delivered by the project facilitators and coordinators. These workshops have reached 1011

teachers and the facilitated photo safaris have involved over 500 students. We estimate that the teachers have taken these lessons back to over 60,000 students across Minnesota and that this is one of the most effective outdoor recruitment programs available in our schools.

At present, there is still a balance of $4,771 available in the budget which if not expended will carry forward into the third year of availability from the Environment and Natural Resources Trust Fund. Critical Habitat Matching Funds from the Reinvest in Minnesota program have been made available through the Department of Natural Resources for a third year of implementation. These funds total $75,000. The goal of the program in FY ’13 will be to carry out a total of 50 teacher workshops and photo safaris across the state and develop 48 teacher lesson plans cross-referenced by subject area and grade level so that those plans meet state learning standards in a variety of subject areas. These lesson plans will be posted on the DNR website.

FINAL REPORT SUMARY AS OF JUNE 30, 2012

At the close of this project on June 30, 2012, the Digital Photography Bridge to Nature project had achieved its goals by presenting 84 workshops to 1147 teachers in two years. That is four more workshops than the goal, and 147 more teachers than the initial goal. Since each teacher reaches about 60 students with the program materials, this project has potentially reached about 69,000 students in two years. When this total is pro-rated to the cost of delivery ($160,000) the cost per student is about $2.30 per student. The cost, when prorated for the number of participating teachers (1147), was about $140 per teacher.

The program has been so successful in generating interest and support by teachers and students that $75,000 has been allocated from RIM Critical Habitat Matching Funds within the Department of Natural Resources to continue this effort. Two coordinators and seven facilitators have been hired for FY ’13 to deliver 40 workshops and photo safaris in the coming year and to develop 48 Photo Safari lesson plans classified by grade level and curricula (science, geography, art, language arts, math, geometry). These lesson plans will be posted on the DNR website.

This project is the first of its kind in the nation, and other states and some federal agencies are looking at this model for implementation elsewhere as a way of generating interest in the outdoors by the nation’s youth.

At the conclusion of this project there was a budget balance of $2698.65 which reverts back to the Environment and Natural Resources Trust Fund.

IV. OUTLINE OF PROJECT RESULTS*:*

RESULT 1: Deliver 80 teacher workshops to 1000 teachers

Description: A total of 80 Digital Bridge teacher workshops will be presented to at least 1000 teachers over the course of two years.

Summary Budget Information for Result/Activity 1: ENRTF Budget: $ 160,000
Amount Spent: $ 157,301
Balance: $ 2,699

Deliverable/Outcome	Completion Date	Budget
1. Develop workshop curriculum and carry out 40 "Connecting Youth to Nature" workshops (FY '11).	June 30, 2011	$ 73,000
2. Carry out 40 "Connecting Youth to Nature" workshops (FY '12).	June 30, 2012	$ 73,000
3. Supplies: Create 42 photo trunks, including field guides & teacher workshop supplies (cameras not included in supply expenses)	June 30, 2011	$ 13,000

Result Completion Date: June 30, 2012

Result Status as of April 15, 2011: The total number of workshops delivered through December 31, 2010) is 32, and the number of teachers attending those workshops is up to 459. This is well ahead of our FY 2011 goal of 40 workshops and 500 teachers by June 30. Workshop evaluations show exceptional response by the teachers, averaging a score between 4 and 5 out of a maximum of 5. The average number of students reached by the participants is twice that which was estimated at the beginning of the project—60. Therefore, in the first six months of the project, we would potentially reach about 27,500 students with this photo safari activity for connecting youth to the outdoors.

Result Status as of September 15, 2011: The total number of workshops delivered through August 31, 2011 is now 62, and the number of teachers attending those workshops is up to 888. This is well ahead of schedule for reaching our project goal of 80 workshops and 1000 teachers with our workshops by June 30, 2012. Workshop evaluations continue to show an excellent reponse to the workshops and their content, averaging a score between 4 and 5 out of a maximum of 5. The average number of students reached by the teachers is 60, so this project has already had the potential of reaching over 53,000 students with the photo safari activities.

A new Facebook page has been created for teachers to share information on their photo safaris and classroom activities: http://www.facebook.com/pages/Digital-Photography-Bridge-to-Nature/269993363016116?sk=wall . This Facebook page is linked to the new LCCMR Facebook page.

There are currently seven more workshops scheduled through October 8.

Result Status as of April 15, 2012: The total of number of workshops delivered through March 31, 2012, is now at 75, and the number of teachers attending those workshops is up to 1011. Ten photo safaris have also been carried out by Project facilitators coordinated with local teachers and reached over 500 students. The response by teachers continues to be excellent, and many schools are already

requesting more teacher workshops for this summer and fall of 2012. It is estimated that this project has now reached over 60,000 students.

The camera trunks have been a very cost-effective way of getting this program into the schools after teachers have taken the initial workshop. Teachers can check out a camera trunk for a two week period to use it on their local photo safaris. There are 40 camera trunks in circulation, and each time they are checked out the cameras are used by an average of 120 students. If each trunk is checked out 15 times per school year, each trunk can be used by approximately 1800 students per year.

Result Status as of September 15, 2012: At the close of this project on June 30, 2012, the Digital Photography Bridge to Nature project has achieved its goals by presenting 84 workshops to 1147 teachers in two years. It is four more workshops than proposed, and 147 more teachers than the initial goal of 1000 teachers. Since each teacher reaches about 60 students with the program materials, this project has potentially reached about 69,000 students in two years.

Final Report Summary: The program has been so successful that $75,000 has been allocated from RIM Critical Habitat Matching Funds within the Department of Natural Resources for FY ’13 to continue this effort. Two coordinators and seven facilitators have been hired to deliver 40 workshops and photo safaris in the coming year and to develop 48 “Photo Safari” teacher lesson plans sorted by grade level and curricula (science, geography, art, language arts, math, geometry). These lesson plans will be posted on the DNR website. It is the intention of the project manager to continue this effort for five years through FY ’17.

This project is the first of its kind in the nation. Other states and some federal agencies are looking at this model for implementation elsewhere as a way of generating interest in the outdoors by the nation’s youth.

At the conclusion of this project there was a budget balance of $2698.65 which reverts back to the Environment and Natural Resources Trust Fund.

V. TOTAL ENRTF PROJECT BUDGET:

Personnel: $ 77,000
Contracts: $ 70,000
Equipment/Tools/Supplies: $ 13,000

TOTAL ENRTF PROJECT BUDGET: $ 160,000

VI. PROJECT STRATEGY:

A.Project Partners: DNR Divisions of Ecological and Water Resources, DNR Division of ++State Parks and Trails, Section of Fisheries, and Division of Enforcement; Master Naturalists’ Program, MN Pollution Control Agency; Watchable Wildlife Inc., MN Nature Photography Club; MN Extension Service; Minnesota 4-H, White Earth Indian Band; National Camera Exchange, Brandenburg Foundation, USFWS National Wildlife Refuges; and Lee and Rose Warner Nature Center.

B. Project Impact and Long-term Strategy: This project uses the multiplier effect of teaching the teachers to reach Minnesota youth, grades 3-9, through the appeal of digital photography to get them outdoors and exposed to Minnesota's outdoors. If each teacher attending a workshop reaches 30 students with the photo safari activities, this program may reach 30,000 students with outdoor experiences that can result in a lifetime interest in nature and in protecting and enjoying Minnesota's outdoors.

C. Other Funds Proposed to be Spent during the Project Period: A total of over $45,000 was spent for the cameras and field guides, and portable camera kits that are used to distribute the cameras to teachers for use in the classroom. All funds for project management personnel time expended by project manager Carrol Henderson were provided through the Nongame Wildlife Fund.

For FY '11, Project manager Carrol Henderson spent 394 hours managing and coordinating this project at a value of $19,602, and FY '12, an additional $16,000 in personnel time was provided by project manager Carrol Henderson.

Camera donations:	**$ 45,000**
DNR staff time:	**35,600**
In-kind Watchable Wildlife time:	**12,000**
DNR workshop supplies:	**8,000**
Total:	**$ 100,600**

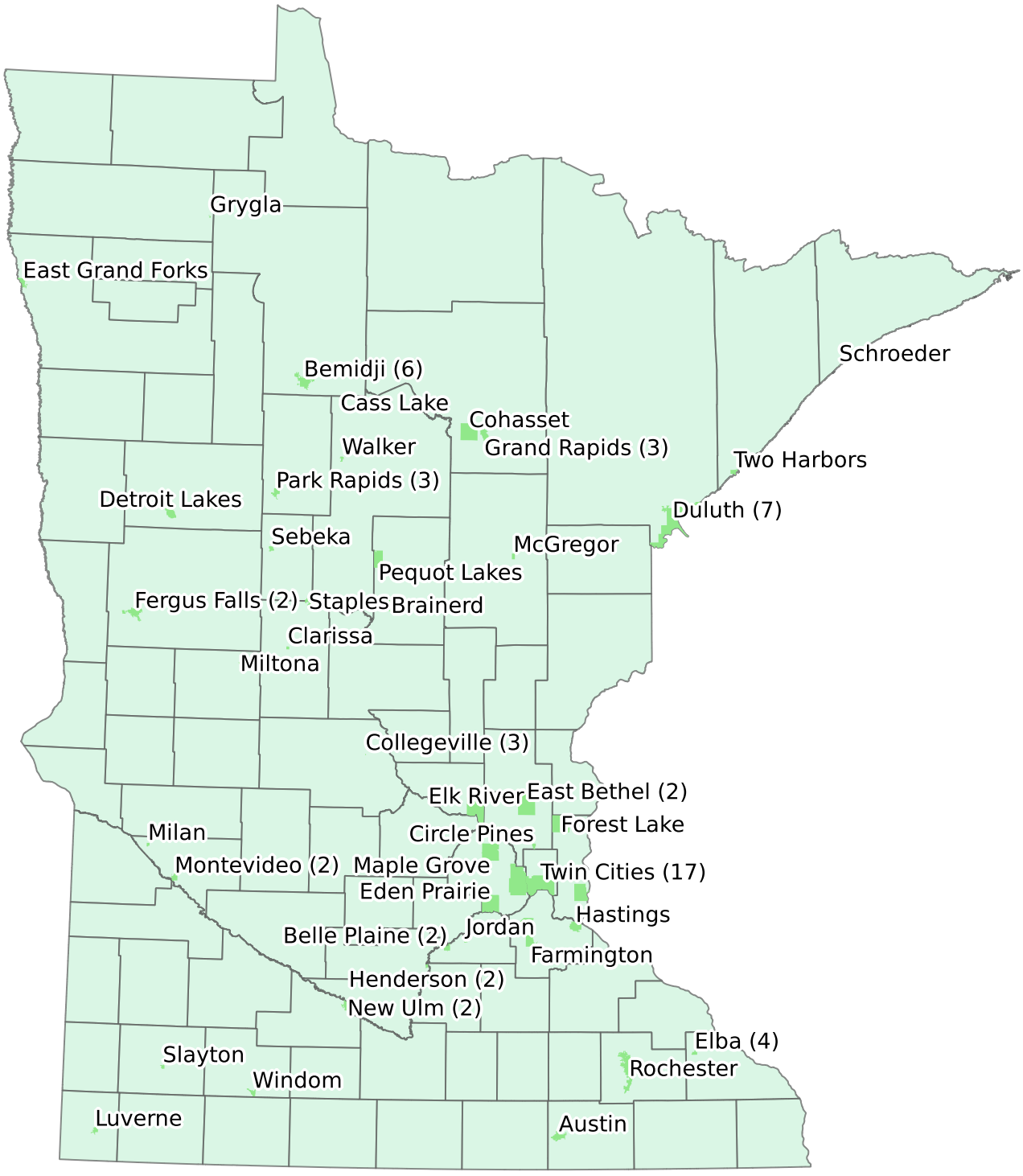
D. Spending History: None.

VII. DISSEMINATION: Information on the Digital Photography Bridge to Nature project is available on the DNR website (www.mndnr.gov). Additional publicity on this project has been shared on local and state newspapers, radio, television, and the national Birdwatching magazine.

VIII. REPORTING REQUIREMENTS: This is the final work program report submitted by September 15, 2012 as requested by the LCCMR.

Attachment A: Final Budget Summary for FY '11-'12 (As of 9-15-2012)					
Project Title: Digital Photography Bridge to Nature					
Project Manager Name: Carrol L. Henderson					
Trust Fund Appropriation: $160,000,					
2010 Trust Fund Budget	**Result 1 Budget:**	**Amount Spent** *(date)*	**Balance (9-15-2012)**	**TOTAL BUDGET**	**TOTAL BALANCE**
	80 teacher workshops				
BUDGET ITEM					
PERSONNEL: wages and benefits	0	0	0	0	0
Contracts					
Professional/technical. Contracts for two workshop coordinators-greater MN and metro area.	70,000	70,000	0	70,000	0
Other contracts: Annual plans for 9 workshop facilitators.	77,000	76,000	1,000	77,000	1,000
Supplies for workshops/learning trunks:reference materials, CDs, trunks	13,000	11,301	1,699	13,000	1,699
COLUMN TOTAL	**$160,000**	**$157,301**	**$2,699**	**$160,000**	**$2,699**

Digital Photography
Bridge to Nature Workshops and Photo Safaris
July 2010 - April 2012



2010 Project Abstract
For the Period Ending June 30, 2013

PROJECT TITLE:	Urban Wilderness Youth Outdoor Education
PROJECT MANAGER:	Greg Lais
AFFILIATION:	Wilderness Inquiry
MAILING ADDRESS:	808 14th Ave SE
CITY/STATE/ZIP:	Minneapolis, MN 55414
PHONE:	612-676-9409
E-MAIL:	greg@wildernessinquiry.org
WEBSITE: [If applicable]	http://www.wildernessinquiry.org
FUNDING SOURCE:	Environment and Natural Resources Trust Fund
LEGAL CITATION:	M.L. 2010, Chp. 362, Sec. 2, Subd. 8d

APPROPRIATION AMOUNT: $557,000

Overall Project Outcome and Results

The goal of Urban Wilderness Youth Outdoor Education (UWYOE) was to provide accessible, outdoor education and recreation opportunities on the Mississippi River and surrounding watershed for more than 20,000 urban youth over a three-year period. UWYOE was developed in response to the sharp decline in participation in outdoor education and activities such as canoeing, camping, hunting and fishing by urban youth.

UWYOE provided experiential environmental learning experiences on the Mississippi River and surrounding watershed for 24,899 Twin Cities middle and high school students, exceeding our initial goal of 20,000. 80% of the youth served identify as a person of color and 80% are eligible for free or reduced lunch. The majority, 76%, had very little or no prior experience with outdoor activities.

Environmental education experiences were provided through outdoor workshops on local lakes and rivers, guided day trips on the Mississippi River, and overnight camping trips in local parks. National Park Service Rangers and Wilderness Inquiry guides provided natural and cultural history and science lessons as part of each program activity. We developed, refined and implemented classroom activities, provided three teacher trainings for Minneapolis Public Schools summer school staff, and developed a program website. We also purchased four 24' Voyageur canoes to expand our capacity to serve more youth.

A three-year evaluation was conducted by the University of Minnesota's Center for Applied Research and Educational Improvement (CAREI). Major outcomes include:

- 77% of participants reported an increased interest in science and the environment
- 87% of teachers agreed that students learned about environmental issues
- 100% of students said they would like to participate in an outdoor activity like this again

This program has gained national attention as a model for engaging urban youth with the environment and building skills to grow future stewards and managers of our public lands. In the summer of 2012, Secretary of the Interior Ken Salazar and Governor Mark Dayton recognized the program as a leader in America's Great Outdoors initiative.

Project Results Use and Dissemination

The Environment and Natural Resources Trust Fund's investment in UWYOE has resulted in the establishment of a model program for engaging youth in the outdoors, which we now call Urban Wilderness Canoe Adventures (UWCA). The UWCA has been recognized by the EPA, the Department of Interior, and Gov. Mark Dayton, among others, as a leader in America's Great Outdoors Initiative. Within the National Park Service and National Forest Service, the UWCA is being held up as an example of how these agencies need to engage in urban communities across the country.

In 2010, Wilderness Inquiry and the Mississippi National River and Recreation Area unit of the National Park Service piloted the UWCA concept developed in the Twin Cities to Washington DC, with support from the National Park Service, US Forest Service, the US Army Corps of Engineers, and several DC based nonprofit organizations. Serving 1,000 DC area school kids on the Anacostia River, this effort helping bring together 20 DC area organizations focused on though and/or the Anacostia River. To build on this success, we launched the "Canoemobile" to introduce youth to urban waters in multiple cities, and to help build local coalitions dedicated to providing outdoor opportunities to disadvantaged youth. In 2013, the Canoemobile will serve youth in Milwaukee, Michigan City, Chicago, Louisville, Cincinnati, Cleveland, Philadelphia, New York City, and Washington DC. Nature Valley has signed on as a sponsor of the Canoemobile.

We held two outcomes briefings (one in 2011 and one in 2013) to present the University of Minnesota's Center for Applied Research and Educational Improvement (CAREI) evaluation results. The first was hosted by the Minneapolis Foundation and the second by Mayor Chris Coleman and the Saint Paul Foundation. Each had more than 35 community leaders, funders, and educators present. Information about the project has also been disseminated through the project website.

The UWCA has received coverage on Kare 11 News, the Star Tribune, Pioneer Press, and Mpls/St. Paul Magazine.

Environment and Natural Resources Trust Fund (ENRTF)
2010 Work Program

Date of Report: June 30, 2013
Date of Next Progress Report: Final Report
Work Program Approval: May 10, 2010
Work Program Amendment Approval: August 22, 2012
Project Completion Date: June 30, 2013

I. PROJECT TITLE: Urban Wilderness Youth Outdoor Education

Project Manager: Greg Lais
Affiliation: Wilderness Inquiry
Mailing Address: 808 14th Ave SE
City / State / Zip: Minneapolis, MN 55414
Telephone Number: 612-676-9409
E-mail Address: greglais@wildernessinquiry.org
Fax Number: 612-676-9401
Web Site Address: http://www.wildernessinquiry.org

Location: Mississippi River Watershed in the Urban Core of Minneapolis and St. Paul and surrounding metropolitan areas.

Total ENRTF Project Budget:	**ENRTF Appropriation**	**$ 557,000.00**
	Minus Amount Spent:	**$ 557,000.00**
	Equal Balance:	**$ 0.00**

Legal Citation: M.L. 2010, Chp. 362, Sec. 2, Subd. 8d

Appropriation Language:
$557,000 is from the trust fund to the commissioner of natural resources for an agreement with Wilderness Inquiry to provide an outdoor education and recreation program on the Mississippi River. This appropriation is available until June 30, 2013, by which time the project must be completed and final products delivered.

II. FINAL PROJECT SUMMARY AND RESULTS:

The goal of Urban Wilderness Youth Outdoor Education (UWYOE) was to provide accessible, outdoor education and recreation opportunities on the Mississippi River and surrounding watershed for more than 20,000 urban youth over a three-year period. UWYOE was developed in response to the sharp decline in participation in outdoor education and activities such as canoeing, camping, hunting and fishing by urban youth.

UWYOE provided experiential environmental learning experiences on the Mississippi River and surrounding watershed for 24,899 Twin Cities middle and high school students, exceeding our initial goal of 20,000. 80% of the youth served identify as a person of color and 80% are eligible for free or reduced lunch. The majority, 76%, had very little or no prior experience with outdoor activities.

Environmental education experiences were provided through outdoor workshops on local lakes and rivers, guided day trips on the Mississippi River, and overnight camping

trips in local parks. National Park Service Rangers and Wilderness Inquiry guides provided natural and cultural history and science lessons as part of each program activity. We developed, refined and implemented classroom activities, provided three teacher trainings for Minneapolis Public Schools summer school staff, and developed a program website. We also purchased four 24' Voyageur canoes to expand our capacity to serve more youth.

A three-year evaluation was conducted by the University of Minnesota's Center for Applied Research and Educational Improvement (CAREI). Major outcomes include:

- 77% of participants reported an increased interest in science and the environment
- 87% of teachers agreed that students learned about environmental issues
- 100% of students said they would like to participate in an outdoor activity like this again

This program has gained national attention as a model for engaging urban youth with the environment and building skills to grow future stewards and managers of our public lands. In the summer of 2012, Secretary of the Interior Ken Salazar and Governor Mark Dayton recognized the program as a leader in America's Great Outdoors initiative.

III. PROGRESS SUMMARY AS OF 1/15/2011:

Since launching the program in July of 2010, we have provided experiential environmental learning experiences on the Mississippi River and surrounding watershed for 5,338 urban youth, developed and implemented classroom curricula, provided a teacher training for Minneapolis Public Schools summer school staff, and completed an evaluation of the program with the University of Minnesota's Center for Applied Research and Educational Improvement. Staff have reviewed the program evaluation, and have begun planning for 2011 events including meeting with partners, scheduling events, preparing curricula, updating the website, and preparing promotional material.

We also purchased two 24' Voyageur canoes for the program to expand our capacity to serve more youth.

PROGRESS SUMMARY AS OF 12/15/2011:

Since launching the program in July of 2010, we have provided experiential environmental learning experiences on the Mississippi River and surrounding watershed for 13,405 urban youth, developed and implemented classroom curricula, provided two teacher trainings for Minneapolis Public Schools summer school staff, and completed two years of program evaluation with the University of Minnesota's Center for Applied Research and Educational Improvement (CAREI). Staff have reviewed the program evaluation, and have begun planning for 2012 events including strategic planning, meeting with partners, scheduling events, preparing curricula, updating the website, and preparing promotional material. We also purchased four 24' Voyageur canoes for the program to expand our capacity to serve more youth.

PROGRESS SUMMARY AS OF 7/6/2012:

Since launching the program in July of 2010, we have provided experiential environmental learning experiences on the Mississippi River and surrounding watershed for 16,952 urban youth, developed and implemented classroom curricula, provided two teacher trainings for Minneapolis Public Schools summer school staff, and completed two years of program evaluation with the University of Minnesota's Center for Applied Research and Educational Improvement (CAREI). Staff have reviewed the program evaluation, and have begun planning for fall 2012 and 2013 events including strategic planning, meeting with partners, scheduling events, preparing curricula, updating the website, and preparing promotional material. We also purchased four 24' Voyageur canoes for the program to expand our capacity to serve more youth.

Approved Amendment Request (8/22/12)

Request for Funds to be **moved from**:	Request for Funds to be **moved to**:	Amount	Reason
Result 1 Line Item - Personnel: Trail Guides	Result 2 Line Item - Personnel: Program Coordinators	$16,000	Due factors beyond our control (i.e. extreme weather, 2011 State shut down, etc.), we are conducting fewer introductory outdoor workshops than originally planned. We are, however, conducting more day events in Result 2 than originally planned. Also, program coordination became much more complicated due to flooding and voluntary discontinued use of locks to prevent spread of Asian Carp. All routes had to be reconfigured and program coordinators are having to work with land owners to develop new landings.
Result 1 Line Item - Personnel: Benefits and taxes	Result 2 Line Item - Personnel: Benefits and taxes	$2,400	See above.
Result 1 Line Item - Food	Result 2 Line Item – Equipment and Supplies	$3,275	See above. Due to increase in number of youth serving at each event, need more life jackets than originally projected.
Result 1 Line Item - Insurance	Result 2 Line Item - Personnel: Program Coordinators	$ 800	Insurance costs were slightly lower than originally projected. Requesting to move these dollars to help cover increased costs of program coordinators in result 2.

Request for Funds to be **moved from**:	Request for Funds to be **moved to**:	Amount	Reason
Result 2 Line Item - Personnel: Trail Guides	Result 2 Line Item - Personnel: Program Coordinators	$10,000	We have benefitted from more volunteers than originally planned for, resulting in lower trail staff salary costs. Program coordination became much more complicated as described above.
Result 2 Line Item - Food	Result 2 Line Item - Personnel: Program Coordinators	$4,000	Cost of food for day trips is less than originally projected. Requesting to move these dollars to help cover increased costs of program coordinators in result 2.
Result 2 Line Item - Insurance	Result 2 Line Item - Personnel: Program Coordinators	$ 5,000	Insurance costs were slightly lower than originally projected. Requesting to move these dollars to help cover increased costs of program coordinators in result 2.
Result 3 Line Item - Insurance	Result 3 Line Item - Personnel: Program Coordinators	$ 4,000	Insurance costs were slightly lower than originally projected. Requesting to move these dollars to help cover increased costs of program coordinators in result 3.
Result 3 Line Item – Permits and Fees	Result 3 Line Item – Personnel: Program Coordinators	$10,000	We had fewer camping fees at Fort Snelling than expected because of flooding and the State shut down. The additional cost for program coordinators is a result of needing to reschedule and move events to other locations.

In addition to the above budget requests, we would like to amend the language in the Equipment and supplies line item for result two to include: These are examples of the kinds of supplies that we will purchase for the project. Other supplies may be needed (i.e. porta potties, fishing supplies, etc).

PROGRESS SUMMARY AS OF 12/31/2012:

Since launching the program in July of 2010, we have provided experiential environmental learning experiences on the Mississippi River and surrounding watershed for 21,950 urban youth, exceeding our initial goal of serving 20,000 youth through the project. We also developed, refined and implemented classroom curricula, provided two teacher trainings for Minneapolis Public Schools summer school staff, developed a program website (http://www.urbanwildernesscanoeadventures.org) and completed two years of program evaluation with the University of Minnesota's Center for Applied Research and Educational Improvement (CAREI), which is attached. Staff have reviewed the program evaluation, and have begun planning for 2013 events including

strategic planning, meeting with partners, scheduling events, preparing curricula, updating the website, and preparing promotional material. We also purchased four 24' Voyageur canoes for the program to expand our capacity to serve more youth.

This program has gained national attention as a model for engaging urban youth with the environment and building skills to grow future stewards and managers of our public lands. In the summer of 2012, Secretary of the Interior Ken Salazar and Governor Mark Dayton recognized the program as a leader in America's Great Outdoors initiative.

IV. OUTLINE OF PROJECT RESULTS*:*

RESULT/ACTIVITY 1: Introductory Outdoor Education Experiences

Description: We will provide introductory canoe and outdoor education experiences serving ~~10,000~~ 5,500 urban youth and families on Mississippi River and surrounding watershed in the Twin Cities metro area. Youth and families will paddle in 24' Voyageur canoes at community events such as Juneteenth and the Stone Arch Festival to introduce them to water safety, basic canoe training, natural history interpretation, and, for many, their first experience getting in a canoe. We will also provide other introductory outdoor activities such as hiking, fishing, snowshoeing and cross-country skiing.

Summary Budget Information for Result/Activity 1:

ENRTF Budget:	**~~$ 50,000.00~~**
Revised Budget:	**$ 27,525.00**
Amount Spent:	**$ 27,525.00**
Balance:	**0.00**

Deliverable/Outcome	Completion Date	Budget
1. Provide introductory or "gateway" canoe and outdoor education experiences for 2,000 youth and families. Cost per youth served: $5.	June 30, 2011	$10,000
2. Provide introductory or "gateway" canoe and outdoor education experiences for ~~3,500~~ 800 youth and families. Cost per youth served: $5.	June 30, 2012	~~$17,500~~ $ 4,025
3. Provide introductory or "gateway" canoe and outdoor education experiences for ~~4,500~~ 2,700 youth and families. Cost per youth served: $5.	June 30, 2013	~~22,500~~ $13,500

Result Completion Date: June 30, 2013

Result Status as of January 15, 2011:

We provided three environmental learning workshops serving 284 urban youth and families from the Twin Cities area. Participants were introduced to the outdoors and environmental education lessons through hands-on exploration of areas in the Mississippi watershed.

Staff reviewed evaluations of the Introductory Outdoor Education Experiences and began planning for 2011 events including meeting with partners, scheduling events, preparing curricula, updating the website, and preparing promotional material.

Result Status as of December 15, 2011:

We have provided a total of 16 introductory canoe and outdoor education experiences serving 2,953 youth and families on the Mississippi River and surrounding watershed in the Twin Cities metro area. Youth and families paddled in 24' Voyageur canoes at community events such as Juneteenth and National Get Outdoors day. We introduced them to water safety, basic canoe training, and natural history interpretation. For many, this was their first exposure to canoeing on local rivers and lakes.

We also provided 16 in-classroom presentations for 250 students on educational and career opportunities in the outdoors through our speakers' bureau.

Staff reviewed evaluations of the Introductory Outdoor Education Experiences and have begun planning for 2012 events including meeting with partners, scheduling events, further developing and preparing curricula, updating the website, and preparing promotional material.

Result Status as of July 6, 2012:

We have provided a total of 24 introductory canoe and outdoor education experiences serving 3,867 youth and families on the Mississippi River and surrounding watershed in the Twin Cities metro area. Youth and families paddled in 24' Voyageur canoes at community events such as Juneteenth and National Get Outdoors day. We introduced them to water safety, basic canoe training, and natural history interpretation. For many, this was their first exposure to canoeing and other outdoor experiences on local rivers and lakes.

Staff reviewed evaluations of the Introductory Outdoor Education Experiences and have begun planning for fall 2012 events and 2013 events including meeting with partners, scheduling events, further developing and preparing curricula, updating the website, and preparing promotional material.

Result Status as of December 31, 2012:

We have provided a total of 30 introductory canoe and outdoor education experiences serving 5,693 youth and families on the Mississippi River and surrounding watershed in the Twin Cities metro area. Youth and families paddled in 24' Voyageur canoes at community events such as Juneteenth, National Get Outdoors day, and Dragon Festival. We introduced urban youth and families to water safety, basic canoe training, and natural history interpretation. For many, this was their first exposure to canoeing and other outdoor experiences on local rivers and lakes.

Staff reviewed evaluations of the Introductory Outdoor Education Experiences and have begun planning for winter and spring 2013 events including meeting with partners, scheduling events, further developing and preparing curricula, updating the website, and preparing promotional material.

Final Report Summary:

We have provided a total of 43 introductory canoe and outdoor education experiences serving 7,127 youth and families on the Mississippi River and surrounding watershed in

the Twin Cities metro area. Youth and families paddled in 24' Voyageur canoes at community events such as Juneteenth, National Get Outdoors day, and Dragon Festival. We introduced urban youth and families to water safety, basic canoe training, and natural history interpretation. For many, this was their first exposure to canoeing and other outdoor experiences on local rivers and lakes.

RESULT/ACTIVITY 2: Environmental Learning Day Trips

Description: We will provide environmental learning day trips serving ~~12,000~~ 15,000 urban youth on the Mississippi River and surrounding watershed in the Twin Cities metro area. These trips will be coupled with more traditional classroom sessions both before and after the day trip.

Youth will paddle in 24' Voyageur canoes to introduce them to the outdoors and provide environmental education lessons through hands-on exploration of the Mississippi River and its surrounding watershed. Other environmental learning activities will involve hiking, snowshoeing, fishing, etc. Youth will participate in environmental education, service learning, river clean up, and habitat restoration activities, creating a foundation for stewardship.

Through a carefully crafted set of modules developed by the National Park Service (as an in-kind contribution to this project), we will assist teachers in linking the indoor and outdoor classrooms for maximum effect. In the weeks preceding the experiential classes on the river, students will be introduced to the science and language arts concepts, as well as to the mapping and topography of the river they will be paddling. While in the outdoor educational setting, they will collect data and build on the information they've acquired in the classroom setting. Following the outdoor classes, students will synthesize what they learned from materials and what they experienced for themselves while on the river.

To help the students develop concrete ways of protecting the river and adjacent wetlands, the teachers and students will develop and execute a "service learning" project where the students will assess how the community interacts with the Mississippi River. They will identify a community need with regard to the river and subsequently, ways to address the need with a student-run initiative, i.e. educating residents about keeping pollutants out of storm water drains. The service learning project will enable the students to apply the skills they're learning in school, and thus reinforce the value of the science and writing knowledge they are gaining through the program.

Summary Budget Information for Result/Activity 2:

ENRTF Budget:	**~~$ 387,000.00~~**
Revised Budget:	**$ 409,475.00**
Amount Spent:	**$ 409,475.00**
Balance:	**$ 0.00**

Deliverable/Outcome	Completion Date	Budget
1. Implement UWYOE curricula in Minneapolis Public Schools Summer School Program.	June 30, 2011	$ 21,833
2. Provide daylong canoe experiences on the	June 30, 2011	$ 68,167

Mississippi River and surrounding watershed for 3,000 youth. Cost per youth served: $30.		
3. Implement UWYOE curricula in one additional school district (total of 2 districts).	June 30, 2012	$ 21,833
4. Provide daylong canoe experiences on the Mississippi River and surrounding watershed for 4,000 youth. Cost per youth served: $30.	June 30, 2012	$150,167
5. Implement UWYOE curricula in two additional school districts (total of 4 districts).	June 30, 2013	$ 21,833
6. . Provide daylong canoe experiences on the Mississippi River and surrounding watershed for ~~5,000~~ 8,000 youth. Cost per youth served: $25.	June 30, 2013	~~$103,167~~ $125,642

Result Completion Date: June 30, 2013

Result Status as of January 15, 2011:

We provided 72 environmental learning day trips serving 4,698 urban youth on the Mississippi River in the Twin Cities metro area. Youth paddled in 24' Voyageur canoes and were introduced to the outdoors and environmental education lessons through hands-on exploration of the Mississippi River.

We introduced an environmental education curriculum to the Minneapolis Public Schools Summer School Program, which students participated in prior to and after the day trip experience.

We also purchased two 24' Voyageur Canoe for the program.

Staff reviewed evaluations of the Environmental Learning Day Trips and began planning for 2011 events including meeting with partners, scheduling events, preparing curricula, updating the website, and preparing promotional material.

Result Status as of December 15, 2011:

We have provided a total of 143 environmental learning day trips serving 9,626 urban youth on the Mississippi River in the Twin Cities metro area. Youth paddled in 24' Voyageur canoes and were introduced to the outdoors and environmental education lessons through hands-on exploration of the Mississippi River.

We introduced an environmental education curriculum to the Minneapolis Public Schools Summer School Program and the St. Paul Public Schools AVID Program (Advancement Via Individual Determination), to engage students before and after the day trip experience. In the summer of 2011, the curricula was further integrated into the online curricula at the high school level for English, Social Studies, Science, Math, Health, and Physical Education courses. Additionally, we conducted two Minneapolis Public Schools teacher-training sessions on the river to provide information and support on using the curricula in the classroom

We have also purchased four 24’ Voyageur Canoe for the program.

Staff reviewed evaluations of the Environmental Learning Day Trips and began planning for 2012 events including strategic planning, meeting with partners, scheduling events, preparing curricula, updating the website, and preparing promotional material.

Result Status as of July 6, 2012:

We have provided a total of 171 environmental learning day trips serving 11,568 urban youth on the Mississippi River in the Twin Cities metro area. Youth paddled in 24’ Voyageur canoes and were introduced to the outdoors and environmental education lessons through hands-on exploration of the Mississippi River.

We introduced an environmental education curriculum to the Minneapolis Public Schools Summer School Program and the St. Paul Public Schools AVID Program (Advancement Via Individual Determination), to engage students before and after the day trip experience. In the summer of 2012, the curricula was further integrated into the online curricula at the high school level for English, Social Studies, Science, Math, Health, and Physical Education courses. Additionally, we conducted two Minneapolis Public Schools teacher-training sessions on the river to provide information and support on using the curricula in the classroom

We have also purchased four 24’ Voyageur Canoe for the program.

Staff reviewed evaluations of the Environmental Learning Day Trips and began planning for fall 2012 and 2013 events including strategic planning, meeting with partners, scheduling events, preparing curricula, updating the website, and preparing promotional material.

We also provided 27 in-classroom presentations for 800 students on educational and career opportunities in the outdoors through our speakers’ bureau.

Result Status as of December 31, 2012:

We have provided a total of 219 environmental learning day trips serving 14,615 urban youth on the Mississippi River in the Twin Cities metro area. Youth paddled in 24’ Voyageur canoes and were introduced to the outdoors and environmental education lessons through hands-on exploration of the Mississippi River.

We introduced an environmental education curriculum to the Minneapolis Public Schools Summer School Program and the St. Paul Public Schools AVID Program (Advancement Via Individual Determination), to engage students before and after the day trip experience. In the summer of 2012, the curricula was further integrated into the online curricula at the high school level for English, Social Studies, Science, Math, Health, and Physical Education courses. Additionally, we conducted two Minneapolis Public Schools teacher-training sessions on the river to provide information and support on using the curricula in the classroom

We have also purchased four 24' Voyageur Canoe for the program.

Staff reviewed evaluations of the Environmental Learning Day Trips and are actively planning for fall 2013 events including strategic planning, meeting with partners, scheduling events, preparing curricula, updating the website, and preparing promotional material.

Final Report Summary:

We have provided a total of 243 environmental learning day trips serving 15,734 urban youth on the Mississippi River in the Twin Cities metro area. Youth paddled in 24' Voyageur canoes and were introduced to the outdoors and environmental education lessons through hands-on exploration of the Mississippi River.

We introduced an environmental education curriculum to the Minneapolis Public Schools Summer School Program and the St. Paul Public Schools AVID Program (Advancement Via Individual Determination), to engage students before and after the day trip experience. In the summer of 2012, the curricula was further integrated into the online curricula at the high school level for English, Social Studies, Science, Math, Health, and Physical Education courses. Additionally, we conducted two Minneapolis Public Schools teacher-training sessions on the river to provide information and support on using the curricula in the classroom. We have also purchased four 24' Voyageur Canoe for the program.

RESULT/ACTIVITY 3: Environmental Learning Overnight Trips

Description: Provide overnight environmental learning experiences for 1,000 urban youth on the Mississippi River and surrounding watershed. These experiences provide an opportunity for students to deepen and expand on the work they have done on the environmental learning day trips.

In addition to canoeing and camping, students will study the ecosystems of the flood plain forest and the history of human efforts to live in the floodplain. Students will understand the many connections between the local river and the world including relationships to commodity agriculture and shipping. Students will define and commit to a vision for a healthy future river while also considering the implications of global climate change for the river environment.

Summary Budget Information for Result/Activity 3:

ENRTF Budget:	**$ 75,000.00**
Amount Spent:	**$ 75,000.00**
Balance:	**$ 0.00**

Deliverable/Outcome	Completion Date	Budget
1. Provide overnight canoe trips on the Mississippi River and surrounding metro area watersheds for 250 youth. Cost per youth served: $75.	June 30, 2011	$ 18,750
2. Provide overnight canoe trips on the Mississippi	June 30, 2012	$ 26,250

River and surrounding metro area watersheds for 350 youth. Cost per youth served: $75.		
3. Provide overnight canoe trips on the Mississippi River and surrounding metro area watersheds for 400 youth. Cost per youth served: $75.	June 30, 2013	$ 30,000

Result Completion Date: June 30, 2013

Result Status as of January 15, 2011:

We provided 12 overnight environmental learning experiences for 356 urban youth on the Mississippi River. These experiences provided an opportunity for students to deepen and expand on the work they have done on the environmental learning day trips.

Staff reviewed evaluations of the Environmental Learning Overnight Trips and began planning for 2011 events including meeting with partners, scheduling events, preparing curricula, updating the website, and preparing promotional material.

Result Status as of December 15, 2011:

We have provided a total of 19 overnight environmental learning experiences for 623 urban youth on the Mississippi River. These experiences provided an opportunity for students to deepen and expand on the work they have done on the environmental learning day trips.

Staff reviewed evaluations of the Environmental Learning Overnight Trips and began planning for 2012 events including meeting with partners, scheduling events, preparing curricula, updating the website, and preparing promotional material.

Result Status as of July 6, 2012:

We have provided a total of 24 overnight environmental learning experiences for 737 urban youth on the Mississippi River. These experiences provided an opportunity for students to deepen and expand on the work they have done on the environmental learning day trips.

Staff reviewed evaluations of the Environmental Learning Overnight Trips and began planning for fall 2012 and 2013 events including meeting with partners, scheduling events, preparing curricula, updating the website, and preparing promotional material.

Result Status as of December 31, 2012:

We have provided a total of 40 overnight environmental learning experiences for 1,099 urban youth on the Mississippi River. These experiences provided an opportunity for students to deepen and expand on the work they have done on the environmental learning day trips.

We also conducted 6 follow-up activities with schools after their day trip to continue student learning. We served 543 youth through these programs.

Staff reviewed evaluations of the Environmental Learning Overnight Trips and began planning for 2013 events including meeting with partners, scheduling events, preparing curricula, updating the website, and preparing promotional material.

Final Report Summary:

We provided a total of 46 overnight environmental learning experiences for 1,197 urban youth on the Mississippi River. These experiences provided an opportunity for students to deepen and expand on the work they have done on the environmental learning day trips.

We also conducted 26 follow-up activities with schools after their day trip to continue student learning. We served 841 youth through these programs.

RESULT/ACTIVITY 4: Evaluate Success of the Program and Develop Plan for Replication

Description: Oversee and evaluate the success of the UWYOE experiences and curricula in connecting urban youth with the natural world and creating a conservation ethic.

We will work with researchers from the University of Minnesota's Center for Applied Research and Educational Improvement to development evaluation strategies to measure the effectiveness of the curricula in achieving environmental education outcomes as well as school performance outcomes in science and English language arts.

The evaluation will measure our success in achieving stewardship objectives, such as:

- Students will be able to identify many ways in which they are connected to the water of the river.

- Students will demonstrate an understanding of how human behavior affects the health of the river ecosystem.

- Students will demonstrate an understanding of conservation issues from numerous cultural perspectives, and be able to compare and contrast those perspectives (i.e. Euro-American and Dakota relationships to the river and other aspects of nature).

- Students will understand the many connections between the local river and the world including relationships to commodity agriculture and shipping.

- Students will define and commit to a vision for a healthy future river while also considering the implications of global climate change for the river environment

During its first year, we will implement the program into Minneapolis Public Schools' 5th through 8th grade classes. We are developing a model that can easily be replicated in other grades within other schools. In years two and three of the grant, Wilderness Inquiry will work with St. Paul and Anoka-Hennepin School Districts to implement the program in their schools. During this same period, Wilderness Inquiry and Minneapolis Public Schools will evaluate ways to expand and extend the program to serve more 9th through 12th grade students throughout the calendar year.

Summary Budget Information for Result/Activity 4:

ENRTF Budget:	**$ 45,000.00**
Amount Spent:	**$ 45,000.00**
Balance:	**$ 0.00**

Deliverable/Outcome	Completion Date	Budget
1. Work with researchers at the U of M to develop and implement an evaluation process to measure the success of the program for students in terms of environmental education outcomes.	December 30, 2010	$ 1,500
2. Collect data and report on year 1 activities.	Oct. 1, 2011	$14,000
3. Collect data and report on year 2 activities.	Oct. 1, 2012	$14,000
4. Collect data and report on year 3 activities.	June 30, 2013	$14,000
5. Disseminate findings to appropriate organizations and journals.	June 30, 2013	$ 0
6. Develop a written model of the program that can be used to replicate the program in other areas around the state.	June, 30 2013	$ 1,500

Result Completion Date: June 30, 2013

Result Status as of January 15, 2011:

We contracted the University of Minnesota's Center for Applied Research and Educational Improvement to design and conduct an evaluation of the program. A draft of the evaluation of this summer's program has been completed. We established a research and evaluation committee to guide the evaluation and research process. Dr. Martha Ferrell Erickson heads this committee.

Result Status as of December 15, 2011:

We contracted the University of Minnesota's Center for Applied Research and Educational Improvement to design and conduct a formal program evaluation. An evaluation of the first year of the program (2010) was completed and presented to supporters at a funders briefing held on April 5, 2011 at the Minneapolis Foundation. A draft of the 2011 summer program evaluation was also completed; the findings from this evaluation suggest that the program has the desired effect of increasing youth interest in environmental protection and pursuing internships or jobs in the outdoor industry. Currently, evaluators are refining instruments and conducting a literature review that will allow us to better measure the program impact on youth. We also hope to follow participants over multiple years, as they gain deeper outdoor experiences and the impact those experiences have on other spheres of their lives and learning.

We established a research and evaluation committee to guide the evaluation and research process. Dr. Martha Ferrell Erickson heads this committee.

Result Status as of July 6, 2012:

We contracted the University of Minnesota's Center for Applied Research and Educational Improvement to design and conduct a formal program evaluation. An evaluation of the first year of the program (2010) was completed and presented to supporters at a funders briefing held on April 5, 2011 at the Minneapolis Foundation. A final report of the 2011 summer program evaluation was also completed; the findings from this evaluation suggest that the program has the desired effect of increasing youth interest in environmental protection and pursuing internships or jobs in the outdoor industry. In year two of the grant, evaluators refined instruments and conducted a literature review that will allow us to better measure the program impact on youth. Data from the 2012 program is currently being reviewed and a report being assembled.

Result Status as of December 31, 2012:

We continued work with the University of Minnesota's Center for Applied Research and Educational Improvement to design and conduct an evaluation of the program. During this period, we compiled data collected from Minneapolis Public School and Saint Paul Public School participants and created a final draft of the evaluation report for this year's program activities. A copy of this report is attached.

Final Report Summary:

Evaluation of the program was conducted by the University of Minnesota's Center for Applied Research and Educational Improvement (CAREI). Major outcomes include:

• 77% of participants reported an increased interest in science and the environment
• 87% of teachers agreed that students learned about environmental issues
• 100% of students said they would like to participate in an outdoor activity like this again

This program has gained national attention as a model for engaging urban youth with the environment and building skills to grow future stewards and managers of our public lands. In the summer of 2012, Secretary of the Interior Ken Salazar and Governor Mark Dayton recognized the program as a leader in America's Great Outdoors initiative.

V. TOTAL ENRTF PROJECT BUDGET:

Personnel: **TOTAL $344,885**

- UWYOE Program Coordinators- $185,300
- WI Trail Guides, TBA (2.5 FTE) - $121,661

  Responsible for conducting safe and enjoyable environmental educational canoe trips.
- Benefits and taxes - $37,924

Contracts: **TOTAL $ 20,500**

To work with the University of Minnesota's Center for Applied Research and Educational Improvement to develop and implement a coordinated assessment and evaluation of the program (more detail provided on pp. 4-6)

Transportation: **TOTAL $ 48,000**

Rental of two vehicles for four months each year to transport staff, equipment, and participants to and from program events. Also includes gas and maintenance for these vehicles.

Equipment/Tools/Supplies: **TOTAL $ 43,000**

All program supplies and equipment for participants and program volunteers. A detailed listing of all equipment and supplies is provided in Attachment A.

Food: **TOTAL $ 11,915**

All meals and snacks for participants, staff and volunteers. Ave cost of 83 cents per person served.

Insurance: **TOTAL $ 32,200**

Students in this program will engage in canoeing, hiking, and other outdoor activities that have inherent risk. While Wilderness Inquiry has an excellent safety record, we must carry liability insurance for this program. We use a standard cost per service day (one person served for one day) to allocate insurance costs. The UWYOE program represents 20% of our overall service days. The total dollar amount for this line represents 20% of our insurance cost.

Permits and Fees: **TOTAL $ 4,500**

For overnight camping fees at Fort Snelling State Park.

Capital Expenditures Greater Than $3,500: **TOTAL $ 52,000**

Four 24' Voyageur canoes.

TOTAL ENRTF PROJECT BUDGET: $557,000

Explanation of Capital Expenditures Greater Than $3,500: As in all programs we do, safety will be our first priority in conducting UWYOE actvities. While our greatest safety precaution on Mississippi River trips is trained, professional staff, another key to safe and successful UWYOE trips is the use of the 24' Voyageur canoes made by Northwest Canoe Company located in downtown St. Paul, MN These boats offer:

- Stability – These canoes are very stable and they can take very large waves—built for Lake Superior.
- Power – Can accommodate up to ten people per boat, providing opportunities to participate for inexperienced or weak paddlers who simply would not be able to safely

handle a tandem canoe.
- Efficient staff to student ratios – Because one staff member can paddle eight students, we are able to safely staff these outings with a ratio of 1 staff to 8 students.

In order to expand our capacity to serve an increasing number of youth in the program each year of the grant, we need to purchase four of these specially crafted boats. We will continue to use these boats for environemental education purposes for the life of the boats.

VI. PROJECT STRATEGY:

A. Project Partners: Mississippi National River and Recreation Area (National Park Service) and Mississippi River Fund. Neither partner is receiving any monies from the appropriation.

The National Park Service role in the partnership will focus primarily on environmental education and interpretation and coordination with other partners, including facilitating land use agreements and developing water trail facilities and interpretation. The NPS will also provide education content to the UWYOE and Park Rangers on all day and overnight trips. Additionally, the NPS will develop a special Jr. Ranger component to the canoe route enabling participants to earn their Jr. Ranger Badge.

Because the NPS staff are closely involved in the preservation and interpretation of the many natural and cultural resources, they are able to enrich the experiences with information customized to the needs of school groups. As part of the the program, the NPS will provide enducational materials such as laminated historic photos, maps, learning activities on shore, and stewardship programs that provide tangilble environmental education learning opportunities and the builidng blocks for a stewardship ethic. Staff at the NPS have already developed a rich trove of educational and interpretive materials to educate youth on the natural, cultural, and environmental aspects of the Mississippi. The NPS and other partners will continue to develop these materials and make them available and accessible to teachers and students.

The Mississippi River Fund's primary role is to champion this program in the community and be the chief fundraising entity to start up and sustain the UWYOE, as well as assist with promotion and public relations. MRF will also coordinate program evaluations to determine the effectiveness of the UWYOE.

B. Project Impact and Long-term Strategy: Our goal is to build pubic awareness, commitment, and enthusiasm for the UWYOE so that it will be sustained long after the initial investment of the LCCMR. We will seek to establish long-term funding options from foundations, corporations, individuals, events, and the Federal Government (National Park Service). By serving 10,000 to 15,000 youth per year, we aim to create a new generation of outdoor enthusiasts who understand and use canoe and boating routes and waterways throughout the State of MN.

C. Other Funds Proposed to be spent during the Project Period:

Wilderness Inquiry: $246,674

For Executive staff time, program administration, web and internet development, and insurance.

National Park Service: $88,021

For curricula development and materials and Park Ranger salaries to provide environmental education curricula and interpretion on environmental education trips.

Mississippi River Fund: $51,000

Additional grants to support the program.

D. Spending HIstory:

2009 Spending

Wilderness Inquiry: $183,522

National Park Service: $45,983

Mississippi River Fund: $86,391

VII. DISSEMINATION:
We will work with our partners at the University of Minnesota and the public schools to identify venues for disseminating information and findings about this project. Information will also be posted at http://www.wildernessinquiry.org/UWYOE

January 15, 2011: To date we have not disseminated information about program outcomes, but we plan to as soon as the program evaluation is finalized.

December 15, 2011: We held a funders briefing on program outcomes and evaluation on April 5, 2011. Hosted by the Minneapolis Foundation, more than 50 funders, school representatives, and interested community members were in attendance.

December 31, 2012: This program has gained national attention as a model for engaging urban youth with the environment and building skills to grow future stewards and managers of our public lands. In the summer of 2012, Secretary of the Interior Ken Salazar and Governor Mark Dayton recognized the program as a leader in America's Great Outdoors initiative. Many other communities have asked for our help and assistance in replicating this program in their communities. In 2012, our Canoemobile project served more than 3,000 urban youth in Chicago, Milwaukee, Michigan City, Cincinnati, Louisville, New York City, and Washington DC.

Final Report Summary:
The Environmental Trust Fund's investment in UWYOE has resulted in the establishment of a model program for engaging youth in the outdoors, which we now call Urban Wilderness Canoe Adventures (UWCA). The UWCA has been recognized by the EPA, the Department of Interior, and Gov. Mark Dayton, among others, as a leader in America's Great Outdoors Initiative. Within the National Park Service and National

Forest Service, the UWCA is being held up as an example of how these agencies need to engage in urban communities across the country.

In 2010, Wilderness Inquiry and the Mississippi National River and Recreation Area unit of the National Park Service piloted the UWCA concept developed in the Twin Cities to Washington DC, with support from the National Park Service, US Forest Service, the US Army Corps of Engineers, and several DC based nonprofit organizations. Serving 1,000 DC area school kids on the Anacostia River, this effort helping bring together 20 DC area organizations focused on though and/or the Anacostia River. To build on this success, we launched the "Canoemobile" to introduce youth to urban waters in multiple cities, and to help build local coalitions dedicated to providing outdoor opportunities to disadvantaged youth. In 2013, the Canoemobile will serve youth in Milwaukee, Michigan City, Chicago, Louisville, Cincinnati, Cleveland, Philadelphia, New York City, and Washington DC. Nature Valley has signed on as a sponsor of the Canoemobile.

We held two outcomes briefings (one in 2011 and one in 2013) to present the University of Minnesota's Center for Applied Research and Educational Improvement (CAREI) evaluation results. The first was hosted by the Minneapolis Foundation and the second by Mayor Chris Coleman and the Saint Paul Foundation. Each had more than 35 community leaders, funders, and educators present. Information about the project has also been disseminated through the project website.

The UWCA has received coverage on Kare 11 News, the Star Tribune, Pioneer Press, and Mpls/St. Paul Magazine.

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than December 15, 2011, September 15, 2012, January 15, 2013. A final work program report and associated products will be submitted between June 30 and August 1, 2013 as requested by the LCCMR.

Final Attachment A: Budget Detail for 2010 Projects

Project Title: Urban Wilderness Youth Outdoor Education (LCCMR ID: 165-F)

Project Manager Name: Greg Lais

Trust Fund Appropriation: $ 557,000

Updated -July 2, 2013

2010 Trust Fund Budget	**Result 1 Budget:**	**Amount Spent** 6/30/2013	**Balance** 6/30/2013	**Result 2 Budget:**	**Amount Spent** 6/30/2013	**Balance** 6/30/2013	**Result 3 Budget:**	**Amount Spent** 6/30/2013	**Balance** 6/30/2013	**Result 4 Budget:**	**Amount Spent** 6/30/2013	**Balance** 6/30/2013	**TOTAL BUDGET**	**TOTAL AMOUNT SPENT 6/30/2013**	**TOTAL BALANCE 6/30/2013**
	Introductory Outdoor Education Experiences (5,500			Environmental Learning Day Trips (15,000 youth served)			Enviornmental Learning Overnight Trips (1,000 youth			Data Collection and Evaluation					
BUDGET ITEM															
PERSONNEL: wages and benefits															
- UWCA Program Coordinators (1.5 FTE)				124,300.00	124,300.00	0.00	39,000.00	39,000.00	0.00	22,000.00	22,000.00	0.00	185,300.00	185,300.00	0.00
- WI Trail Guides (2.5 FTE)	22,000.00	22,000.00	0.00	80,000.00	80,000.00	0.00	19,661.00	19,661.00	0.00	-	0.00	0.00	121,661.00	121,661.00	0.00
- Benefits and Taxes (15% of wages)	3,300.00	3,300.00	0.00	29,175.00	29,175.00	0.00	2,949.00	2,949.00	0.00	2,500.00	2,500.00	0.00	37,924.00	37,924.00	0.00
Contracts															
Professional/technical University of MN for Evaluation										20,500	20,500	0	20,500.00	20,500.00	0.00
Other direct operating costs:														0.00	
Transportation (vehicle rental to transport staff and equipment to and from program events, gas, and maintenance.)				48,000.00	48,000.00	0.00				-	0	0	48,000.00	48,000.00	0.00
Equipment/Tools/Supplies: (~~All~~ Examples of program supplies and equipment for participants and program volunteers are listed below. Please note that the items below are estimates of program supplies and equipment needed. We will bill for actual costs): • $4,000 for life jackets (80 @ $50 ea.) • $8,400 for VHF radios (30 @$280 ea.) • $2,500 for paddles (80 @ $31.25 ea.) • $ 500 for coolers (20 @ 25 ea.) • $ 500 for action packers (15 @ $33 ea.) • $15,000 for boat and equip. maintenance • $ 200 for megaphones • $ 3,500 for staff and volunteer vests (uniform) • $ 5,125 for t-shirts • $ 500 for port-a-potty rental • $2,775 for fishing supplies (i.e. tackle, lures,				43,000.00	43,000.00	0.00				-	0	0	43,000.00	43,000.00	0.00
Food (all meals and snacks for participants and staff)	25.00	25.00	0.00	8,000.00	8,000.00	0.00	3,890.00	3,890.00	0.00	-	0	0	11,915.00	11,915.00	0.00
Insurance (for liability insurance; we use a standard cost per service day, our unit of measure, to allocate insurance costs. The UWCA program represents 20% of our overall service	2,200	2,200.00	0.00	25,000.00	25,000.00	0.00	5,000.00	5,000.00	0.00	-	0	0	32,200.00	32,200.00	0.00
Permits and Fees (camping fees at Ft. Snelling)							4,500.00	4,500.00	0.00	-	0	0	4,500.00	4,500.00	0.00
Capital equipment over $3,500 Four 24' Voyaguer Canoes @ $13,000 each				52,000.00	52,000.00	0.00		0.00	0.00	-	0	0	52,000.00	52,000.00	0.00
COLUMN TOTAL	**27,525.00**	**27,525.00**	**0.00**	**409,475.00**	**409,475.00**	**0.00**	**75,000.00**	**75,000.00**	**0.00**	**$45,000.00**	**$45,000.00**	**$0.00**	**557,000.00**	**557,000.00**	**0.00**

NO CHILD LEFT INSIDE

Wilderness programs in local public schools unplug city kids from their devices and plug them into the joys of nature. BY BETH DOOLEY • PHOTOS BY KATHERINE HARRIS

ONE HOT MORNING LAST JULY, I found myself sitting in a yellow school bus with a small army of bleary-eyed high-school students, rumbling toward Cleary Lake Regional Park for an overnight "urban wilderness adventure." We hadn't gotten to the adventure part yet, so the students were wearing the sort of jaded expressions that D. H. Lawrence once called the "know-it-all state of mind," that half-awake teenage leer that suggests a mood somewhere between contempt and disdain.

The kids were from South, Southwest, Roosevelt, Washburn, and North high schools, and were part of a summer "Credit Recovery Program" (what we used to call summer school) sponsored by Wilderness Inquiry, the Mississippi River Fund, and the Minneapolis Public Schools. Credits aside, the purpose of these trips is to give urban youth a chance to experience nature and, with any luck, whet their appetite for activities that don't require an Xbox and a speedy Internet connection. When the bus huffed to a stop in the

*As seen in the July issue of *Mpls.St.Paul Magazine!*

Swimming and studying: Kids earn credits while discovering the joys and lessons of the great outdoors through the Urban Wilderness Canoe Adventures program.

park, the students stood, yawned, and stretched, then spilled out across the verdant green campsite, swinging their backpacks or dragging enormous duffels and roller bags. They dumped their luggage in a heap, simultaneously shedding their droopy attitudes. A football arced through the thick air, and the students began to shout, giggle, tumble, and goof around as they pawed through piles of sleeping bags and mats. Four Wilderness Inquiry guides sorted the students into groups of three, allowing friends to cluster, then sent them off to assemble their tents. "Boys on this side of the campfire ring, girls over there." The guides let the students fumble with tent poles and zippers, and stepped in only when asked. Soon, nylon shelters were popping up across the green, forming a small village of colorful domes.

MORE THAN A FIELD TRIP

Under the direction of Sarah Oppelt, the trip leader, we all gathered to hold hands in an introductory game that involved catching our neighbor's middle finger. We each went around shouting our names and our favorite band. Rihanna, Adam Lambert, Big Sean, and Kid Cudi reigned; the Rolling Stones did not. Then came the rules. Respect preceded every instruction: Respect oneself, respect the environment, respect each other.

In only its fourth year, Urban Wilderness Canoe Adventures has led day trips down the Mississippi River for **MORE THAN 22,000 YOUTHS**.

Within minutes the students were swimming in Cleary Lake. Their hard stares had vanished, and the clumps of friends that had first huddled together, reluctant to mingle, now gleefully dispersed across the beach. The subsequent learning activities, meals,

reflections, and s'mores were carefully calibrated to provide a blend of action and downtime. Prior to the trip, the staff discussed preparatory concerns—everything from meals, drug-abuse issues, and medical emergencies—and had created a plan to address them all.

These overnight camping excursions are much more than a field trip or "fresh air" experience. The students also earn credits for classes in math, science, English, social studies, and health. It is technically "school," after all, so there are expectations that the students will do more than simply have fun.

NATURE DEFICIT DISORDER

Beyond academics, the program also seeks to bridge the enormous gap between urban youth and the great outdoors. As child-advocacy expert Richard Louv writes in his ground-breaking work, *Last Child in the Woods: Saving Our Children from Nature Deficit Disorder*, many of the seemingly unrelated maladies of the younger generation—obesity, depression, behavioral disorders—may be linked in part to a highly wired environment that is detached from nature. Whereas every generation before them has spent a substantial portion of their free time outside (because there wasn't much to do inside), the younger generation's fascination with video games, television, computers, laptops, and smartphones has lured them indoors, where they now spend the majority of their time. Louv

THE STUDENTS EARN CREDITS FOR CLASSES in math, science, English, social studies, and health. It is technically "school," after all, so there are expectations that the students will do more than simply have fun.

calls this lack of exposure to natural beauty and the sensory experience of being outdoors "nature deficit disorder." Drawing on extensive research, Louv makes a compelling case that regularly interacting with nature is essential to healthy physical and emotional development. The Urban Wilderness Canoe Adventures program is specifically designed to expose urban youths to outdoor activities they might otherwise never experience, and it deliberately takes place in parks near the city in

CHANGING ATTITUDES

The UWCA summer-school program has introduced the Mississippi River to more than 5,000 ethnically diverse students, many of them students of color living in high levels of poverty.

77 percent of the participating students report that the experience changed their attitude about the environment and science.

70 percent of their teachers say they witnessed far deeper engagement in the students' work after completing the program.

order to impress upon kids that in the Twin Cities, beautiful natural habitats are never far away.

In only its fourth year, Urban Wilderness Canoe Adventures has led day trips down the Mississippi River for more than 22,000 youths. Older students are offered longer excursions that include an overnight at Fort Snelling. Those who have completed both day and overnight trips have an opportunity to apply for a much grander trip to Glacier National Park.

The program is being studied by the University of Minnesota's Center for Applied Research and Educational Improvement. According to last year's U of M report, the Urban Wilderness Canoe Adventures program significantly improved students' classroom attendance, increased their interest in the natural world, and heightened their commitment to take care of the city's natural resources.

"Something happens to city kids when they get into nature," says Mike Hastert, an educational associate who accompanied his students on the trip, along with his colleague Maria Vallejo. Hastert has a scruffy blond beard, wears his baseball cap backwards, and is just beefy enough to look tough. He considers these outings to be a big job perk, even though he is giving up part of his own summer to do them. At one point I remarked that the kids seemed more engaged and lively than they were on the bus, and he nodded in agreement.

"The walls come down," Hastert says. "They don't have to cling to whatever identity they have at school, athlete or hipster. They don't have to stick in a clique. And they see me as a regular guy, tossing the football and telling jokes—not the one nagging them about schedules and homework."

RESPECT AND S'MORES

Back on the lake, a group of students shouted "Whoa!" as an egret floated to a graceful landing on the opposite bank. Michael, a sophomore who wouldn't let go of his girlfriend Diniqua's hand all morning, bobbed in the water playing a game of Marco Polo, while Diniqua played tag on the shore. Only Renuke, a girl from Nepal who wore a pink knee-length top and ankle-length pants, sat apart under a tree, engrossed in a paperback book. "It's not common for us to undress," she told me.

After lunch, the students split into groups. Under the direction of national park ranger Mary Blitzer, some wandered off with a Wilderness Inquiry guide to study Fort Snelling's voyageurs and traders. Another group headed to the lakeshore to test the water for nitrogen levels and turbidity, as well as plant and aquatic life. They scooped up freshwater mussels, clams, and crayfish in tiny nets, and even found a baby catfish. For a math assignment, they measured trees and calculated their height using

OTHER NATURE PROGRAMS

The UWCA, offered through Minneapolis and St. Paul Public Schools, is one of many nature-oriented programs available to local young people. Following are several education-oriented programs that offer similar experiences:

AUDUBON CENTER OF THE NORTH WOODS Located in Sandstone, the Audubon Center offers a variety of programs for students K–12. *audubon-center.com*

WILDERNESS INQUIRY Youth, teens, and families can have a range of experiences—on the Mississippi River, in the Boundary Waters, and in the Apostle Islands. *wildernessinquiry.org*

WOLF RIDGE ENVIRONMENTAL LEARNING CENTER The center provides a number of experiences and camps along the North Shore for students K–12. *wolf-ridge.org*

YMCA TWIN CITIES CAMPS The YMCA offers nature experiences for both younger children (including Outdoor Living Skills Camp, Canoe Camp) and for teens (Leaders in Training, Canoeing Camp). *ymcatwincities.org*

CAMP MENOGYN Located outside Grand Marais on West Bearskin Lake in the Boundary Waters, Camp Menogyn offers a range of eight- to 50-day wilderness experiences. *ymcatwincities.org*

CAMP WIDJIWAGAN Located outside Ely, the camp offers a variety of 10- to 50-day wilderness experiences similar to Camp Menogyn. *ymcatwincities.org*

YOUTH FARM AND MARKET PROJECT Aimed at youth ages 9–24, this project provides year-round youth-development programming including experiential education, urban agriculture, gardening, and greenhouses. Farm stays are optional. *youthfarm.net*

geometry and ratios. The groups that correctly answered all the questions got to splash the guide; those who didn't got doused themselves.

Come evening, the students were divided into cooking and cleanup crews. I listened as three girls—Clarisse, Anna, and Renuke—shredded cheese and chopped tomatoes. They talked about what they cook at home—Nepalese soups, Swedish meatballs, pot roast, fajitas—sketching between them a sort of international culinary map. Before we ate, we gathered again in a circle to hold hands through announcements for the evening's schedule, then observed a moment of silence. The "chow circle" was broken after we "passed the pulse," squeezing the palm of our neighbor to the left. There was plenty of food—burritos with spiced chicken, guacamole, salsa, cheese, refried beans, lettuce, chopped tomatoes, sour cream—and we ate a lot. I complimented Diniqua on her rings, one on each finger, and she had a story for each. "This one my boyfriend Michael just gave me. This one is from my mom's boyfriend. This I found on the ground," she told me. "This is the one my dad was wearing when he was shot. My mom took it off his finger before he went to the morgue, so it never got washed," she explained. "It's like his skin is still right next to mine. I keep it on all the time." The table went silent; I didn't know what to say. "It was bad," she added. "But he's in a better place." "When do we get s'mores?"

3 MAIN REASONS KIDS STAY INDOORS

Parental fear—especially perceived "stranger danger."

Addiction to technology: The average child between the ages of 8 and 18 spends 53 hours per week engaged with media (computer, TV, phone, etc.).

Real or perceived lack of access to natural places.

Clarissa chimed in.

Kyle, a lean and lanky junior with an afro that added five inches to his height, hopped up on his table to announce that it was time for the cleaning crew to gather. He told us all to wipe the food off our plates into the trash before dunking them in the wash water. "Respect me, please," he shouted. After cleanup, the students broke into five groups and were prompted by the Wilderness Inquiry guides to reflect on their day. Swimming was a highlight, they agreed. So was meeting new people. Several admitted that they wanted to be more patient and more accepting of their peers. Some even claimed they wanted to be better listeners.

We gathered around the campfire, roasting marshmallows and chomping on s'mores, telling jokes and a ghost story. Fireflies danced through the gathering darkness, and Renuke remarked that "they look like a celebration." By 10 PM, the students were in their tents, and there was some quiet chattering late into the night.

> "These are gateway experiences. We don't expect one trip will change someone's life, but **IT WILL PROVIDE ACCESS**. Sure, the Boundary Waters are great. Yellowstone is amazing. But we have tremendous opportunities to be in nature right in our own city."
>
> GREG LAIS, FOUNDER OF WILDERNESS INQUIRY

The 7 AM wake-up came early. Several students hugged their guides; three boys who were strangers before the trip hopped up on one of the tables to sing and dance. Mike Hastert gathered us all for a photo, and he sent it out to everyone within an hour of our return.

GATEWAY EXPERIENCES

Precisely how this trip will affect these kids and their choices in the future is uncertain, but the value of the trip, however intangible, is hard to overstate. "These are gateway experiences," says Greg Lais, founder of Wilderness Inquiry. "We don't expect one trip will change someone's life, but it will provide access. Sure, the Boundary Waters are great. Yellowstone is amazing. But we have tremendous opportunities to be in nature right in our own city."

Paul Labovitz, superintendent for the Mississippi National Park and Recreation Area (MNPRA), points out the untapped potential that the Mississippi River offers all of us in the Twin Cities. "Most people don't appreciate that there's a national park—the MNPRA—in their own backyard," he says. "The UWCA is a wonderful way for us to get these kids on the river. Out there, it can feel truly wild. In some stretches, there's not a car or person in sight. That's the first step to getting them to care about this magnificent place."

For some students, their Wilderness Inquiry experience not only gives them an appreciation of the natural world, it gives them a job. "One thing that never gets talked about when we consider outdoor education is the opportunity for careers, especially for 'non-traditional users.'" Lais says. "This is a seven- or eight-billion-dollar industry screaming for diversity."

Staff member Josh Garabunda, who is African American and organized the Cleary Lake trip, first experienced these adventures as a public high-school student. He then became a volunteer and eventually worked his way into a career as an outdoor guide.

The collaborative nature of the program has also allowed each partner to reach out to a broader group of funding sources. A recent fundraiser sponsored by Wilderness Inquiry and Mississippi River Fund, hosted by Garrison Keillor and Mayors Coleman and Rybak, drew a standing-room-only crowd. The EPA, the Minnesota Environment and Natural Resources Trust Fund, and a range of corporate foundations, government, and nonprofit organizations are continuing their support as well.

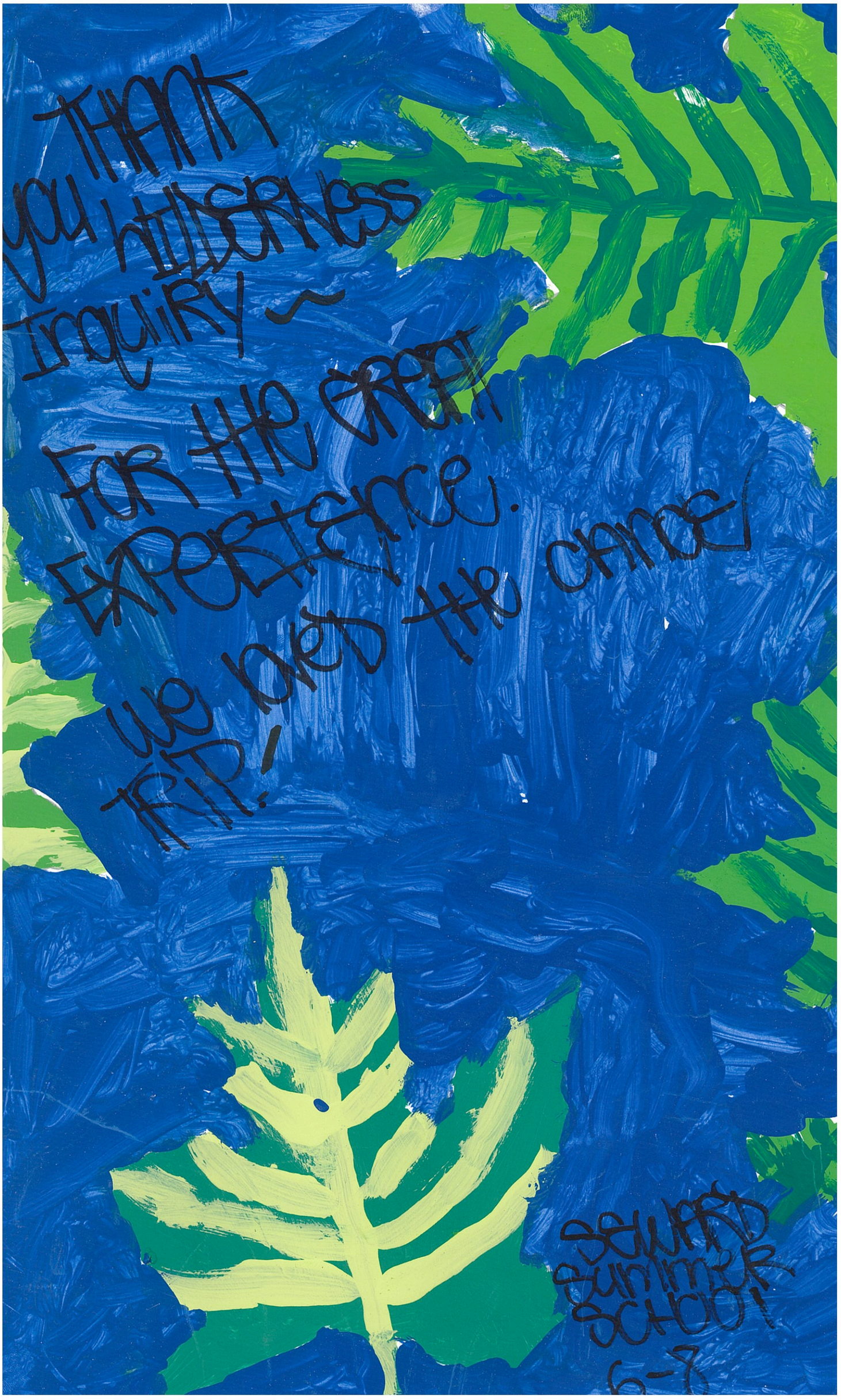
Because the program has had some success, it's now on the radar of other public schools looking for innovative ways to get their kids outdoors. "Barriers come down in the wilderness," Lais says. "This is not just about conservation, it's about the kids. And people from all sides of the table are emboldened by our success. The schools, park officials, politicians, parents, [and] volunteers are all stepping up and saying that they'd like to get involved. These kinds of experiences are crucial for everyone." He pauses for a moment. "But stewardship isn't the entire point—being a complete human being is." ■

Beth Dooley is a frequent contributor to Mpls.St.Paul Magazine.

SCIENCE SAYS TO GO PLAY OUTSIDE

Spending time outdoors isn't just fun for kids—it's important. "A growing body of research documents the costs to children, teenagers, and society when youth are not engaged in active play and exploration outdoors," says Marti Erickson, co-founder with Richard Louv of the Children and Nature Network. A developmental psychologist and retired University of Minnesota professor, Erickson says the costs are reflected in many ways:

- Skyrocketing childhood obesity rates
- Difficulty concentrating and learning in the classroom (especially for those with ADHD)
- Overmedication of children for behavioral "disorders"
- A marked statistical increase in childhood depression
- Missed learning opportunities that build on natural curiosity and encourage creativity
- Lower test scores in the natural sciences
- Lack of confidence and poor body image, especially in teenagers
- A new generation of adults—and voters—who may be less inclined to care about, or inform themselves about, the environment and environmental issues


THANK YOU WILDERNESS INQUIRY ~ FOR THE GREAT EXPERIENCE. WE DID THE CANOE TRIP!
SCWRRD SUMMER SCHOOL 6-8

Photos, Videos and Graphics

Below are links to a number of videos, photos, and other material about the program.

Program Website: http://www.urbanwildernesscanoeadventures.org

Internal Video Links:

Overview Video - http://www.youtube.com/watch?v=miOPqe9QPvg

Overnight Prep Video - http://youtu.be/XCIo6IHndtg

External Video Links:

Kare 11: http://www.youtube.com/watch?v=Zu_eW75svpQ

Ron Schera: http://www.youtube.com/watch?v=tInE8dhsfFk

Travelers/AVID: http://www.youtube.com/watch?v=ORk0eSRhQNY

Photo link:
http://www.youtube.com/watch?v=knlA5c08JIA

MISSISSIPPI River Fund

Mississippi River

Urban Wilderness Canoe Adventures

Pyramid of Engagement

Outcomes

Hundreds of new faces placed in outdoor jobs ranging from canoe guides to EPA scientists.

Careers
[100 youth]

- Desire to "give back" begins.
- Interest in outdoor jobs and volunteering

Outcomes

Internships & summer Jobs
[250 youth]

Outcomes

- Increased leadership
- 100% felt closer to peers & increased teamwork
- 50% considering environmental career

Developing grit and determination
[500+ youth on multi-day experiences]

- Reduced fear of unknown
- Increased independence
- 70% developed strong bonds with peers, community & environment

Outcomes

Building trust, skills, and teamwork
[1,000+ youth on overnight experiences in local parks]

Outcomes

Inspiring confidence, curiosity and wonder
[10,000+ youth on introductory outdoor experiences]

- 87% more engaged in school
- 96% learn new skills
- 88% increased teamwork

Schools | Youth Organizations | Neighborhoods | Religious Organizations

Urban Wilderness Canoe Adventures Evaluation
2012 Summary of Findings

Prepared by Timothy D. Sheldon, Ph.D.
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University of Minnesota

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"I think the students really got to know each other well and got to know me better. I'll never forget the bus ride home. I felt like there was almost peace or sadness because, I think out in the woods, they felt really amazing and confident, almost like they were in a team of winners. And I don't think they often feel that way. They felt really positive and they don't always feel that way here in school."

Teacher, Minneapolis Public Schools

Executive Summary

The Urban Wilderness Canoe Adventures (UWCA) Program provides a continuum of experiences for youth and families that are designed to engage all participants in a life-long relationship with the outdoors and also encourages environmental awareness and leadership development. The UWCA seeks to fill a gap in the outdoor industry by reaching, engaging, and serving underserved, low and middle income urban youth and families.

According to UWCA staff, the program served 22,412 youth and families on 351 events in Minnesota in 2011-2012. The UWCA provides programming in communities throughout the United States, as a way to demonstrate the UWCA model and promote the Twin Cities program to national audiences.

Researchers from the University of Minnesota's Center for Applied Research and Educational Improvement (CAREI) have collaborated with Wilderness Inquiry and its partners since spring 2010 to evaluate the UWCA.

CAREI evaluators collected data from an array of sources in 2012. We reviewed more than 50 peer-reviewed journal articles, conducted in-depth interviews with young adults with long term involvement, and analyzed the responses of more than 1,100 students, teachers, and youth leaders to prepare this report.

Key Evaluation Findings

Introductory Outdoor Experiences are the point of entry for most young people in the UWCA program. The experiences vary in length, but usually last about six hours. The goal of the introductory experiences is to expose a large number of students to the outdoors. In most instances, this first exposure is a trip in a voyager canoe down a segment of the Mississippi National River and Recreation Area.

An important finding of our evaluations of the introductory outdoor experiences shows how few young people have regular experiences in nature. Three of every ten students had no prior experiences on the Mississippi River and one in four had never visited a state or national park.

3 in 10 **Students had no prior experience related to the Mississippi River. One-quarter of the 669 students had never visited a state or national park.**

92% *Of the teachers agreed or strongly agreed that the river trip was a valuable experience for the students.*

88% **Of the students *agreed* or *strongly agreed* that they "worked with others as a team"**

92% *Of the teachers believed that the outdoor experience supported academic learning.*

The evaluation also revealed that high percentages of the students learned new skills, made connections to the environment, enjoyed the experiences, and wanted to return to the River.

The highest survey ratings related to **relationship building among peers and trip leaders**, with 91% of students *Agreeing* or *Strongly Agreeing* that the "trip leaders were friendly to all students" and that "the trip leaders were knowledgeable." Eighty-eight percent of students *Agreed* or *Strongly Agreed* that they "worked with others as a team" and 84% indicated that they "had opportunities to participate in small groups" on the trip.

"It really brought students together. They had been bickering in the canoe, but after a while spontaneously began to work as a team to paddle faster and they were laughing a lot."

Teacher, Summer Session

The evaluation also highlighted how teachers value these experiences for academic learning. For example, one teacher stated,

"The trip fit with our teaching theme of aquatic ecosystems and the netting was the closest connection to studying organisms."

Teachers indicated that they highly valued these experiences, based on their responses:

- 96% of the teachers *Agreed* that **students acquired new skills** while on the trip.
- 87% of the teachers *Agreed* that **students learned about environmental issues**.
- 87% of the teachers *Agreed* that **students were highly engaged throughout the trip**.

Overnight Experiences are the second level of engagement in the UWCA program. Overnight experiences are designed to increase independence and exposure to outdoor activities, and at the same time, reduce fears and misconceptions. Two examples of student perspectives are:

"One highlight was when I caught a fish on the ice fishing trip because it was my first time catching a fish ever."

"The team building and seeing the wildlife, like the eagles and a coyote."

The evaluation findings also show that overnight and multi-day experiences foster deeper connections among peers and adults and may provide an important reconnection to school. The excerpts below are from a teacher who accompanied students on an overnight trip.

"I think the students really got to know each other well and got to know me better. I'll never forget the bus ride home. I felt like there was almost peace or sadness because, I think out in the woods, they felt really amazing and confident, almost like they were in a team of winners. And I don't think they often feel that way. They felt really positive and they don't always feel that way here in school."

"I had one student who didn't come to school at all one semester. Then we met with her and she joined my class. Her attendance was ok, it did improve, but not excellent. After the trip, she's been at school almost every day which is huge. I really think attendance is why a lot of these students are failing. She's one I saw huge improvements with. I think the class felt like a community to her after the trip. She belonged more."

Teacher, Minneapolis Public Schools

Multi-Day Experiences are the UWCA program's third level. It is hoped that as students pass from introductory and overnight experiences to multi-day experiences, they will solidify connections to nature and their interest in outdoor jobs and careers will grow.

The evaluation found that students' initial concerns about weather, lack of water services, coming [too] close to wildlife (e.g., bears), and not getting along with their peers ultimately became some of the most memorable aspects of the trips. For example, a survey given to students after a trip found that the most common themes expressed were about connecting to nature (42%), making or strengthening friendships (30%), and enjoyment and having fun (30%)

When students were asked if they would attend additional trips through UWCA, 100% of the students responded, "yes."

Growing connections with nature. Students were also asked to share what they valued about the experience afterwards.

"I learned that what we put in the earth is what we get out and so--by being a part of this outdoor experience I know how to treat my earth a little bit better than before."

Student, Saint Paul

"Urban Wilderness Canoe Adventures has impacted my life by showing me a side of nature that I've never seen, and giving me the chance to enjoy the beauty of nature…I pay closer attention than I have before by picking up litter and watering dried trees, grass and other plants."

Student, Saint Paul

Students also supplied several examples of new skills they had acquired and other things they learned about themselves. Below are some representative examples.

"The experiences I have had camping with my classmates and the Urban Wilderness Canoe Adventures gave me confidence and I was able to be myself."

"(UWCA trips) helped me grow by having me be more open to myself and to others. For example, I took the lead in several group activities."

"Three days of straight hiking-I now know that I can push myself through being tired, sore, and injuries."

I gained the skills of knowing how to canoe and how to use a GPS.

"If you put your mind to something, you will reach it."

"Hiking may become a new hobby of mine."

"I learned more about my race and others and therefore myself. I am more open-minded because of it." The last student commented on the group in general. The student said, "We are just all closer and I feel like I know them so much better."

"I am physically stronger."

"I will live in the moment more because of this trip."

Internships and Jobs are a long term objective of UWCA. The goal is to encourage young people, who possess a diversity of skills and come from all backgrounds, to consider careers and work in environmental fields.

CAREI Evaluators conducted interviews with young people who were former participants. The objective of the interviews was to explore whether participation at all levels of the Pyramid of Engagement resulted in any long term effects on the individuals. *Building relationships*, *diversity*, and *program influences* were three recurrent themes of our interviews.

Interviewees discussed how their outdoor experiences helped them learn to lead and how to build relationships with others. Some excerpts from the interviews include,

"Leaders have to learn to be selfless. They consider their needs last. They eat last and they give their jackets up when someone's cold. That's how you need to be. If you have one piece of gum you split it in half."

"My level of confidence is higher. For me, it was that I stopped seeing barriers. I can see other people's barriers, and my own too, but you can take steps to address them."

Former participant

Interviewees also spoke about the influence the program has had on them.

"I don't think I'd be anywhere if I had not gained that independence from WI. I came to the program with some street skills, but the skill of figuring out how to think things through, until you can't think it through anymore, is what WI is good at."

"I've learned that I wanted to do something outdoors."

The interviews with former participants underscored that important life skills (i.e., persistence, cooperation, planning, physical endurance, and problem-solving) are learned and practiced in the context of the wilderness setting.

Recommendations

Evaluation findings from 2012 point to numerous youth benefits derived from UWCA programming. We offer these six recommendations based on our findings from our evaluations as well as points revealed in the literature review for Wilderness Inquiry's consideration.

1. The literature review identified the need for all outdoor and wilderness programs to provide more detailed descriptions of their activities. We recommend that UWCA consider detailing field activities and educational objectives for two reasons (1) to explicitly state the goals and objectives of the activities and (2) to describe the activities with sufficient detail so that the relationship between participant outcomes and program elements can be understood.
2. We recommend that UWCA staff incorporate a version of the General Wilderness Program Assessment Instrument into the UWCA program for the purpose of collecting participant data over time. This instrument was designed to collect information about students' prior knowledge, attitudes, and experience (before a trip) and their attitudes, personal, social, and academic growth after a trip. We think these data would help inform UWCA programming in important ways.
3. We recommend that UWCA staff continue to incorporate some form of evaluation in programming for program improvement and to understand and document the impact of the program on its participants.
4. The literature review and student survey responses signal the critical role trip leaders play in student growth and the overall success of the program. This finding underscores the importance of training and developing trip leaders who must possess a variety of skills including safety, wilderness craft, youth development, interpersonal relations, and to a degree, teaching abilities. We recommend that Wilderness Inquiry devote the time and resources necessary to ensure they provide adequate and outstanding training to its trip leaders.
5. The evaluation findings found that teachers often provide little or no pre-trip or post-trip teaching as a means to extend the environmental learning experience to promote further personal reflection. For example, Minneapolis Public Schools' summer session students and teachers reported that fewer than half the students studied the Mississippi River prior to participating on the field trip. Similarly, AVID teachers in Saint Paul Public Schools did not use available materials that were provided by the National Park Service staff or evaluators. We recommend that Wilderness Inquiry staff explore the barriers teachers encounter in incorporating enrichment materials into the regular classroom setting. For example, during one of our teacher interviews, a teacher stated, *"I'd like to see if students could use it [a trip] for credit. Having systems in place where trips are aligned with standards would be great too."* We recommend the exploration of how teachers might be supported to incorporate supporting materials. Would aligning lessons to national or state science standards or district goals promote curricular integration in classrooms?
6. We recommend that Wilderness Inquiry staff follow-up with participants who have had an ongoing relationship with the outdoors through UWCA programming. Research has shown that very few programs follow changes that occur among participants over extended periods of time. Since the impact of outdoor experiences is likely cumulative and may not be in evidence in the shorter term, these efforts may show important participant gains.

Urban Wilderness Canoe Adventures Evaluation Report

Program Overview

The Urban Wilderness Canoe Adventures (UWCA) Program provides a continuum of experiences for youth and families that are designed to engage participants in a lifelong relationship with the outdoors, encourage environmental awareness, and foster leadership development, according to UWCA staff. The goal of the UWCA is to:

- Cultivate an ethic of environmental stewardship in a new generation;
- Motivate participants to explore, learn about, and protect these special places;
- Empower participants to improve school performance; and,
- Create pathways to pursue deeper educational and career opportunities in the outdoors.

The UWCA seeks to fill a gap in the outdoor industry by reaching, engaging, and serving underserved, low and middle income urban youth and families. The UWCA is a partnership of committed organizations including Wilderness Inquiry, the National Park Service, Mississippi National River and Recreation Area, and the Mississippi River Fund. Together, these organizations set the standards for program safety, quality, and educational content.

Core Elements and Key Strategies

Core elements and key strategies of the program provide a range of engaging outdoor educational experiences that use an innovative classroom and fieldwork curriculum. The program is designed to forge a strong connection between youth and the natural environment. UWCA activities include:

- Introductory outdoor experiences (day trips on the Mississippi River in voyageur canoes and paddling events for the general public);
- Teacher professional development in an outdoor educational content that is tied to Minnesota graduation standards;
- Overnight and multi-day outdoor experiences for youth and families; and,
- An exploration of outdoor education activities, internships, and careers.

These progressively deeper exposures to the outdoors are intended to increase interest in the natural environment. It is hoped that by offering a series of engaging outdoor education experiences, youth will make personal discoveries that energize their learning and lead to improved academic outcomes. Interpersonal skills and teamwork are also important elements of the UWCA. Students working together in teams learn to value their own contributions and the contributions of others. Trips also provide an opportunity for youth to get to know their teachers and peers in different ways, which may in turn result in strengthening their bonds to school.

Urban Wilderness Canoe Adventures' Pyramid of Engagement

The UWCA framework is depicted in Figure 1, *The Pyramid of Engagement*. The figure describes the UWCA strategy of exposing thousands of youth to introductory outdoor experiences (base of pyramid). The outdoor experiences deepen as one travels up the levels of the pyramid. Ultimately, the program hopes to place young people in internship positions and have them consider pursuing further education and careers in environmental fields.

FIGURE 1. PYRAMID OF ENGAGEMENT

According to UWCA staff, the program served 22,412 youth and families on 351 events in Minnesota in 2011-2012. The UWCA also provides programming in communities throughout the United States, as a way to demonstrate the UWCA model and promote the Twin Cities program to national audiences.[1]

The 2012 Program Evaluation

The 2012 UWCA evaluation was conducted by the Center for Applied Research and Educational Improvement (CAREI) at the University of Minnesota. The evaluation was designed to answer specific evaluation questions around changes in participants' attitudes and behaviors about the outdoors. The 2012 report is organized around the levels of the *Pyramid of Engagement* that include: Introductory Outdoor Experiences; Overnight Experiences and Multi-day Experiences; and, Internships and Jobs. In the section below, we revisit some of the findings from 2010 and 2011 evaluations and describe 2012 evaluation activities.

Looking Back to the 2010 and 2011 Evaluations

The Center for Applied Research and Educational Improvement began evaluating the UWCA in spring 2010. The main purpose of the 2010 evaluation was to assess the UWCA's impact on students' attitudes and behaviors, on teachers' perspectives and attitudes, and to provide staff and funders with specific

[1] These services currently make-up less than 10% of all UWCA program activities.

information about the benefits of participation in UWCA programming.

The 2010 and 2011 evaluation findings documented the program's reach, the populations it served, and the benefits derived from participation. For example, the Minneapolis Public Schools' summer program alone has involved over 4,000 students in outdoor activities over the last three years. Our findings showed that majority of the program participants come from traditionally underserved populations. These findings revealed that UWCA participants in Minneapolis were from ethnically-diverse families and that more than 80 percent were eligible for free or reduced lunch–an indicator of lower socio-economic status.

Surveys that we administered to students prior to the introductory trips indicated that many students had only limited knowledge of the Mississippi River. We also found that most students had very few personal experiences in the wilderness. And yet, student responses after the trip suggested that these initial interactions with the natural world, deepened students' interest in the environment, the sciences, and their desire to participate on future trips to the outdoors. The majority of teacher-participants in the 2010 evaluation reported that UWCA activities were both age and content appropriate and teachers stated that *they* were equally engaged by UWCA activities. The findings from the 2011 evaluation corroborated the findings from the 2010 evaluation.

Our earlier evaluations also highlighted the need for us to conduct a more extensive literature review related to outdoor and wilderness programming for middle school students and underscored the need for the evaluators to collect more information about the participant experience for the 2012 evaluation.

Research Activities Initiated Prior to the 2012 Evaluation

In winter 2011-2012, evaluators conducted a comprehensive review of literature on wilderness education programs. Over 50 peer-reviewed journal articles and research studies pertaining to outdoor adventure were examined. We reviewed the evaluation methods used to study outdoor programs, the effects of outdoor programming on participants, and the variables used to assess program effectiveness.

Summary of Major Findings of the Literature Review

The review identified program elements and participant characteristics that should be considered in evaluations of outdoor programs. The review found that children and adolescents benefit from participating in wilderness and outdoor experiences. It also found that outdoor adventure programs, such as the UWCA, affect participants across a wide variety of personal, social, and academic attributes. The literature also revealed that interpersonal skills such as cooperation and conflict resolution also improved and environmental attitudes and behaviors were positively impacted. Some studies revealed that the environmental awareness gained through wilderness experiences resulted in improving children's and adolescents' interest and mastery of science concepts. The following is a summary of major findings that we identified during the literature review.

Meta-analysis is an analytical approach that looks across multiple research studies to identify the most influential factors of a program approach. During the literature review, we found two meta-analysis studies that were especially useful as we considered the 2012 UWCA evaluation: Cason and Gillis's (1994) and Hattie, Marsh, Neill and Richards (1997). Cason and Gillis's (1994) meta-analysis examined 147 program effects among 11,238 adolescents in 43 studies. Hattie, Marsh, Neill and Richards' (1997) meta-analysis was based on 151 individual samples located within 96 studies published between 1968 and 1994. The Hattie analysis included 12,057 participants, between 11 years to 42 years of age.

Both studies found that adventure programming can have an effect on academic measures (i.e., grades, school attendance, and attitudes), motivation, self-concept, and interpersonal skills. Both meta-analyses, for example, showed that grades in math, reading, and overall GPA increased as a result of participating in outdoor programs. In follow-up studies, Hattie found that attributes of self-concept, such as independence and confidence were influenced positively even after program involvement ended. This result suggests that effects on self-concept may begin to develop during a program, but continue to increase after the program ends.

Cason and Gillis (1994) noted a wide variation of effect sizes in their study. [2] To explain the variations in effect size, the researchers speculated that important variables may have been hidden or overlooked in many evaluations. For example, they noted that leadership training and leadership styles were rarely discussed in study descriptions, so it was impossible to determine the extent to which leadership contributes to program outcomes. They also noted that program activities were rarely described in sufficient detail. The authors recommended that researchers and evaluators attempt to provide more descriptive details of program activities. More complete descriptions of program activities could increase the likelihood of identifying the factors that contribute most to the desired outcomes. These improvements might also make it possible to replicate successful programs.

Both meta-analyses also found that younger adolescents benefitted more from programming than did older adolescents and that programs of longer duration showed higher effects than programs of shorter duration (Cason & Gillis, 1994). For example, the meta-analyses studied the impact of programs that ranged from one day to ten months with a median program length of three weeks. Statistical analyses demonstrated that as the length of the program increased, the effects on participants became stronger. The analysis also found that studies that incorporated control groups and more rigorous measures of effectiveness tended to result in lower effects than studies using less rigorous research designs. Based on this finding, the authors concluded that studies having less empirical rigor were more likely to result in positive findings.

Hattie's meta-analysis identified many of the same program elements that influenced program outcomes. Their analysis also found that programs of longer duration usually produced higher effect sizes. Participant characteristics such as academic background, socio-economic status, and age also accounted for effect size variance. The Hattie analysis also found that the type of program influenced effect results. For example, higher effect sizes were noted for participants with behavioral and/or emotional problems enrolled in residential treatment centers. The authors attributed this difference to the intensity and duration (usually 30 days) of the outdoor educational component of their treatment.

Based on the two studies, we have identified seven important factors that UWCA program staff should consider for their programming and evaluation.

- Leadership training and leadership styles may impact program effects
- Expect younger participants to display greater effects
- Activity type (physically active, experiential, team building, etc.) influences participants' level of engagement
- Program characteristics (large group, one-on-one, intensity/risk level, setting type) influence program impact

[2] Effect size is an indicator of the power or contribution of a particular factor on a measureable outcome.

- Programs that last days will likely be more effective than programs that last hours
- Programs that promote independence, confidence, self-efficacy, and self-understanding may result in the most significant and lasting effects on participants
- Program outcomes are affected by participant characteristics (e.g., academic background, socio-economic status, and age). These characteristics determine the extent of program success on any given participant

The literature review underscored what little research exists on the study of outdoor programs and its influence on levels of knowledge, attitudes, and beliefs about the environment (Gunderson, Barns, Hendricks & McAvoy, 2000). Although it is commonly believed among practitioners that wilderness education increases participants' awareness and appreciation of the wilderness, few studies have documented those beliefs.

The review also highlighted several important issues that should be considered when evaluating of outdoor programs. Outdoor program evaluations should strive to:

1. Track variables that relate to: (a) the type of activities; (b) the size of groups (and whether the evaluator is studying the group as a unit or studying separate individuals within the group); (c) the qualifications and characteristics of leaders; (d) descriptive qualitative data; and, e) regression data that can help predict who is more likely to be successful in adventure programming (Gillis, 1992).
2. Look at the long-term effects of wilderness programs.
3. Assess the extent to which program benefits persist beyond the immediate aftermath of activities—and if present, what those benefits might be (Neill & Richards, 1998).
4. Develop purposeful, multidimensional evaluation tools that use the best available psychometric techniques ((Neil, 2006).
5. Conduct systematic, rigorous studies that use standardized testing instruments. Too many evaluations rely only on end-of-the program evaluator constructed surveys (Hattie et al., 1997).

The information collected from literature review helped inform our approach the 2012 UWCA program evaluation. The survey and interview protocol we developed focused on assessing characteristics that mentioned in the meta-analyses. As a result, we designed instruments and methods that collect more information about program variables (Recommendation 1); long-term effects on outdoor programming on participants (Recommendation 2); program benefits beyond the immediate outcomes of the experience (Recommendation 3); and, to a lesser degree, the development and testing of a standardized testing instrument (Recommendation 4).

2012 Evaluation Activities

For the 2012 evaluation, CAREI staff collected data from 11 different sources of data. From surveying students participating in introductory outdoor experiences to extensive interviews with young adults who had participated in multi-day experiences, and who ultimately led those programs. We surveyed summer school teachers and interviewed teacher who led a winter camping trip for marginalized youth. We collected and analyzed the responses of more than 1,100 students, teachers, and youth leaders to prepare this report. In Figure 2, on the next page, we summarize all of the evaluation activities including the questions we attempted to answer, the sources we drew from, the methods we used, and the size of the data source. The Table organized evaluation activities around levels identified in the *Pyramid of Engagement* described in the Introduction.

FIGURE 2. SUMMARY OF ALL METHODS AND SOURCES

Research Question	Collection Method	Brief Description	Data Source	Sample Size
PRIOR RESEARCH ACTIVITIES How do outdoor programs impact participants and what variables affect those outcomes?	Literature Review	*Extensive examination of outdoor adventure programming literature*	Published research studies and articles	*50+ documents*
INTRODUCTORY OUTDOOR EXPERIENCES What are changes in student perceptions after an initial exposure such as the Mississippi River trip?	2012 Pre-/Post General Assessment for UWCA Trips	*Pre-Assessment: 24 multiple choice items, 4 open-ended response* *Post Assessment: 36 multiple choice items*	Minneapolis Summer School Students Grades 5-12	*Pre-Survey = 669 Students* *Post- Survey = 413 Students*
What is the impact of the Mississippi River trip on students?	2012 Post General Assessment for UWCA Trips	*36 multiple choice items*	Minneapolis Summer School Students Grades 5-12	*413 Students*
What are teachers' attitudes and perceptions related to a whole day experience like the Mississippi River trip?	2012 Post Trip Online Survey	*18 multiple choice items, 2 open-ended responses*	Minneapolis Public School Teachers/Staff	*22 Teachers*
What are AVID students' perceptions of the UWCA Speaker's Bureau?	AVID Post UWCA Speaker's Bureau Evaluation	*2 open-ended responses, 1 multiple choice item*	AVID Students	*39 Students*
MULTI-DAY EXPERIENCES What is the impact of UWCA overnight experiences on at-risk high school students?	Interview Protocol	*11 open-ended interview questions*	Washburn High School Teacher	*1 Teacher*
What is the impact of UWCA overnight experiences like the Baker Near Wilderness trip on AVID high school students?	AVID Pre and Post Trip Evaluation	*4 open-ended responses*	AVID Grade 11	*17 Students*
What is the impact of UWCA multi-day experiences, such as the Apostle Island trip, on AVID students?	AVID Trip Applications AVID Post Trip Evaluation	*2 open-ended responses* *4 open-ended responses*	AVID Grade 11	*17 Students*
What is the impact of other UWCA multi-day experiences, including the 2012 Glacier National Park trip, on AVID students?	AVID Trip Applications Interview Protocol AVID Yearend Student Survey	*2 open-ended responses* *7 open-ended interview questions* *20 multiple choice items, 8 open-ended responses*	AVID Grade 11 AVID Grades 7-12	*15 Students* *12 Students* *479 Students*
INTERNSHIPS & JOBS What are important characteristics of WI programs and how does programming impact youth who participate overtime?	Interview Protocol	*7 open-ended interview questions*	Wilderness Inquiry *Former youth participants*	*3 Former youth participants*

Introductory Outdoor Experiences

Introductory experiences are the point of entry for most young people in the UWCA program. The experiences vary in length, but usually last about six hours. The goal of the introductory experiences is to expose a large number of students to the outdoors. In most instances, this first exposure is a trip in a voyager canoe down a segment of the Mississippi National River and Recreation Area.

Minneapolis Public Schools, Summer Session

Our evaluation of the introductory outdoor experiences focused primarily on students who were enrolled in Minneapolis Public School's summer program and to a lesser extent on some activities in Saint Paul Public Schools, AVID program. The majority of Minneapolis students who participated in the day-long UWCA Mississippi River trips were in grades 5-8. About 30 teachers and other school staff accompanied students on those trips.

This introductory river experience took place in the heart of the Twin Cities at the Mississippi National River and Recreation Area. The Mississippi National River and Recreation Area is an "urban wilderness" corridor providing the opportunity to experience nature in an urban setting. Canoeing beneath limestone bluffs, beaches, and cottonwood trees, the river is a habitat for hundreds of species of birds, fish, endangered mussels, and river otters. UWCA trip leaders facilitated the six-hour Mississippi trip for the summer school students, teachers, and staff. Groups paddled in 24-foot voyageur canoes past landmarks like Fort Snelling, as well as ruins of the fur trade and the milling industry.[3]

Methods and Instruments

General Assessment Survey for UWCA trips

Evaluators used the knowledge collected from the literature review to develop the UWCA General Assessment Survey.

The survey was designed to assess how students perceived this introductory experience and determine whether changes in attitudes and perceptions occurred after the trips. The survey was made up of four sections: 1) *Views on the Urban Wilderness Canoe Adventures Trip*; 2) *Personal Views*; 3) *Outdoor Experiences*; and, 4) *Demographic Questions*. Four additional open-ended questions on the pre-survey were used to collect data on the prior knowledge, attitudes, and environmental interests of the trip participants. Participants were asked to complete the UWCA General Assessment Survey during the first week of the summer session and soon after the trip.

The *Views on the Urban Wilderness Canoe Adventures Trip* section asked students to respond to 15 items related to their trip experience using a four-point scale (*Strongly Disagree to Strongly Agree*). The items sampled outcome effects associated with environmental attitudes and concerns, school engagement (specifically in Science), and social and personal growth. Other items solicited responses to general impressions of the trip and its impact on participants. For example, one question asked students to rate the likelihood of doing more outside activities as a result of trip participation. Based on the literature review, the survey also asked participants to answer three items about trip leaders.

The *Personal Views* section was used to determine whether personal perceptions were influenced or changed as a result of an Urban Wilderness Canoe Adventures trip using the same four-point scale.

[3] Weather conditions forced trip leaders to use an alternate trip comprised of spending the day on the chain of lakes in Minneapolis in a few cases.

Students reported their views on environmental issues, connections, and concerns, understanding of self, personal school behaviors, and how well they worked with others.

The third section of the survey, *Outdoor Experiences*, asked students to share their previous participation in other outdoor experiences that were not related to Urban Wilderness Canoe Adventures. The *Demographic* section asked students to supply basic background information such as grade level, gender, ethnicity, and about prior UWCA experiences.

Minneapolis Summer School Online Teacher Survey

During the summer of 2012 an online survey was also developed for and administered to Minneapolis summer school teachers and staff who accompanied students on the river trip. The purpose of the survey was to collect teachers' perspectives, attitudes, and observations on this introductory outdoor experience and the trip's perceived effect on students.

The survey was comprised of three sections, which asked teachers to rate items on a six-point scale (*Strongly Disagree to Strongly Agree*). The first section focused on general trip perceptions. Statements ranged from attitudes about on UWCA trip leaders to the degree in which students learned about environmental issues. The second section concentrated on teacher beliefs regarding how students benefitted from the UWCA Mississippi trip. Teachers rated student engagement during the experience, the trip's academic contribution, and the overall value of such an event for students. The third section emphasized teacher attitudes towards the trip as it related to student learning. For example, teachers were asked to what degree the trip influenced environmental awareness and interest in science subject matter among the students.

The teacher survey also included two open-ended questions. The first question asked teachers what surprised them the most about the introductory river experience. The second question asked teachers to identify the greatest benefit that the UWCA Mississippi trip offered students.

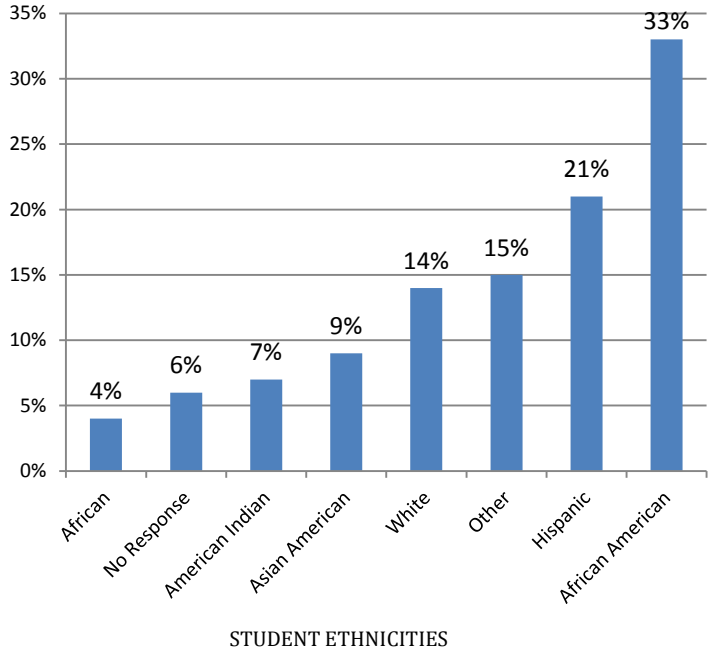
The online teacher survey was administered to teachers in early August during the last week of summer school. Twenty-two of the thirty staff who accompanied the students on these introductory outdoor experiences completed the survey (73%).

Mississippi River Survey Results

Student Demographics

Six-hundred and sixty-nine summer school students completed the General Assessment for UWCA Trips prior to the trip. Demographic information on the students was gathered through the survey. Figure 3 displays ethnicity information on the sample.

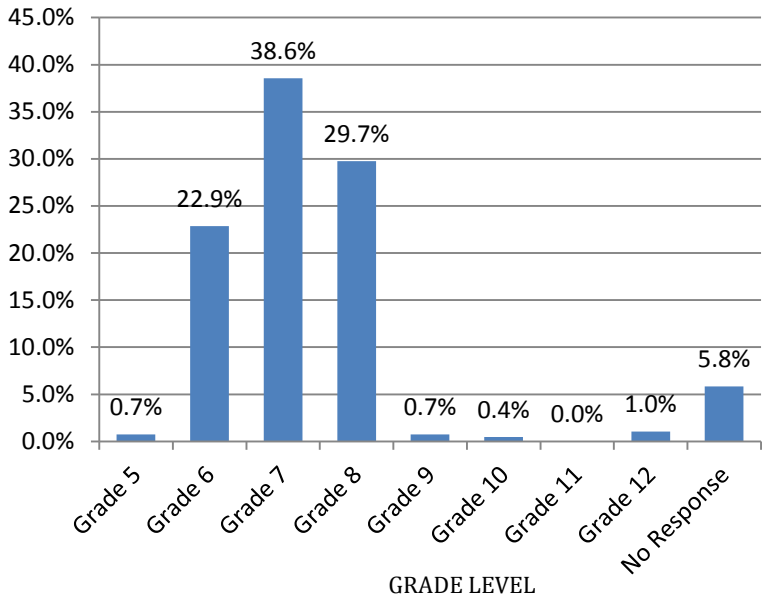
FIGURE 3. ETHNICITY OF MINNEAPOLIS SUMMER SCHOOL STUDENTS WHO COMPLETED THE UWCA MISSISSIPPI RIVER TRIP PRE-SURVEY (N = 669)



Approximately 33% of the students were African American, 21% Hispanic, and 14% white. Fifteen percent (15%) of the students responding identified their ethnicity as *Other*. Students were asked to record their ethnicity on a blank line if they checked the "other" category. Most of the students recorded biracial or multi-racial combinations so the total number of responses exceeds 100%.

Based on student responses, 91% of the students who went on the trip were in grades 6, 7, or 8, however, a small percentage of students were enrolled in grades 5 through 12. Figure 4 shows the distribution of students by grade level.

FIGURE 4. GRADE LEVEL DISTRIBUTION OF MINNEAPOLIS SUMMER SCHOOL STUDENTS WHO COMPLETED THE UWCA MISSISSIPPI RIVER TRIP PRE-SURVEY (N = 669)



The gender profile of the students who completed the survey was 51% female and 49% male.

Outdoor Experiences

Students were asked on the pre-survey about any previous outdoor experiences not related to UWCA. These questions were included to assess involvement with family or friends in prior outdoor-related activities. Figure 5 shows the results of this section of the survey.

FIGURE 5. OUTDOOR EXPERIENCES PRIOR TO THE UWCA SUMMER SCHOOL MISSISSIPPI TRIP (N = 669)

How often have you …	NEVER	1 or 2 TIMES IN MY LIFE	3 to 5 TIMES IN MY LIFE	6 OR MORE TIMES
Visited a STATE or NATIONAL Park.	25%	32%	19%	24%
Visited the Mississippi River (swimming, boating, fishing, camped)	31%	26%	20%	22%
Camped at a campground.	36%	27%	15%	19%
Canoed, fished, or played other water sports.	15%	20%	21%	44%
Biked or hiked on a trail.	20%	23%	17%	40%

The most notable result of this survey section was the number of students who had not previously participated in any listed outdoor experience. Approximately one-third (36%) of the 669 students had never been camping at a campground. Thirty-one percent of the students had no prior experience related to the Mississippi River. One-quarter of the 669 students had never visited a state or national park. Similar percentages were identified in the second column that asked students if they had experienced 1-2 activities in their lives with each of the listed activities. The findings indicated that over 50% of the students had only limited experiences with parks, the Mississippi River, and camping.

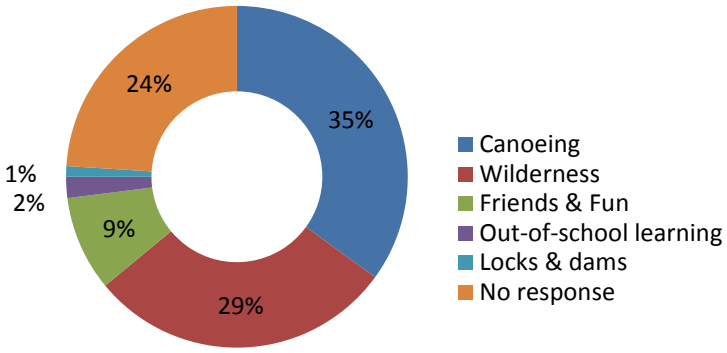
Pre-Trip Views on the UWCA Trip

Students were asked four open-ended questions on the pre-trip questionnaire. The qualitative responses were recorded in an Excel file and coded for common themes. The responses that emerged are reported by question.

What are you most excited about canoeing on the Mississippi?

The first question asked, "What are you most excited about canoeing on the Mississippi?" The highest number of responses (35%) related to some aspect of canoeing. For example, some responses just said "canoeing" while others elaborated that they "wanted to learn to canoe" or "it will be my first time canoeing." About 29% of the student responses were categorized under "Wilderness." These responses pertained to nature, animals, or the river itself. Students commented on "seeing loons," "seeing wildlife and the river," "seeing different fish," or "seeing the Mississippi for the first time." Nine percent of the students mentioned that they were excited about being with "Friends" and "Having Fun." Two percent of students wrote responses that we classified as "Out-of-school learning." For example, one student commented, "experience new things and see new things" while another student said, "learning outside of school." Finally, about one-percent of the students identified an interest in the locks and dams on the River. For example, one students said, "Finding new things and going to the lock and dam" while another student wrote, "The locks. I want to go down the falls."

FIGURE 6. WHAT ARE YOU MOST EXCITED ABOUT CANOEING THE MISSISSIPPI?



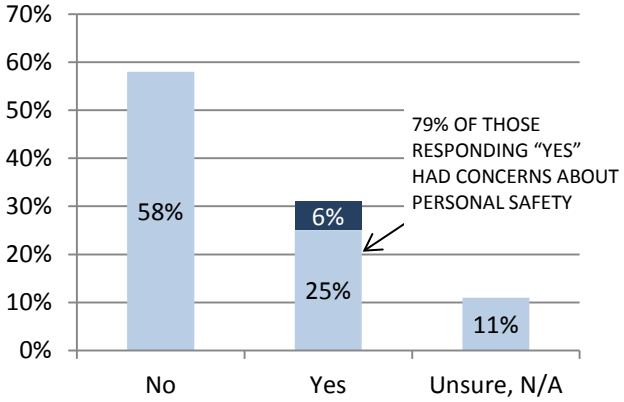
What are two things that you hope to learn from the Mississippi River trip?

The second question asked students "What are two things that you hope to learn from the Mississippi River trip?" Responses varied for this question. Most answers (25%) pertained to learning to canoe. Other students (10%) were interested in learning more about animals. A typical response in this category was, "What kind of animals live near the Mississippi?" Some students (6%) wanted to know more about the "origin" of the River. For example, students asked "What is the history of the Mississippi?" or "How was the River formed?" A few students (5%) wanted to learn more about "the fish" in the River. A common question in this category was "How many different types of fish are in the Mississippi?" A smaller percentage of students, about 3%, expressed concerns related to being safe on the trip. For example, one student wrote, "How do you help people when they tip the canoe over?" while another said, "Are there fish that eat people?"

Do you have any concerns about canoeing on the Mississippi River?

The third question asked if students had any concerns about canoeing on the Mississippi River. And, if they did, what those concerns were. Fifty-eight percent (58%) reported they had no concerns. Thirty-one percent of the students (31%) indicated that they did have some concerns. Of those students who reported they had concerns, 79% related to health and personal safety. Most of the comments related to drowning, falling out of the canoe, and not being able to swim. About 11% of the students did not respond to the question or said they were unsure if they had concerns.

FIGURE 7. DO YOU HAVE ANY CONCERNS ABOUT CANOEING ON THE MISSISSIPPI RIVER? IF SO, WHAT?



The thing I care most about the environment is…

The final open-ended question asked students to discuss environmental concerns. About one fifth of student responses (19%) related to pollution concerns. Responses for this category ranged from "keeping the water clean" to "keeping it healthy to live around" and "stopping pollution." Fourteen percent of students identified the preservation of habitat as a primary concern. For example, one student wrote, "the trees getting cut down and then the animals have nowhere to live." Another student responded, "Helping animals and their habitats." About 13% of the concerns related to "Personal Action." These answers mainly addressed the need to "stop littering" and to "recycle." Twelve percent of students wrote about "Animal Protection." Common responses were "keeping animals safe," "protecting animals," and "people killing animals." Finally, ten percent of students wrote about preserving the environment. For example, one student commented "taking care of the earth" while another student wrote, "Making sure animals don't go extinct."

Personal Views

The Personal Views category of statements was incorporated in both the pre and post survey. This section was designed to determine if personal perceptions were influenced or changed as a result of the UWCA Mississippi River trip. Students rated their views on environmental issues, understanding of self, personal school behaviors, and how well they work with others on a four-point scale (*Strongly Disagree* (1) to *Strongly Agree* (4)). These items were included in the surveys based on literature findings that indicated personal growth and environmental awareness can be impacted by outdoor adventure programs. Figure 8 presents the mean ratings by students prior to the trip and after the trip for each of the statements (For example, a rating of 3.0 means that the mean response is *Agree*. For example, a mean response of 3.5 is halfway between *Agree* and *Strongly Agree*).

FIGURE 8. PRE AND POST PERSONAL VIEWS' AVERAGE OR MEAN SURVEY RESPONSES BY STATEMENTS (PRE N = 669, POST N = 413)

		PRE-TRIP AVERAGE	POST-TRIP AVERAGE
1.	I am interested in environmental issues.	3.08	2.93
2.	I enjoy spending time in nature (parks, wilderness areas, camping).	3.25	3.21
3.	I have many opportunities to visit parks and other natural settings.	3.03	3.03
4.	I would do more activities outside if I could.	3.19	3.17
5.	My friends like the outdoors.	3.08	3.09
6.	I get good grades in Science at school.	2.93	2.99
7.	My family and I do outdoor activities together.	2.83	2.93
8.	I think I have a role to play in protecting the environment.	2.91	3.03
9.	It is important for me to get good grades.	3.56	3.48
10.	When I am in school I feel like I belong.	3.09	3.07
11.	I am not concerned about the environment.	2.75	2.62
12.	I feel that I have a number of good qualities.	3.16	3.13
13.	The thought of being in the wilderness is frightening to me.	2.80	2.26
14.	When I make plans, I am certain I can make them work.	3.06	3.07
15.	I work well in groups.	3.26	3.21

A *t*-test statistical comparison was performed to compare pre-trip and post-trip ratings for significant differences among personal views. The mean rating (scale = 1-4) for the statements prior to the trip was 3.06. The mean (scale 1-4) for the post trip statements was 3.01. The *t*-test revealed no statistically significant differences in pre and post personal views with a t (df = 1080) = 1.96, p = .05.

The literature on outdoor adventure programs suggests a number of reasons that personal views may not have changed as a result of the Mississippi River trip. First, research indicates that wilderness programs of longer duration have a greater impact on participants' personal, social and academic development. The Mississippi River trip was conducted in one day, less than eight hours of outdoor activity. Second, the intensity of the program, which includes types of activities, their risk level, and the program setting, influence effects on participants. The Mississippi River trip was designed to give students the opportunity to experience nature in a metropolitan area. The trip provided historical and environmental information about the river itself. The trip was not designed for high intensity activity that aimed at promoting significant personal change. Finally, although personal views did not show a significant change, perceptions of the trip (as noted in the next section) remained positive and showed that students gained environmental awareness and a greater interest in exploring future outdoor activities.

Post-Trip Views on the UWCA Mississippi River Trip

Four hundred-thirteen of the 669 students (62%) completed the post-trip survey. The first section of the post-trip survey consisted of 21 statements that sampled students' general impressions related to the trip. Students were asked to rate the trip's outcome effects associated with environmental attitudes and concerns, school engagement (specifically related to science), and social and personal growth on a 1-4 scale (*Strongly Disagree to Strongly Agree*). Other items asked students to rate the likelihood of their doing more outside activities as a result of participation. Additional statements asked students to assess trip activities, group dynamics, and trip leaders. Figure 9 presents the findings for this section of the survey.

FIGURE 9. STUDENT VIEWS ON THE UWCA MISSISSIPPI RIVER TRIP (N = 413)

		STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE
1.	I am more interested in the Mississippi River because of this trip.	8%	15%	50%	27%
2.	Because of this trip, I would canoe on the Mississippi again.	8%	16%	43%	33%
3.	I am more interested in science because of this trip.	14%	34%	37%	15%
4.	We studied about the Mississippi River before coming on this trip.	19%	31%	36%	14%
5.	I would like to do more outside activities.	6%	12%	43%	39%
6.	My friends like the outdoors.	6%	13%	47%	34%
7.	My teachers prepared me for what would happen on this trip.	7%	15%	47%	31%
8.	The trip leaders were friendly to all students.	4%	5%	32%	59%
9.	The trip leaders were knowledgeable.	4%	5%	47%	44%
10.	I learned safety procedures for the trip.	4%	10%	44%	42%
11.	Because of the trip, I know what I can do to protect the environment.	5%	13%	46%	36%
12.	I learned new skills (paddling, water safety, setting up camp, reading maps, use of equipment and tools) on the trip.	9%	20%	37%	34%
13.	On the trip, I learned about environmental issues that affect the River.	5%	11%	47%	37%
14.	During the trip, I worked with others as a team.	7%	5%	43%	45%
15.	On the trip, I had opportunities to participate in small groups.	7%	9%	52%	32%
16.	Because of the trip, I feel closer to others–even people who weren't my friends.	10%	23%	45%	22%
17.	On this trip I was challenged to try new things that were unfamiliar to me.	8%	17%	46%	29%
18.	Trip leaders handled trip conflicts appropriately.	5%	9%	51%	35%
19.	I am more interested in science because of this trip.	14%	27%	41%	18%
20.	I would like to do more outside activities.	6%	10%	46%	38%
21.	My friends like the outdoors.	6%	11%	51%	32%

Student views on the trip were overall very positive. More than 70% of the 413 students either *Agreed* or *Strongly Agreed* with 17 of the 21 statements. The highest ratings pertained to trip leaders. Ninety-one percent of students *Agreed* or *Strongly Agreed* that the "trip leaders were friendly to all students" and that "the trip leaders were knowledgeable." And 86% of the students *Agreed* or *Strongly Agreed* that "the trip leaders handled conflict appropriately." Participants also reported that they had "learned safety procedures for the trip."

High ratings were also noted with survey items #14 and #15. Eighty-eight percent of students *Agreed* or *Strongly Agreed* that they "worked with others as a team" and 84% indicated that they "had opportunities to participate in small groups" on the trip. Additionally, 84% of the students *Agreed* that that "they learned about environmental issues that affect the River" while 82% learned "what I can do to protect the environment." More than 70% of the students agreed that as a result of the trip, they:

- would canoe on the Mississippi again;
- had learned new skills; and,
- were challenged to try new things that were unfamiliar.

Finally, 77% of the students expressed more interest in the Mississippi River and indicated that they would like to go on similar trips in the future.

The lowest ratings of the survey were for survey items #3 and #4. These items asked students whether their interest in science had improved because of the trip, and if they had studied about the Mississippi River prior to coming on the trip. In both instances, more than half the students disagreed with the items. This suggests that attitudes toward science were not substantially affected by the trip. Responses to item #4 revealed that fewer than half the students had studied the Mississippi River prior to taking the trip.

Minneapolis Summer School Online Teacher Survey Results

Teachers and staff members who participated in the Mississippi River trip with their students were asked to complete an online survey during the last week of summer school. Twenty-two of the 30 teachers and staff members (76%) completed the survey. When asked the number of times they had "canoed" prior to the River trip, 73% had canoed more than six times. Eighty-six percent said that the weather on the day of the River trip was either "somewhat pleasant" or "very pleasant." Many of the respondents were teachers at Barton Public School. Other teachers who completed the survey taught at Andersen, Nellie Stone Johnson, and the Hmong International Academy during the summer session.

River Trip Evaluation

The first section of the survey asked teachers/staff to rate on a scale of 1-6 (*Strongly Disagree to Strongly Agree*) statements related to the trip itself. The figure below provides the results of this section.

FIGURE 10. RIVER TRIP EVALUATION (N = 22)

	STRONGLY DISAGREE	DISAGREE	SLIGHTLY DISAGREE	SLIGHTLY AGREE	AGREE	STRONGLY AGREE
1. My class studied about the Mississippi River before going on the river trip.	19%	19%	0%	33%	24%	5%
2. The students learned a lot about environmental issues on the trip.	0%	9%	4%	41%	32%	14%
3. The students learned new skills on the trip.	0%	0%	4%	27%	32%	37%
4. The trip leaders were friendly to all students.	0%	0%	0%	4%	28%	68%
5. The trip leaders were knowledgeable.	0%	0%	0%	0%	36%	64%

In general, teachers rated the overall trip experience positively. Ninety-six percent of the teachers *Agreed* that students acquired new skills while on the trip. Eighty-seven percent of the teachers *Agreed* that students learned about environmental issues. Twenty-two teachers said they observed UWCA trip leaders as both friendly and knowledgeable, with strong agreement that trip leaders demonstrated these two attributes (64% and 68% respectively). The lowest rating was seen on survey item #1, which asked teachers whether their students had studied the Mississippi River in class prior to the trip. Twelve of the 22 teachers (62%) indicated that the river had been a class topic before the trip.

Students and the River Trip

This section of the survey asked teachers and staff to rate statements that pertained to their students and the River trip. Figure 11 summarizes the results of this information.

FIGURE 11. STUDENTS AND THE RIVER TRIP (N = 22)

	STRONGLY DISAGREE	DISAGREE	SLIGHTLY DISAGREE	SLIGHTLY AGREE	AGREE	STRONGLY AGREE
1. Overall I think the river trip was a valuable experience for the students.	0%	4%	0%	4%	42%	50%
2. I believe that the river trip was age appropriate for grades 5-8.	0%	0%	0%	4%	32%	64%
3. I believe that students with fewer outdoor experiences especially benefitted from the river trip.	0%	0%	4%	9%	14%	73%
4. I believe that students had fun on the trip.	0%	0%	4%	4%	28%	64%
5. After the trip, students talked about the river experience in class.	0%	5%	5%	24%	33%	33%
6. My students exhibited a high level of engagement on the trip (i.e., paid attention, respected others, participated enthusiastically).	4%	0%	9%	18%	46%	23%
7. I believe my students benefitted academically from going on the river trip.	0%	4%	4%	23%	37%	32%

Overall, teachers were positive about the Mississippi River trip and its impact on students. Most teachers believed that students were engaged and learning during the experience. Ninety-two percent of the teachers *Agreed* or *Strongly Agreed* that the river trip was a valuable experience for the students. Fifty percent *Strongly Agreed* with this statement. All 22 teachers believed that the trip experience was age appropriate for fifth through eighth graders. Sixteen teachers (73%) *Strongly Agreed* that students with fewer outdoor experiences especially benefitted from the river trip. Approximately 87% of the teachers *Agreed* that students were highly engaged throughout the trip. Additionally, teacher responses showed that the trip benefitted students academically with 92% of the teachers agreeing that the experience supported academic learning.

Attitudes Related to the River Trip

Section three of the survey asked teachers to rate attitudinal results of the introductory outdoor experience. Statements either pertained to teacher or student attitudes. 20 of 22 teachers (92%) agreed that, as a result of the trip, students would be more interested in science. Ninety-six percent of the teachers responded that students would have more positive attitudes towards the environment based on the Mississippi River experience. The same number of teachers also indicated that they were glad that they participated with the River trip. Additionally, approximately 87% of the teachers believed that an outcome of the trip was a deeper engagement of learning among students. These data are summarized below in Figure 12.

FIGURE 12. ATTITUDES RELATED TO THE RIVER TRIP (N = 22)

	STRONGLY DISAGREE	DISAGREE	SLIGHTLY DISAGREE	SLIGHTLY AGREE	AGREE	STRONGLY AGREE
1. As a result of the trip, I think my students will be more interested in science.	0%	4%	4%	33%	55%	4%
2. As a result of the trip, I believe students will have more positive attitudes about the environment.	0%	4%	0%	32%	50%	14%
3. I am glad that I participated on the river trip.	0%	4%	0%	9%	23%	64%
4. The river trip was the highlight of my summer teaching experience.	0%	14%	14%	14%	29%	29%
5. I am more likely to teach summer school next year because of the river trip.	0%	19%	9%	29%	10%	33%
6. I believe that one outcome of the river trip was a deeper engagement in learning.	4%	0%	9%	32%	28%	27%

What surprised me the most…

Teachers and staff were asked to complete two open-ended statements on the survey. The first statement asked them "What surprised me the most about the River trip was….." Eighteen teachers responded to the item. Their responses were analyzed qualitatively which consisted of coding and clustering responses into common themes. Teachers' responses fell into four categories:

- Nature and the Environment;
- Student Interactions;
- Student Challenges; and,
- Trip Characteristics.

Five teachers responded with trip observations of nature and the environment. For example, one teacher completed the statement with "the existence of outdoor adventure venues in the city" while another teacher noted "the bluffs and how secluded we were in nature." Two teachers commented on learning about "the Mississippi" and "the connections of Lake Calhoun, Lake Harriett and the secret beach." The last teacher wrote about "the coolness of the river on such a hot day…."Other teachers commented on student interactions and group dynamics on the trip. One of these teachers wrote, "It really brought students together. They had been bickering in the canoe but after a while spontaneously began to work as a team to paddle faster and they were laughing a lot." Another teacher commented, "How well the students cooperated in the canoes. They really had to work together to make it work, and every team did a great job." Still another noted, "How well the students from grades 5-8 worked together."

Some teachers wrote about specific challenges that their students faced both before and during the trip. A challenge before the trip was expressed by one teacher who said, "I was surprised by how many students did not want to attend because of the fear of water or the river." A variety of challenges were identified during the trip. For example, one teacher wrote "how hard it was to canoe" while another one said, "Students were not offered much water or methods of cooling themselves until after they arrived at the destination." Still another teacher noted, "The reluctance of some of my older students to paddle their own canoe."

A few teachers mentioned specific trip characteristics as a major surprise. One said, "How well planned it (the trip) was and how students were taught to canoe." Another commented on the UWCA staff and wrote, "How well organized the WI staff was for all our groups." Three teachers mentioned that they were not able to go on the Mississippi because "the river was too high." They participated in an alternative trip on a chain of lakes around and within Minneapolis. One of these teachers commented, "We were not on the river…..still a good trip though. Good plan B."

Greatest Benefit to Students

Teachers were also asked to complete the statement, "I believe that the greatest benefit to students that a trip like this offers is….." Nineteen teachers completed the statement with comments. As with previous sections, responses were analyzed qualitatively and coded into categories. We identified four data clusters:

- Learning about Nature and the Environment;
- New Experiences for Students;
- Connections to Academic Learning; and,
- Social and Personal Benefits.

Seven of the 19 teachers wrote that the trip's greatest benefit to students related to learning about nature and the environment. For example, one teacher said, "We got an education about the lakes, access to the lakes, the impact of lakes on Minneapolis, and the impact of people on the lakes."

One teacher commented, "Students learned that the ecosystem is right in their backyard. They learned the importance of keeping the water clean." Two teachers mentioned that "interacting with nature" and "a chance to experience nature" were beneficial to students. Finally, one teacher wrote, "an opportunity to really engage in hands-on learning and something physical in nature…as well as learning about wildlife in its natural environment."

Some teachers commented that the trip allowed students new experiences. For example, one teacher wrote, "(the trip) gave them a new experience that they may never have." Another teacher said, "The opportunity to engage with the river in ways that most families will not be able to do on their own." Two teachers wrote that the trip allowed students to experience "something important in their own backyards." For example, one teacher commented that students benefitted by learning, "There are many outdoor learning opportunities available right in our own city." Another teacher commented, "The experience they get interacting with real outdoors, and the learning of the existence of outdoor recreational facilities or venues in their proximity in the city."

Teachers noted that the river experience was connected to the academic learning conducted in their classrooms. For example, one teacher wrote, "The trip fit with our teaching theme of aquatic ecosystems and the netting was the closest connection to studying organisms." Another teacher stated, "(the trip) was a chance to put classroom learning into real life context." One teacher wrote about possible future river trips and connections that can be made to school. The teacher said, "I would love to take students to the beginning of the river and come down to the cities over time. I think using the river as a way of educating students would be great for the summer school program."

Other teachers wrote about the personal and social benefits that students gained from the trip. One teacher said, "Experience in the outdoors and an opportunity for community building. It was really nice to have it in the beginning of summer school." Another teacher commented that self-development was an important component of the trip. She commented, "(the trip) was a chance to reach a part of them that is outside their comfort zone."

Speaker's Bureau in Saint Paul Public Schools

The Urban Wilderness Canoe Adventures Speakers Bureau is another UWCA activity to introduce youth to outdoor experiences and knowledge. The Speaker's Bureau focuses on introducing youth to outdoor careers. Students read excerpts from the text *"Black and Brown Faces in America's Wild Places,"* by Dudley Edmondson to learn about different jobs in the outdoors. Park Ranger Mary Blitzer presents primarily about positions in the National Park Service and how students can prepare themselves for these types of jobs.

Fifteen AVID attended a Speaker's Bureau presentation in February 2012. This session mostly addressed learning about geography, map reading, and nature. Another group of 24 AVID students attended a Speaker's Bureau presentation in March 2012. This session focused on information about National Parks and jobs related to them.

After the presentations, students were questioned about the usefulness of the information, how the presentation might be improved, and to rate the presentation in general. Thirteen of the students (87%) rated the session as *Good* (9) or *Very Good* (4). Six of the 15 students in the February session found the information on maps most useful. Four students rated the history information as being useful. When asked how the session could be improved, nine students suggested having other rangers speak.

The students in the March session on National Parks found the information on places and animals most useful (nine out of 17 responses). Eight out of 12 students said that they "would go on trails or camp or hike." When asked how the session could be improved only seven students responded. Four students said that the students "could be more focused." Three students wanted "more focus on trade." When asked to rate the session, eighteen of the respondents (78%) rated the session as *Fantastic* (8) or *Very Good* (10).

Overnight Experiences

Overnight experiences are the second level of engagement in the UWCA program. At this level, activities are designed to increase independence and exposure to outdoor activities, and at the same time, reduce fears and misconceptions. In 2012, the UWCA served 153 youth on six overnight experiences.

Teacher Interview

During May of 2012 an evaluator interviewed a teacher at Washburn High School who had accompanied a group of students on a UWCA camping trip. The teacher works with the TRIO College Access Program at the school. She teaches at-risk senior level students who have difficulties succeeding in the high school environment. Most of her students will not graduate this year with other seniors. Their challenges ranged from poor achievement, lack of school engagement, to school absences.

During the winter of 2012 eight of her students participated in the UWCA Baker Winter Overnight trip. She accompanied them on the trip as a teacher chaperone. The group left on a Friday afternoon and returned from the trip on Sunday. The interview with their teacher describes what the students did on the trip and what they learned from it.

Methods and Instruments

Interview Protocol

The purpose of the interview was to explore the impact of a UWCA trip on at-risk adolescents. The evaluators developed an interview protocol that consisted of questions related to trip activities, UWCA facilitators and their role, and observations that the teacher had on the impact the trip had on her students.

The teacher interview lasted about 90 minutes. It was conducted in a classroom at Washburn High School. The interview was tape-recorded for accuracy and completeness. The teacher provided a rich, detailed description of the UWCA Baker Winter trip and how at-risk students benefitted from the experience. Responses to questions were transcribed and provided below.

Minneapolis Public School Teacher Interview Transcript

1. Can you describe the trip for me?

> *There were no showers or electricity. Not having showers was traumatic for the students! We did a host of amazing activities. We tapped for maple syrup, did star gazing, and took hikes. The students made all their own meals, if the girls made a meal, the boys cleaned up. We had an equal number of boys and girls so it was amazing that way. We did team building and did a survivor challenge where students had to make a fire and build a shelter. It was busy but we also had a lot of time to relax and chat with each other and chat with the leaders.*

2. Some of the literature on outdoor experiences suggests that students who attend outdoor trips gain increased self-esteem, independence and confidence. Did you observe students displaying/growing with these characteristics? If so, have they continued to grow after the trip?

> *Definitely. It's actually a really amazing group. It's actually confusing to me that they are not on track because I think they can be really motivated. They were very independent and got a long very well on the trip. No discipline problems. It was an environment that gave them a lot of independence and I think they improved on their responsibility. And also when they came back it*

was something they were really proud of. They talked with other students in class about their experience. It was a really positive thing for them. They almost felt like a club when they got back.

3. From your perspective, what is the value-added (what do students gain) by participating on a trip like this?

I think the students really got to know each other well and got to know me better. I'll never forget the bus ride home. I felt like there was almost peace or sadness because, I think out in the woods, they felt really amazing and confident, almost like they were in a team of winners. And I don't think they often feel that way. They felt really positive and they don't often feel that way here in school. It's just really hard. They are not on track so senior responsibilities don't really apply to them in a sense. They might not be able to walk (graduation) or even attend the ceremony. So I think the trip gave them something positive, boosted their confidence and definitely made my class better. They felt like they knew me better.

4. Tell me about the trip leaders. What did they do with the students? How did they interact with them? What did the students learn from them (connections to the environment, environmental awareness about issues/concerns)?

There were facilitators who did the survival activities and we had a really, really amazing guide. He did a good job with teaching but also gave the students the time to do things without much guidance. He really let them take the lead on making their shelter. The facilitators from Urban Wilderness Canoe Adventures read our group really well. They gave them freedom because they deserved it—they didn't complain. They loved the star gazing; they loved laying out on the tarps. The facilitators talked to them about how big the universe was. The facilitators were flexible and let them go star gazing 2 nights since the students loved it so much. We also had a facilitator who was really great at using down time to get to know the students. She played games a lot with them, played spoons with them, and she always had some trivia questions for them. The students wanted to hang out with the adults which was really nice.

Our male leader did a really good job with the boys initiating and making dinner a positive thing. The leaders gave the students independence, didn't make them feel like kids. I think they treated them with respect.

5. What did the students say that they enjoyed the most? How did they benefit?

One of the leaders told a ghost story, it was actually about an abandoned building built into a hill at the site. It's extremely creepy. And the story he told was extremely terrifying. But as a team we all walked out into the woods together with him leading us. We went into the shelter together and the students thought that was the coolest thing. And they talked so much about the star gazing, like sitting on a mountain, hill, in a field and looking at the stars that they don't get to see living in a big city.

6. Did the students describe any challenges?

Not showering. Also I think that they were really positive though. They were willing to do anything. But they were leaving all their friends for a weekend. And I know for a fact that most

of them lead adult lives more than they should. So for them to leave that all behind and go out in the woods instead of partying with their friends, I think that was a sacrifice and a challenge for them.

7. What kind of skills did they gain from the trip?

The survivor challenge, just to create something from nature, I think that was a skill. They had to create a shelter with only materials they found in the woods. That resourcefulness, that's a skill. I also think that simple things like putting on a meal for people, working as a team to do that. Our dinners depended on that participation. I think that's a skill. I also think that when we did maple sugar taping, just the skill of listening about the process, then doing the process. It was really like a scientific lab in a sense.

8. As a result of the trip, did the students express gaining knowledge about the environment, science--what did they learn? How did what they learn support the content of your class?

Our naturalist talked a lot about environmental issues. But I'm not sure how much the students learned. I don't teach science so I can't really say.

9. How did the students work together as a group? Were there any conflicts and, if so, how were they handled? (Team building, working together setting up camp, learning skills)

No conflicts on this trip. I had been nervous about it. The shower—they were mad about that. But that quickly passed. They got a long really well. They were all Latino students except one—and they spoke a lot of Spanish. It was very familial, a very family like experience.

10. Do you feel the trip impacted grades, school attendance, school engagement, school attitude? If so, how?

I had one student who didn't come to school at all one semester. Then we met with her and she joined my class. Her attendance was ok, it did improve, but not excellent. After the trip, she's been at school almost every day which is huge. I really think attendance is why a lot of these students are failing. She's one I saw huge improvements with. I think the class felt like a community to her after the trip. She belonged more.

11. Do you want to add any information, perceptions, observations that I haven't covered?

I have a lot more faith in my students now. I want them to be motivated, to be good people. The trip reassured me that they have potential to be good, resourceful people. You don't always see that in school.

Teacher Comment

I would love it if all students could have this opportunity. They (UWCA) were extremely organized, and really cared about following through. I wish it would be less money. I think if my students could do more of it I think it could be really life changing. I'd like to see if students could use it [trips] for credit. Having systems in place where trips are aligned with standards would be great too.

Multi-day Experiences

Multi-day experiences are the UWCA program's third level. It is hoped that as students pass from introductory and overnight experiences to multi-day experiences, students will solidify connections to nature and their interest in outdoor jobs and careers will grow. The CAREI evaluation team used teacher interviews, surveys, and student responses to application essays and reflections to determine the extent to which multi-day activities affected students' connections with and perceptions of the outdoors. In 2012, the UWCA served 164 youth on eight multi-day experiences.

Saint Paul Public Schools AVID Program

Twelve AVID[4] schools in Saint Paul Public Schools partnered with Wilderness Inquiry on UWCA activities. Student-participants were in grades 7-10 whose composition is similar to the overall SPPS population of about 39,000 students, for example:

- Students speak more than 100 languages and dialects
- Student ethnic composition in 2011 was: 31.2% Asian American, 29.4% African American, 24.4% White, 13.5% Hispanic, 1.7% American Indian
- Approximately 4,000 students are new to SPPS each year; 2,000 at the secondary level
- 8% of students require special education services
- 72% of students are eligible for free or reduced-price lunch
- Approximately 2,000 students experience homelessness during the school year

In April 2012 the evaluators interviewed a District Liaison for the Advancement via Individual Determination (AVID) program. The teacher-liaison told the evaluators that they have worked with Urban Wilderness Canoe Adventures for the past four years. AVID students participate in grade sequential Urban Wilderness Canoe Adventures trips. Seventh graders complete team building activities at state parks. Eighth and Ninth graders participate in river canoeing activities and the 11th graders have an extended overnight camping trip.

Evaluators also met with AVID staff in May 2012. The meeting took place at AVID's central office and lasted approximately two hours. The purpose of the meeting was to discuss ways in which the evaluation team and the AVID staff could collaboratively work together to study the impact of UWCA trips on students. Data sources, the development of survey, interview, and reflection prompts, and potential additional data were discussed. The evaluators agreed to develop and provide AVID with reflection prompts for students attending the summer Glacier trip. The AVID staff provided the evaluators with data they had collected from students who had attended UWCA activities during the school year.

Methods and Instruments

Evaluators analyzed AVID students' application essays and pre and post trip evaluations for two overnight extended UWCA camping trips: The Baker Near Wilderness Winter Camping Trip and the Apostle Island Three Night Camping Trip.

AVID staff also provided 15 application essays for the 2012 trip to Glacier National Park. Each student was asked to discuss previous Urban Wilderness Canoe Adventures trips and the impact of those trips in

[4] Advancement via Individual Determination (AVID) Program is implemented in many school systems across the nation including Saint Paul Public Schools and Minneapolis Public Schools. AVID is an elementary through postsecondary college readiness system that is designed to increase school wide learning and performance. AVID is intended for all students and is implemented school-wide and district-wide. It targets students in the academic middle. The mission of AVID is to ensure that all students succeed in a rigorous college preparatory path.

the essays. The evaluators also provided AVID staff with reflection prompts that students were expected to use for journal entries before, during, and after the trip. The prompts were based on our review of the literature. We asked students to respond to questions that related to environmental awareness, observations, and wilderness connections, and topics that related to new self- and group-perceptions that occurred as a result of the trip.

Upon returning from the Glacier trip, AVID staff told evaluators that the students did not complete the reflections. However, an AVID staff member, who accompanied the students on the trip, used the prompts to interview students about the trip. For example, students were asked about what they learned about nature and the environment and if the trip had changed them personally in anyway. The interviews took place at the conclusion of the trip as they awaited the train back to Minnesota. These data were provided to the evaluators by the AVID staff.

AVID staff also provided the results of a survey that was administered to all AVID students near the end of the 2012 academic year.

All qualitative data provided by AVID were analyzed by the evaluators for patterns and themes among the responses. The responses were coded into like categories. Classifications of responses and examples to support each category are discussed. These data findings are presented below.

Findings of Multi-Day Experiences

The Baker Near-Wilderness Winter Settlement Adventure

This Near Wilderness Settlement is located 20 minutes west of downtown Minneapolis. Students spend two winter nights and three days at the camp site participating in skiing and snowshoeing adventure activities. Trip leaders guide the students through these activities and also show them how to build a snow shelter and how to dress comfortably in cold temperatures. Although the students can stay in cabins, they are invited to spend one night sleeping outdoors in the snow shelter. To protect the environment, WI uses "minimum impact" camping techniques.

Seventeen AVID high school students participated in the Baker Winter Settlement experience during the winter of 2012. Two Urban Wilderness Canoe Adventures trip leaders facilitated their experiences. The students were attending various high schools in Saint Paul.

Prior to the trip, the students were asked to complete a pre-trip survey. When asked why they choose to attend the trip, 47% of the students mentioned that they wanted to experience “nature,” “winter wilderness” or “the outdoors.” Approximately 30% of the students responded that they either “wanted to be with their friends” or “meet new people.” When asked if they had previous camping experiences, 15 out of the 17 answered that they had. The students had a variety of responses when asked what they were looking forward to on the trip. Some of the remarks are listed below:

- Learning new things about nature, bonding and enjoying the field trip
- Having fun, meeting new people, exploring the wilderness
- Community building activities
- Learning more about survival things in the wild
- A great time with no electricity, just how camping should be
- Going snowshoeing---never done it before
- Eating food and getting to know people

Students were also asked what they were most concerned about with the trip. Nine students out of the 17 said that they had no concerns. The remaining students listed concerns related to the weather, the lack of water services, coming close to wildlife such as bears, and not getting along with their peers. After the trip, the students completed a survey comprised of 4 open-ended questions about their experiences. The first question asked if they enjoyed the winter trip and if so, why, and if not, why not. All 17 students responded yes, they enjoyed the trip. Reasons for their positive answers were:

Theme	Percent responses
Being with my peers and meeting new people	47%
Being around nature	30%
The Urban Wilderness Canoe Adventures trip leaders	24%
Learning new skills and more about the environment	24%
Learning more about myself	12%

When asked if their expectations for the weekend were met, 15 out of the 17 (88%) replied "yes." Comments that supported their positive responses were:

- Yes, we were able to enjoy nature
- Of course, actually they exceeded my expectations
- Yes, because the staff did all that is possible to make us comfortable
- Yes, in the end I learned a lot about myself and the people around me
- I got to communicate and experience things outside my comfort zone, yes!

The third question asked students if their opinion towards the outdoors or outdoor experiences had changed as a result of the trip. Six of the 17 students said "yes" with most of their comments pertaining to an increased appreciation for nature and the environment. For example, one student said, "Yes. It's really interesting to know you're surrounded with animals and how they survive and live." Most of the remaining 11 students responded "no." These students remarked that they had always "loved camping," and/or "loved nature and the outdoors" and the trip had not changed these opinions.

The final question asked students if they would choose to attend additional trips through Urban Wilderness Canoe Adventures. All 17 students (100%) responded "yes." When asked "why" the following comments were made:

Theme	Percent responses
Fun and Enjoyment	53%
Experiencing nature and the environment	35%
Meeting new people	24%
The Urban Wilderness Canoe Adventures trip leaders	18%

Apostle Island Three Night Camping and Adventure Trip

Located on the south shore of Lake Superior between Cornucopia and Bayfield, the Apostle Islands are known for sea caves, sandy beaches, historic lighthouses, and sunken shipwrecks. Seventeen Minneapolis AVID high school students participated in a 3-day Urban Wilderness Canoe Adventures camping trip on the Island during the 2011/2012 school year. When the weather is nice campers are able to venture out in sea kayaks or 24-foot voyageur canoes. On windy days, campers must paddle close to land but they are able to take some great hikes. Unfortunately, the weather was not optimum for this trip and most activities centered on hiking excursions.

The evaluators did not collect pre-trip data from the students. However, AVID students were required to complete an application for the trip. Questions on the application asked students why they were interested in attending the trip and what they hoped to learn from the experience. AVID administrators provided student responses on these two questions.

There were a variety of answers when the students were asked why they were interested in participating in the trip. Most responses fell under specific categories. The most common categories and their respective frequencies of answers were:

Theme	Percent responses
Experiencing nature and the outdoors	53%
Learning new skills (canoeing, camping, adapting to the outdoors, being independent, leadership and teamwork)	41%
Meeting new people, being with friends	41%

When the students were asked what they hoped to learn from the experience, 14 out of the 17 referred to some aspect of nature, the environment, or the outdoors. For example one student said, “I would like to learn new things about the outside; especially because there are so many issues with taking care of our resources, it would be a way to build empathy towards our environment.” Another student responded, “I hope to learn and understand the land I walk on and how to help preserve its beauty.” Still another student remarked, “I honestly just want to learn about the beauty of nature. Being a city girl, the wilderness is foreign to me. The only idea I have of it is from what I see on TV and I would just like to learn what it’s like for myself.”

After the Apostle Island trip, the 17 students completed the same 4 item, open-ended trip evaluation survey that the students attending the Baker Near Wilderness trip completed. When asked if they enjoyed the winter trip and if so, why, and if not, why not, 16 out of 17 students responded “yes,” they enjoyed the trip. Reasons for their positive answers were:

Theme	Percent responses
Trip leaders/planned activities	30%
Learning about the Islands and the environment	30%
Meeting new people/bonding	24%
Enjoyment and fun	18%
Learning about myself	12%

The second question asked students if their expectations for the weekend were met. Nine out of the 17 students responded both positively and negatively. For example, they said some expectations were met but others were not. Eight of these students referred to not being able to do some activities due to weather problems. For example, one student said, “I was hoping to see the caves, visit one of the islands and canoe. But I had fun anyway.” Another student responded, “Yes and no. Yes since I had fun and no since we were told we were going kayaking and didn’t go.” Still another student said, “I wish the weather was nicer and more activities were available. Other than that the food was really delicious, the games were fun; the people were amazing.”

The third question asked if the students' opinions towards the outdoors had changed and, if so, how? Seven of the students responded "yes." Most of these students referred to learning more about the outdoors and environment. Some of their responses were:

- Yes! I now realize that our planet is ours. As in team. So it's what we choose to do with it.
- It has broadened my experience on the outdoors.
- Yes. I learned that what we put in the earth is what we get out and so--by being a part of this outdoor experience I know how to treat my earth a little bit better than before.
- Yes. Because I came to the realization that I can survive without my phone.

The last question asked students if they would choose to participate in additional trips through Urban Wilderness Canoe Adventures. Fifteen out of the 17 students (88%) responded "yes." Their responses could be categorized into four categories. These categories and their frequency of responses were:

Theme	Percent responses
Enjoyment of the outdoors, nature, and the environment	42%
Trip leaders/activities	30%
Fun and enjoyment	30%
Wanting to learn more	18%

AVID Glacier Trip 2012 Application Responses

AVID students who attended the 2012 Baker Near Wilderness Winter Settlement Adventure and the Apostle Island Three Night Camping and Adventure Trip have the opportunity to attend the 2012 summer Glacier National Park Hike and Explore Urban Wilderness Canoe Adventures trip. This culminating trip consists of six days and five nights exploring Montana's Glacier National Park. The park is known for its pristine forests, alpine meadows, rugged mountains, and spectacular lakes. With over 700 miles of trails, Glacier is a hiker's paradise. The trip's main adventure is hiking the length of the famous Going to the Sun Highway.

AVID students who are interested in participating in the Glacier trip go through an application process. One component of the process is to write an essay reflecting on previous Urban Wilderness Canoe Adventures trips, what skills and knowledge were gained from them, and how this information can be used in the future. The evaluators were provided fifteen of these essays. The writings were qualitatively analyzed for themes and patterns among the responses. When examining the impact of the students' two previous Urban Wilderness Canoe Adventures trips, four specific themes emerged from the data. The following list identifies the four prominent response patterns and the number of statements in which they were mentioned across the essays:

- Environmental and Nature Connectedness 31
- Meeting New People/Bonding with Peers 31
- Self-Development 30
- Developing Skills in Outdoor Environments 21

Environmental and Nature Connectedness

All fifteen essays showed that Urban Wilderness Canoe Adventures trips supported environmental awareness and an appreciation of nature. Students demonstrated this connectedness through a variety of statements. For example, one student wrote, "Urban Wilderness Canoe Adventures has impacted my life by showing me a side of nature that I've never seen, and giving me the chance to enjoy the beauty of nature." The same student elaborated with environmental behavioral changes that resulted from the trips. The essay says, "I pay closer attention than I have before….by picking up litter and watering dried

trees, grass and other plants." Another student discussed environmental opportunities not experienced due to living in a city. Urban Wilderness Canoe Adventures provided, "Gaining more knowledge of the nature you would never really see in the city or blocks you live." Another similar statement was shown by a student who wrote, "WI trips impacted me by letting me know more about nature and wildlife outside of the city." Increased environmental interest was emphasized in several essays. For example, one student responded, "Learning from that experience (WI) has made me more interested in the outdoors, exploring life and nature." Across all essays students reflected that Urban Wilderness Canoe Adventures trips influence levels of knowledge, attitudes and beliefs about the environment.

Meeting New People/Bonding with Peers

Most of the essays addressed positive aspects associated with inter-personal relationships experienced while on Urban Wilderness Canoe Adventures trips. The benefits of meeting new people were mentioned by several students. For example, one student said, "The biggest impact that I have had is meeting new people, I learned a lot about myself and others." Still another student wrote, "I have been able to learn how to open up and meet new people, this will make it easy for me in the future." Other students discussed the development of inter-personal skills while on trips. For example, one student stated, "Cooperation is also a skill that I learned from all the activities that we've done together from the Urban Wilderness Canoe Adventures trips. Learning to cooperate and work together with people sometimes may be challenging but with the good communication between each other I manage to pull through. I will definitely refer back to these skills in the future." Another student mentioned, "(WI trips) help me with leadership skills and people skills." Finally, one student compared the AVID school program with Urban Wilderness Canoe Adventures trips and how they complement each other. The student said, "Both of these programs are similar in many ways because both teach leadership, team building and they both create a family environment."

Self-Development

The essays revealed that students grow, develop, and change in multiple ways as a result of Urban Wilderness Canoe Adventures trip participation. Self-assurance was one attribute that seemed to be nurtured the moSaint One student reflected on this developmental aspect by writing, "The experiences I have had camping with my classmates and the Urban Wilderness Canoe Adventures gave me confidence and I was able to be myself…" The same student goes on to say, "…. (UWCA trip) gives me more confidence to speak out and be myself, showing my skills and what I can do in these situations." Another student supported confidence building by saying, "(WI trips) helped me grow by having me be more open to myself and to others. For example, I took the lead in several group activities." Other students spoke of overall self-development. For example, a student wrote, "The opportunities that the AVID/Urban Wilderness Canoe Adventures trips have given me to participate in creative activities outside has left me a changed person. Urban Wilderness Canoe Adventures has altered my view on nature; in my school and community." Additionally, self-awareness was also shown by several essay remarks. Students consistently mentioned that "I learned more about myself, or "I know myself better now."

Developing Skills in Outdoor Environments

Students wrote about many outdoor survival skills that they learned through Urban Wilderness Canoe Adventures trips. For example, students wrote of learning how to "build fires, build forts and find shelter and food sources." One student wrote extensively about safety skills acquired on trips. The essay says, "Skills and knowledge that I took away from the AVID and Urban Wilderness Canoe Adventures trips: learning how to survive in the wilderness and an appreciation of nature. As a group we learned how to prevent certain mishaps from happening, if possible, what to be aware of, and how to react if something

happened. Learning how to be safe and fun at the same time is very important when going on outdoor trips. I can use these skills in the future when I choose to go on a trip that is in the wilderness." Another student wrote about "three rules" to follow when encountering danger while outdoors; "shooting a gun three times (if you have one)," "you can go three weeks without food and still survive," and "keep a positive attitude at all times." The essays showed that students were acquiring basic skills to meet outdoor wilderness challenges.

AVID Glacier Trip 2012 Student Interviews

Twenty students participated in the 2012 summer Glacier trip. An AVID administrator accompanied the students on the trip. At the conclusion of the trip, the administrator interviewed 12 of the students as they waited for their train to return to Minnesota. Interview questions were classified in two categories: 1) During Trip Reflections and 2) Post Trip Reflections. The first category of questions asked students about their trip experiences, challenges they encountered, the trip leaders, and group dynamics. The second category of questions asked about the trip's impact on the students' personal growth, plans for the future, and perceptions of the environment. The evaluators were provided with the transcripts of the interviews.

During Trip Reflections

Students were asked to describe one experience or observation that helped them feel closer to nature on the trip. There was no clear pattern of responses as each student mentioned a unique experience. One student said, "Star gazing – seeing the big and small dipper and the North Star for the first time." Another student reflected on "the view of the mountains" while another student said just "getting dirty." Two students talked about specific trip activities. One said, "Looking back on our hikes and seeing how far we had hiked." The other spoke about "Swimming in the glacial lakes."

When asked about the challenges that they experienced while on the trip, some students mentioned the "cold" weather while one student said, "no showers." Another student said it was difficult "getting to know others." One student discussed the hiking activities by saying, "Three days of straight hiking-I now know that I can push myself through being tired, sore, and injuries."

Students were asked what they learned from the trip leaders. Most responses centered on "motivation." For example, one student said, "If you put your mind to something, you will reach it" while another student remarked, "to keep going." Some students identified specific skills that the trip leaders taught them. One student spoke about learning "to cook, mixing different foods." Another student cited "how to survive being close to bears." Other students mentioned learning "to take risks." For example, one student gave the example, "(trip leader) was always the first one to jump in the water. I learned to take risks."

When asked about any observations the student had related to how the group got along, there were only two responses. One student said, "Everyone helped." While the other student reflected that "We motivated each other."

Post Trip Reflections

The first interview question in this category asked students if the trip altered any plans for after high school. Two students said they were planning on changing their major to environmental studies or "something similar." One student said, "I want to travel more." Another student discussed the trip's hiking experiences and remarked, "Hiking may become a new hobby of mine."

When students were asked to describe any ways that the trip had significantly changed them as a person, seven responses pertained to social skill development and group dynamics. For example, one student said, "I now know how important teamwork is" while another student remarked, "I am more trustworthy of others now." Other students spoke about specific social skills. One said, "I learned to be a better listener because there were no distractions like cell phone, computer, etc." Another said, "I am more patient now because I had to learn to wait for everyone so we could stay together on the hikes and I enjoyed staying together with everyone." One student commented on how the trip encouraged acceptance of others. The student said, "I learned more about my race and others and therefore myself. I am more open-minded because of it." The last student commented on the group in general. The student said, "We are just all closer and I feel like I know them so much better."

Other students spoke of personal development when asked this question. For example, one student said, "I feel renewed" while another student said, "I learned not to doubt myself." Still another student commented, "I am physically stronger." The last student remarked, "I will live in the moment more because of this trip."

Four students responded to a question that asked how the trip changed their perspectives about the natural environment. Two students voiced concerns. One said, "Glaciers – global warming – I want to help stop that now." The other said, "Always leave no trace to maintain the naturalness." The other two students spoke about traveling more. One student mentioned "I want to get out of my state more and learn about other states and their environment." The other student said, "I want to see more National Parks."

When asked what they had learned from the trip, again only four students responded. Their answers varied. One student said, "I am excited now – I have closer friends, I want to meet more new people." Another student commented, "Know your limits." Still another student mentioned, "Bear bins." And the last student said, "I need to always have water."

AVID Yearend Student Survey

Four hundred and seventy-nine students (479) responded to the AVID Yearend Student Survey. Student responses from this survey align and corroborate many of the findings in evidence from the survey and interview data described above. In this survey students were asked numerous questions about future plans as well as questions that related to the content of the AVID program.

Improving AVID Activities

When students were asked how AVID activities might be improved, many students suggested that activities should be more active and that staff should consider increasing the number of teamwork activities. Below are some typical responses about this item.

> *You can have more hands-on activities (this will draw in more AVID students).*
>
> *I think there should be more teamwork activities, because we can learn how to build trust with one another. Not only that, we should have days when we can talk about college and what kind of college can benefit us.*
>
> *We can have more activities that will help the students learn how to become leaders.*

Comments Regarding UWCA Day and Overnight Trips
On the AVID Yearend Student Survey students were asked, *During the past school year, did you go on any day trips or overnight trips with Wilderness Inquiry (UWCA)?*

One hundred-eighty-five students reported that they had been on at least one trip or camping activity.

When students were asked to rate their trip experience 125 of the 174 students who responded (72%) rated the experience as *Fantastic* or *Very Good*. Some of the typical responses students offered were:

> *Everyone was helpful and respectful towards one another. I've had such a wonderful experience in both trips, I can't wait for the next one in Montana.*
>
> *I had an amazing experience. I feel that it was because of the camping trips that made my bond between my AVID friends closer. I also met new people and had good relationships with them.*
>
> *Having fun with friends and learning things that you don't usually learn in school. You actually experience the wildlife.*
>
> *Canoeing was such a fantastic trip. It was my third year attending there! It's a great way to bond and start the school year. It shows team work and I learned a lot about nature and habitat. I also got to learn a lot more about students and Minnesota!*

Students were also asked about the highlight of their outdoor experiences. Many students talked about wildlife encounters, making or deepening friendships, or challenging themselves and discovering a new strength. A few examples:

> *One highlight was when I caught a fish on the ice fishing trip because it was my first time catching a fish ever.*
>
> *The team building, and seeing the wildlife, like the eagles and a coyote.*
>
> *Getting to know my classmates better, as well as making new friends!*
>
> *I made new friends and learned new leadership skills.*
>
> *Being offered a chance to go to Glacier National Park! And making a lot of friends!*
>
> *A highlight from the field trips were the times when everyone, the staff and students, stay up and talk, just having a fun time talking about our future.*
>
> *Hiking the extra miles when, the night before, I did not think I could.*

Many of the students reported that they learned valuable skills about respect and teamwork as well as outdoor skills, as illustrated in the comments below.

> *That it's good to get along with people and that you need others to help you, not just do it yourself.*

Communication skills, working skills, sportsmanship, respect, patience, etc.

Taught me team work. And mostly how to get along better with people.

It taught me how to be more open to people I'm not really used to.

A skill I gained is how to respond to situations I don't believe are right. It also helped me feel comfortable asking questions and adding my ideas into other ones. It gave me a great bond overall in school and in AVID.

I gained the skills of knowing how to canoe and how to use a GPS.

I learned how to set up tents and survive in the wilderness.

These student responses, collected from almost 500 students, support the findings the evaluators have enumerated in this and previous evaluations of the UWCA program.

Internships & Jobs

A long-term objective of UWCA is to encourage young people, who possess a diversity of skills and come from all backgrounds, to consider careers and work in environmental fields. Evaluators met with three young people who had participated in Wilderness Inquiry activities and had begun working in outdoor careers to understand their experiences.

Interviews with Urban Wilderness Canoe Adventures Youth Participants

The evaluation team wanted to assess longer term impacts of wilderness programming on youth sometime after their introduction to the outdoors. We interviewed three young people who had participated as youth in a Wilderness Inquiry program that served as the forerunner to UWCA. All three youth began participating in adventure programming as high school students and served as youth trip leaders after high school graduation. All are now in their mid-twenties.

The objective of the interviews was to explore whether participating in outdoor activities at all levels of the Pyramid of Engagement resulted in any long term effects on the individuals. Interview subjects were asked to reflect on their early experiences in the outdoors and to share how these experiences may have affected their current interests in and relationship to the outdoors and environmental issues. We also asked the interviewees to discuss their experience roles as trip leaders, their experiences with trips and the populations they served, and how the UWCA may affect youth who participate in the programs.

Interviewed were conducted in March 2012. Each interview lasted 60 to 90 minutes. Evaluators used a semi-formal interview protocol and asked them open-ended questions about interviewees past involvement with Wilderness Inquiry. Our goal was to have interviewees reflect on their formative experiences in wilderness programs. We wanted to learn how their experiences changed them as a person, what their unique perspective were about trips, and how those trips may have affected program participants.

All interviews were recorded and later transcribed and coded for patterns of responses. Three themes in particular emerged from data analysis and evaluators noted that these themes aligned to the mission of Wilderness Inquiry:

> *Our mission is to provide outdoor adventure experiences that inspire personal growth, community integration, and enhanced awareness of the environment. Wilderness Inquiry adventures encourage people to open themselves to new possibilities and opportunities.*

Building Relationships and Community Integration

The Urban Wilderness Canoe Adventures' mission statement emphasizes outdoor experiences as a path to "personal growth and community integration." All three young people stated that "building relationships" and "establishing community" were integral parts of their outdoor experiences with Wilderness Inquiry. All three interviewees reported that leadership skills that support participant bonding are "crucial" to a trip's success.

For example, one youth spoke of the "wilderness experience" as a context for "getting people to talk with each other, to address issues." He explained how many groups arrive for a WI trip in cliques with "preconceptions and prejudices" about others. He viewed wilderness trips as a way to "address awareness" and "see beyond your own culture." When asked about leadership styles, he expanded on these ideas by saying, "Sometimes you only have five days to make a connection, get to know people, get to a place where you can invoke that emotional response, to make that trip memorable, the trip of a lifetime---or just 6 hours (a day trip), or a 30 minute workshop, to do that for someone, make them feel that 'I can change my life.'"

Another youth stated that "building relationships" is an important facet to outdoor education programming. He recalled one trip with a group of inner city youth who were into "their iPods, walk men, tech stuff" and talked to each other in slang, often using profane language. He said, "A real challenge was to get the kids to bond and connect." He said, "People come from all over. They mostly don't know each other. It may be their first time camping, sometimes it's the first time they've been in the snow. Just hearing their story is interesting. They make connections and network with others." When he was asked "What was a major benefit to participating in a WI trip?" This leader responded, "Bonding with each other, getting to know each other, and connecting."

The third youth spoke of needed "skills" to "engage" youth in "building relationships." He talked about his relationship with a WI staff member, how the staff member mentored him, and helped him develop those skills. According to the trip leader, "The first five minutes of any trip sets the tone." It is a "crucial time to make people feel comfortable" with each other. A leader's skill and ability to "set this tone" are paramount to establishing a cohesive group, one that "will work together."

Working with Diverse Groups
Urban Wilderness Canoe Adventures is dedicated to making high quality outdoor experiences accessible to all, including those who do not typically get out and enjoy the wilderness. The interviews with the three trip leaders supported this goal. All three youth spoke about the challenges and rewards of working with diverse groups.

Urban Wilderness Canoe Adventures Influences
Urban Wilderness Canoe Adventures impacted all three youth in both personal and professional ways. Throughout our interviews, the three youth spoke often about the personal development they experienced while both participating in Wilderness Inquiry trips as adolescents and working at WI as youth leaders.

One interviewee spoke about learning independence and gaining confidence in his own abilities. According to him, WI staff mentored these skills to all new leaders. For example, WI staff allowed him to plan trips which required working out navigation, equipment and skill details, planning activities, and always facilitating safety measures among the participants. The trip leader said, "I don't think I'd be anywhere if I had not gained that skill (independence). I came to WI with some street skills but the skills of figuring out how to think things through until you can't think it through anymore is what WI is good at."

Another youth reported, working with WI fosters "confidence" and independent skills. He commented that "you don't need high tech gear and clothes" for outdoor experiences. But you do need "attitude and the smarts to survive out there." The third youth, often referred to by the others as the "hard skills" guy, the one with exceptional outdoor survival skills, said, "It's more of a skill. When there is an incident, I'm not running around, I get things done….it can be difficult, stressful, and you have to make decisions." Confidence, independence, autonomy, self-reliance and determination were all personal skills that WI promoted among these youth –and were modeled to trip participants once they became leaders themselves.

The youth also discussed how the "skill set" of "engaging youth" transferred to their present professional venues and future goals. At different points in their WI experience, all three youth realized that they had the ability and talent to work well with people. For example, youth speaks of the leadership skills of being "empathetic, understanding, and pushing people to look inside themselves." He recalls his "first trip" when he realized he could "engage people" in talk, activity, and thoughtful discussion.

Conclusions
Interviews with past Urban Wilderness Canoe Adventures youth participants supported the literature review. All three youth emphasized that outdoor experiences promoted personal growth and community building. Personal skill development such as gaining confidence, independence, and self-reliance were mentioned by the youth throughout our interviews. Team building and connecting with others were also specific goals for trip experiences.

Conclusions of the 2012 Evaluation

The 2012 UWCA Evaluation investigated the outcomes of three UWCA activities this year: 1) The Minneapolis Public Schools' Summer School Mississippi River trip; 2) Washburn High School's at-risk students' involvement with one UWCA trip; and, 3) AVID student's participation in three UWCA trips. Our findings consistently demonstrate that regardless of the specific program or modification the participants received numerous personal, social, and academic benefits through UWCA trip participation. Many of the variables that influenced these benefits have been identified during our data analyses.

The research we initiated before the 2012 evaluation supports findings we observed in earlier evaluations, whether the data was collected from students, teachers, or former youth participants.

Environmental Awareness

The literature suggests that outdoor education increases students' awareness and appreciation of nature and the environment. Yet there are few studies that document those changes. The data from our UWCA evaluation shows that those changes do occur. Eighty-four percent of Minneapolis Public School students and 87% of their teachers agreed that the students learned about environmental issues during their Mississippi River trip. Eight-two percent of the students agreed that due to the trip they knew what to do to protect the environment. Additionally, 96% of the teachers said that students would have more positive attitudes towards the environment as a result of the trip. Several of those teachers wrote that learning about nature and the environment was the trips' greatest benefit.

AVID students who participated in three UWCA trips consistently commented on learning about nature and the environment during their experiences. For example, 53% of those who attended the Baker Wilderness trip cited "experiencing nature" as a reason for applying to participate in the Apostle Island trip. Fourteen out of the 17 students who went on the Apostle trip hoped to "learn" even more about "nature, the environment, or the outdoors" on future UWCA trips. Essay applications for the Glacier trip showed that environmental and nature connectedness was the most prominent impact on AVID students who attended the two previous trips. Across all of the AVID data, UWCA trips supported environmental awareness and an appreciation of nature among students.

Social Development and Connectedness

The literature revealed, and this evaluation confirmed that outdoor programs have significant positive effects on students' social competence. Data across all of our evaluations supported this claim. Eighty-eight percent of the Minneapolis students said that they "worked as a team" on their River trip. Qualitative observational data from their teachers showed positive student interactions and group dynamics occurring as students navigated together canoeing down the River. Teachers noted that the trip "really brought students together," how well "students cooperated" in their canoes, and that the experience involved "community building."

A consistent theme throughout the AVID data was student development related to interpersonal and social skills. Trip evaluation surveys and interview transcripts showed students learning "cooperation," "teamwork," "good communication skills," and "acceptance of others" through UWCA experiences. Further, students cited that "meeting new people" was one of the biggest trip benefits.

As observed by their teacher, at-risk students from Washburn High School also gained social skills on their trip. According to the teacher, trip activities promoted "teamwork." Further, after the trip, the

class showed social bonding that had not been observed before. The teacher described the class as more of a "community" and "club" when they returned.

Academic Benefits

Evaluation data showed that UWCA trips offered students numerous academic benefits. Ninety-two percent of the Minneapolis School teachers said that the Mississippi River trip benefitted their students academically and they believed that students their students were more interested in science as a result of the trip. Eighty-seven percent of those teachers also responded that an outcome of the trip was a deeper engagement of learning among the students. Teachers' qualitative comments showed that the trip was connected in some way to classroom learning. For example, one teacher said the trip connected to her teaching theme of "aquatic organisms" while another teacher mentioned that the trip "put classroom learning into a real context."

A Minneapolis teacher noted that her students' UWCA trip promoted school engagement. She described one student who had school attendance problems. After the UWCA trip, the student began to attend school regularly. According to the teacher, the class was more like a "community" when they returned from the trip and the student felt like she "belonged" more.

It has been difficult to show a causal relationship between UWCA participation and higher academic performance. We believe that this is largely due to a lack of articulation between the outdoor program materials and specific curriculum lessons taught in the classroom. In more than one instance, teachers did not use materials that were provided and available. We believe that a concerted effort to link UWCA activities to specific learning outcomes would make a connection between activities and learning more evident.

Personal Benefits

The outdoor adventure literature and the Wilderness Inquiry trip leaders identified personal development as an important outcome of wilderness programs. The evaluation showed that a variety of students' personal attributes were impacted by UWCA trips. AVID students cited personal growth related to "leadership skills," "self-understanding," "confidence," and "independence." According to one teacher, at-risk students gained "responsibility," "resourcefulness," "confidence," and "independence" as a result of the UWCA trip.

The evaluation did not show a significant change in pre and post personal views among the students participating in the Mississippi River trip. However, as discussed previously, the literature suggests a number of reasons why this result may have occurred. For instance, the sensitivity of the surveys may not capture changes in student attitudes that actually took place; or, the limited time of programming and lower demands associated with the river trip may not demonstrably effect personal growth. Evaluators noted that UWCA AVID trips and the Washburn High School trip were of longer duration and provided more wilderness exposure. Additionally, the post survey was administered to the Minneapolis School students directly after the River trip. Some literature suggests that personal growth, such as independence, may begin to develop during a program and continue to increase after a program ends. Follow-up studies may be necessary to determine if indeed personal development has been impacted.

Recommendations

Evaluation findings from 2012 point to numerous youth benefits derived from UWCA programming. We offer these six recommendations based on our findings from our evaluations as well as points revealed in the literature review for Wilderness Inquiry's consideration.

7. The literature review identified the need for all outdoor and wilderness programs to provide more detailed descriptions of their activities. We recommend that UWCA consider detailing field activities and educational objectives for two reasons (1) to explicitly state the goals and objectives of the activities and (2) to describe the activities with sufficient detail so that the relationship between participant outcomes and program elements can be understood.
8. We recommend that UWCA staff incorporate a version of the General Wilderness Program Assessment Instrument into the UWCA program for the purpose of collecting participant data over time. This instrument was designed to collect information about students' prior knowledge, attitudes, and experience (before a trip) and their attitudes, personal, social, and academic growth after a trip. We think these data would help inform UWCA programming in important ways.
9. We recommend that UWCA staff continue to incorporate some form of evaluation in programming for program improvement and to understand and document the impact of the program on its participants.
10. The literature review and student survey responses signal the critical role trip leaders play in student growth and the overall success of the program. This finding underscores the importance of training and developing trip leaders who must possess a variety of skills including safety, wilderness craft, youth development, interpersonal relations, and to a degree, teaching abilities. We recommend that Wilderness Inquiry devote the time and resources necessary to ensure they provide adequate and outstanding training to its trip leaders.
11. The evaluation findings found that teachers often provide little or no pre-trip or post-trip teaching as a means to extend the environmental learning experience to promote further personal reflection. For example, Minneapolis Public Schools' summer session students and teachers reported that fewer than half the students studied the Mississippi River prior to participating on the field trip. Similarly, AVID teachers in Saint Paul Public Schools did not use available materials that were provided by the National Park Service staff or evaluators. We recommend that Wilderness Inquiry staff explore the barriers teachers encounter in incorporating enrichment materials into the regular classroom setting. For example, during one of our teacher interviews, a teacher stated, *"I'd like to see if students could use it [a trip] for credit. Having systems in place where trips are aligned with standards would be great too."* We recommend the exploration of how teachers might be supported to incorporate supporting materials. Would aligning lessons to national or state science standards or district goals promote curricular integration in classrooms?
12. We recommend that Wilderness Inquiry staff follow-up with participants who have had an ongoing relationship with the outdoors through UWCA programming. Research has shown that very few programs follow changes that occur among participants over extended periods of time. Since the impact of outdoor experiences is likely cumulative and may not be in evidence in the shorter term, these efforts may show important participant gains.

2010 Project Abstract
For the Period Ending June 30, 2014

PROJECT TITLE: Get Outside! Urban Woodland for City Kids
PROJECT MANAGER: Bryan Murphy
AFFILIATION: City of Saint Paul, Dept of Parks and Recreation
MAILING ADDRESS: 400 City Hall Annex, 25 West Fourth Street
CITY/STATE/ZIP: Saint Paul, MN 55102
PHONE: 651.266.6411
E-MAIL: Bryan.Murphy@ci.stpaul.mn.us
WEBSITE: www.stpaul.gov
FUNDING SOURCE: Environment and Natural Resources Trust Fund
LEGAL CITATION: ML 2010, Chap.[_362_], Sec.[_2_], Subd._8(e)_
& ML 2013, Chap.[_52 _], Sec.[_2_], Subd._17_

APPROPRIATION AMOUNT: $ 218,000

Overall Project Outcome and Results

The City of Saint Paul developed a 17.65 acre outdoor classroom in Como Regional Park to provide environmental education, historical interpretation, and habitat for native wildlife in an inner-city community where environmental learning opportunities are rare. The woodland is located within five miles of over 75 public and private schools. To date, the Como Woodland Outdoor Classroom has been utilized by 2,103 students and educators. It has become the School Forest for Great River School and Crossroads Elementary School through the MN DNR's School Forest Program.

The Environment and Natural Resources Trust Fund's investment in the Como Woodland Outdoor Classroom has resulted in the development of outdoor study areas featuring coniferous woodland, oak savanna, tallgrass prairie, shortgrass prairie, transitional woodland, and terrace forest plant communities. Additionally, a propagation garden area has been constructed within the Classroom that will serve as a native plant demonstration garden for the public and will be utilized by students to grow native plants for the Classroom. ENRTF funds were also utilized to install 2,525 feet of ADA accessible gravel trails within the Classroom.

Funds were used to install four entry signs at each of the major entrances to the Como Woodland Outdoor Classroom. 27 numbered, interpretative posts were installed at key locations throughout the site. The City of Saint Paul has received $17,000 from the Minnesota Historical Society and is in the final stages of developing a guide book to the cultural and natural history of the site, referencing these numbered posts. When published, the guide book will be an invaluable resource for educators wishing to bring students to the Como Woodland Outdoor Classroom.

Community volunteers were engaged throughout the restoration process. 2,005 volunteers participated in restoration activities, including planting, invasive species removal, and trail construction.

Project Results Use and Dissemination

Our advisory committee, the Como Woodland Advisory Committee, has set up a website dedicated to the classroom: http://www.comowoodland.org/. Progress about our project has been shared with the general public through our blog (http://restoresaintpaul.blogspot.com/) and

our Facebook page (https://www.facebook.com/saintpaulnaturalresources). Community volunteer events taking place in the classroom are highlighted on the City's website http://www.stpaul.gov/index.aspx?NID=1043. The Minnesota Lottery recently highlighted the Como Woodland Outdoor Classroom in their newly launched blog: http://blog.mnlottery.com/blog/2014/07/24/64/where_the_money_goes_como_woodland_outdoor_classroom.

Environment and Natural Resources Trust Fund (ENRTF)
2010 Work Program Final Report

Date of Report: August 11, 2014
Date of Next Progress Report: Final Report
Date of Work Program Approval: Amendment approved June 23, 2014
Project Completion Date: June 30, 2014

I. PROJECT TITLE: Get Outside! Urban Woodland for City Kids

Project Manager:	Bryan Murphy
Affiliation:	City of Saint Paul, Dept of Parks and Recreation
Mailing Address:	400 City Hall Annex, 25 West Fourth Street
City / State / Zip:	Saint Paul, MN 55102
Telephone Number:	651.266.6411
E-mail Address:	Bryan.Murphy@ci.stpaul.mn.us
FAX Number:	651.292.7405
Web Site Address:	www.stpaul.gov

Location: Como Regional Park, Ramsey County, Saint Paul, MN

Total ENRTF Project Budget:	**ENRTF Appropriation**	**$ 218,000**
	Minus Amount Spent:	**$ 212,694**
	Equal Balance:	**$ 5,306**

Legal Citation: ML 2010, Chap.[_362_], Sec.[_2_], Subd._8(e)_ & ML 2013, Chap.[_52 _], Sec.[_2_], Subd._17_

Appropriation Language:
The availability of the appropriations for the following projects are extended to June 30, 2014: (7) Laws 2010, chapter 362, section 2, subdivision 8, paragraph (e), Get Outside – Urban Woodland for Kids;

$218,000 is from the trust fund to the commissioner of natural resources for an agreement with the city of St. Paul, Department of Parks and Recreation, to restore and develop an outdoor classroom for ecological education and historical interpretation at Como Regional Park in St. Paul. This appropriation is available until June 30, 2013, by which time the project must be completed and final products delivered.

II. FINAL PROJECT SUMMARY AND RESULTS:

Overall Project Outcome and Results

The City of Saint Paul developed a 17.65 acre outdoor classroom in Como Regional Park to provide environmental education, historical interpretation, and habitat for native wildlife in an inner-city community where environmental learning opportunities are rare. The woodland is located within five miles of over 75 public and private schools. To date, the Como Woodland Outdoor Classroom has been utilized by 2,103 students and educators. It has become the School Forest for Great River School and Crossroads Elementary School through the MN DNR's School Forest Program.

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III. PROGRESS SUMMARY AS OF:

January 31, 2011 – Grant Agreement is being processed

July 21, 2011 – Result 1: Vegetation management and invasive species control initiated across 17.65 acres. Trail layout underway and will be constructed later this fall. Result 2: Great River School is applying for School Forest Status through the MN DNR. A joint powers agreement has been drafted between the City and the School should be completed by November 2011. On track to complete training and student involvement deliverables by project completion date.

November 27, 2011 – Result 1: Vegetation management and invasive species control continued across 17.65 acres. Woody species control is 90% complete. Field alignment of trail system stalled until woody species removal was nearly complete,

as tree removal and tree preservation activities dictated trail alignment. Trail alignment approved by Advisory Committee November 2011. Trail construction RFP to be released this winter for spring 2012 installation. Result 2: Great River School has been authorized to complete School Forest application with the MN DNR. A second school, Crossroads Elementary is applying for School Forest status as a result of school board authorization. On track to complete training and student involvement deliverables by project completion date.

June 16, 2012 – Result 1: Vegetation management and invasive species control continued across 17.65 acres. Conservation Corps MN crews have achieved excellent control of major, herbaceous invasive threats – garlic mustard and burdock. Trail construction activities scheduled to begin in July. Prairie installation to be completed in 2012. Result 2: Great River School (ISD#4105) achieved School Forest status in October 2011. The City of Saint Paul Public School District (ISD #625) authorized the use of the Como Woodland Outdoor Classroom for use as a School Forest in April 2012. Saint Paul public school, Crossroads Elementary, is now using the Como Woodland Outdoor Classroom as their School forest.

Amendment Request (09/06/12):

- A fund shift of $4,000 is requested under Result 1, *Personnel* to engage Angela Koebler, Lead Landscaper, in the design of the propagation garden, and to oversee the *Propagation Garden Construction Contract* related to this work. A reduction in Result 2, *Personnel*, funding for Meghan Manhatton allows for this addition.
- It was anticipated that a section of roadway running through the classroom was to be closed as a part of an unrelated project during the grant period. As this did not happen, trails will not be constructed adjacent to the ephemeral wetland site at this time, reducing the total length of the trail system from ~4,000 to ~2,525 feet.
- Parks has been coordinating gravel trail installation specifications with the National Center on Accessibility. In order to maintain accessibility, the aggregate material mixture recommended by the National Center on Accessibility is more complex, more expensive, and more labor intensive to install than our initial estimates. Due to these conditions, Parks is requesting a fund shift of $10,000 under Result 1, *Trail Installation Contract*. A fund reduction of $10,000, under the *Forest Restoration Contract*, allows for this change.
- The addition of a Result 1, *Plant, Herbicide & Erosion Control Materials* budget under *Other* will allow the City to better engage volunteers and Conservation Corps Minnesota in restoration and enhancement activities. A fund shift of $4,000 under *Prairie Installation Contract*, and $6,000 from *Personnel*, funding for Don Ganje, is requested to provide this funding.

Amendment Approved: September 18, 2012

Extension Request (03/01/13):

- The City of Saint Paul Department of Parks and Recreation formally requested a four month extension for our 2010 LCCMR project: Get Outside! Urban Woodland for City Kids (179-F). Our current grant period ends on June 30, 2013. We are asking for an extension through October 31, 2013. Two external factors are the basis behind this request:

- First, the City commissioned a comprehensive sign redesign analysis for Como Regional Park in 2012. Visual Communications Inc completed their analysis and design work in late January, 2013. Results of this analysis have produced a specific sign type which now needs to be modified for use in the Como Woodland Outdoor Classroom. The current timeline to design and manufacture signs for the Outdoor Classroom will result in a rushed design and the final product may not be completed in time.
- Second, the City received a small grant from the Minnesota Historical Society to research the history of the Como Woodland Outdoor Classroom site. This research will facilitate the production of a classroom guide for educators which will reference interpretive posts that will be installed in the classroom using LCCMR funding. This research will not be completed until May 2013. We believe that this research is crucial to inform our placement of the interpretative posts. Additional time to work through this process with local educators and the classroom's advisory committee would result in a better final product.

Amendment Approved: May 9, 2013

April 24, 2012 – Result 1: 2,525 feet of accessible gravel trail have been installed as of November 1, 2012. With the exception of a small washout on 30 feet of trail, which has since been restored, the trail held up beautifully through winter weather and spring thaw. Two acres of native prairie were seeded and 2,200 plugs installed in the fall. Erosion and sediment control materials were installed to stabilize trail work and support prairie establishment. Volunteers initiated installation of understory plant material within the coniferous woodland. One acre of disturbed woodland seeded. Conservation Corps Minnesota crews removed declining green ash trees with targets, as an Emerald Ash Borer infestation has been confirmed within 500 feet of the outdoor classroom. Propagation garden design has been completed. RFP to be released shortly. Sign construction contract awarded. Sign order to be placed shortly.

Amendment Request (04/24/13):
- A fund shift of $3,000 is requested under Result 1, from *Personnel – Don Ganje* to *Contracts – Propagation Garden Construction* to provide a larger construction budget for the propagation gardens.
- A fund shift of $187 is requested under Result 1, from *Contracts – Prairie Installation Contract* to *Other – Plant, Herbicide & Erosion Control Materials* to provide a larger budget for Parks and Recreation staff to enhance the project's native plant communities. The prairie installation contract has been fully implemented. Remaining prairie installation contract funding will cover spring 2013 maintenance.
- A fund shift of $3,776 is requested under Result 1, from *Contracts – Trail Installation Contract* to *Other – Plant, Herbicide & Erosion Control Materials* to provide a larger budget for Parks and Recreation staff to enhance the project's native plant communities. The trail installation contract has been fully implemented.
- A fund shift of $5,885 is requested under Result 1, from *Contracts – Sign Construction Contract* to *Contracts – Propagation Garden Construction* to provide a larger construction budget for the propagation gardens.

Amendment Approved: May 7, 2013

October 29, 2013 – Result 1: Conservation Corps Minnesota crews have continued comprehensive management of herbaceous and woody invasive species. Planting has been completed in the coniferous woodland section of the outdoor classroom. Local school groups and community volunteers have been engaged in management and planting efforts. Modifications to the propagation garden design has held up release of an RFP. As construction costs of the garden will dictate how much money can be spent on signage, we have held off on ordering entry signs, but have designed and ordered interpretative trail signs.

Amendment Request (10/29/2013):

- Requesting a project completion date shift from October 31, 2013 to June 30, 2014 as allowed under appropriation language: ML 2013, Chap.[_52 _], Sec.[_2_], Subd._17
- A fund shift of $1,942 is requested under Result 2, from *Personnel* to Result 1 *Contracts – Propagation Garden Construction* to provide a larger construction budget for the propagation gardens.

Amendment Approved: November 12, 2013

Amendment Request (06/15/14):

- A fund shift of $24,308 is requested out of *Contracts – Sign Construction* to other items within Result 1. The original plan for the four entry signs included one, 4-sided sign. When the bids came in for the entry signs, the cost was overly prohibitive and the four-sided sign needed to be scaled back to a one-sided sign. All four entry signs are now slated to be single-sided signs. The following is a breakdown of the requested $24,308 fund shift.
    - *Invasive Species Management* ($2,900) – the invasive plant, burdock, continues to persist in large colonies in the project area and continues threaten the viability of our restoration efforts. This request would provide additional time for Conservation Corps MN crews to control this invasive species.
    - *Forest Restoration* ($82) – we inadvertently overspent our originally approved (11/12/13) budget by $82. We would like to shift $82 to cover these costs.
    - *Propagation Garden Construction* ($13,173) – The City's original estimate for propagation garden construction was $30,827 (approved on 11/12/13 budget). Following a competitive bidding process, the lowest bidder came in at $66,900, as designed. After scaling back the project to include only the essential elements of the propagation gardens, the bid was lowered $42,900. We are requesting the difference between our current, approved budget and the adjusted bid to complete this element of the project.
    - *Plant, herbicide and erosion control materials* ($3,728) – as invasive plants are removed from the woodland and prairie restoration areas, bare soil is often the result. We would like to purchase additional plant material to fill in these voids to outcompete invasive plant encroachment. Additionally, we need to install several water bars (timbers) and backfill with aggregate to correct several small erosion issues.
    - *Fencing materials* ($1,750) – our two prairie restoration areas on site have been damaged by vandalism. Specifically, we have experienced three

separate incidences when cars have driven into the prairies and 'spun doughnuts'. This was an unpredicted situation, as there is significant topography in both areas. We would like to install cedar split-rail fencing to restrict access to the prairies.
    - o *Sign materials* ($3,675) – The sign construction contract only covers the manufacturing of the four entry signs. Interpretative signs were not included in the contract. This fund shift will cover the cost of interpretive posts and ENRTF acknowledgement sign materials produced and installed by City staff.
- A fund shift of $1,000 is requested under Result 1, from *Personnel – Don Ganje* to *Other – Plant, herbicide and erosion control materials*. Mr. Ganje's time was earmarked to assist with the design of the propagation gardens. Mr. Ganje has decided not to code his time to this project so these funds can be used to purchase plant material to propagate in the propagation garden. This budget item was not included in the propagation garden construction contract.
- A fund shift of $1,000 is requested under Result 1, from *Personnel – Angela Koebler* to *Other – Plant, herbicide and erosion control materials*. Ms. Koebler's time was earmarked to assist with the design of the propagation gardens. Ms. Koebler will not code additional time to this project so these funds can be used to purchase plant material to propagate in the propagation garden. This budget item was not included in the propagation garden construction contract.

Amendment Approved: June 23, 2014

IV. OUTLINE OF PROJECT RESULTS*:*

RESULT 1: Develop outdoor classroom study areas.

Description:

Result One of this proposal is to develop seven outdoor study areas encompassing 15⅓ acres according to the recently completed Como Woodland Outdoor Classroom Master Plan. The study areas will include: oak woodland, coniferous forest, oak savanna, tallgrass prairie, sedge meadow, transitional woodland, and propagation gardens.

A three year invasive species management contract for the entire 17¾ acre classroom will ensure establishment and growth of the classroom study areas. Construction of accessible, gravel trails will provide access to each of these study areas and informal gathering areas for small groups of students will provide a location for learning in the study areas. Informational signage and interpretative trail signs will direct the outdoor classroom experience.

- Complete 10.9 acres of woodland restoration and enhancement to include oak woodland, coniferous forest, and transitional woodland.
- Invasive species management. 17.65 acres annually for three years.
- Complete 3.6 acres of prairie, savanna and sedge meadow enhancement.
- Contractor(s) to construct 0.85 acre propagation gardens. These propagation beds will highlight useful native species in the home landscape and provide a

source for local ecotype plant material for future restoration activities within the classroom.
- Contractor to construct 2,525 feet of ADA accessible gravel trails.
- Sign construction and installation contract(s). Four entry signs and approximately fifty interpretative trail signs.
- In-house design, engineering services, and project management to fully develop restoration, trail, and sign construction activities.

Summary Budget Information for Result 1: ENRTF Budget: $ 215,942
Amount Spent: $ 210,636
Balance: $ 5,306

Deliverable	Completion Date	Budget
1. Woodland restoration – 10.9 acres (Oak woodland – 5.8 acres, coniferous forest – 1.9 acres, & transitional woodland – 3.2 acres)	June 2014	$ 70,982
2. 3.6 acres (Prairie –.95 acres re-creation, Oak Savanna – 2.3 acres by removing invasive woody and herbaceous species and additional native species planting and Sedge Meadow restoration – .35 acres)	June 2014	$ 10,813
3. Propagation gardens – 0.85 acres	June 2014	$ 44,000
4. Construction of 2,525 feet of ADA accessible trails	November 2012	$ 31,224
5. Entry signs (four) and interpretative trail signage (~fifty)	June 2014	$ 19,807
6. Design and engineering for trails, signage, planting, and classrooms (City of Saint Paul staff)	June 2014	$ 15,000
7. Budget Item: *Other – Plant, Herbicide & Erosion Control Materials*	June 2014	$18,691
8. Budget Item: *Other – Fencing materials*	June 2014	$ 1,750
9. Budget Item: *Other – Sign materials*	June 2014	$ 3,675

Result Completion Date: June 2014

Result Status as of November 2010: Vendors contacted and processing contracts to initiate restoration activities in March 2011.

Result Status as of July 2011: Woodland and prairie restoration activities initiated by City staff and contractors. Large tree removal completed in prairie and savanna plant communities. Seed and plugs ordered for prairie and savanna restoration. Trail construction activities are still in the planning phase. Community volunteer event scheduled for September 2011 to install sedge meadow.

Result Status as of November 2011: City staff and Conservation Corps crews to complete woody species removal this winter. Prairie and savanna restoration activities

highlighted by installation of 3,000 local ecotype, native grass plugs. Savanna areas to be frost-seeded this winter by Conservation Corps crews. Prairie areas to be prepared and drilled with native seed, spring 2012. Trail installation to begin spring 2012. Trail alignments approved by Advisory Committee. Community volunteers installed 1,204 woodland plants during September event in sedge meadow (floodplain terrace forest plant community). Youth Job Corps crews completed nearly $15,000 in labor to control exotic species. Propagation garden construction planning to begin in winter 2012. Sign design and construction activities to begin winter 2012.

Result Status as of June 2012: Trail construction activities were pushed back to July to reduce the possibility of oak wilt introduction, and so as not to interfere with a scheduled event in Como Park on July 1. Prairie installation activities need to be completed after trails are installed, so this was also pushed back. Woodland restoration activities are proceeding as scheduled. Invasive species management continues to be a priority across the classroom. 290 volunteers have assisted with restoration activities during the spring of 2012.

Result Status as of November 2012: Trail construction activities have been completed. 2,525 feet of ADA accessible gravel trails have been installed. Prairie restoration activities have been completed. 1.5 acres of prairie have been seeded and plugged. Savanna areas previously completed. Woodland restoration activities are proceeding as scheduled. Invasive species management and prairie maintenance will be a priority in 2013. 286 volunteers assisted with restoration activities during the fall of 2012. Sign design underway with installation to occur in spring 2013.

Result Status as of April 2013: Erosion and sediment control materials have been installed to stabilize trail work and support prairie establishment. Volunteers initiated installation of understory plant material within the coniferous woodland. One acre of disturbed woodland seeded. Conservation Corps Minnesota crews removed declining green ash trees with targets, as an Emerald Ash Borer infestation has been confirmed within 500 feet of the outdoor classroom. Propagation garden design has been completed. RFP to be released shortly. Sign construction contract awarded. Sign order to be placed shortly.

Result Status as of October 2013: Conservation Corps Minnesota crews have continued comprehensive management of herbaceous and woody invasive species. Planting has been completed in the coniferous woodland section of the outdoor classroom. Local school groups and community volunteers have been engaged in management and planting efforts. Modifications to the propagation garden design has held up release of an RFP. As construction costs of the garden will dictate how much money can be spent on signage, we have held off on ordering entry signs, but have designed and ordered interpretative trail signs.

Final Report Summary:

Invasive Species Management (17.65 acres) and Forest Restoration (10.9 acres) – Conservation Corps Minnesota (CCM) crews and community volunteers completed invasive species management and forest management work across the entire 17.65

acre site. CCM crews were hired for their technical skills (chainsaw/brushsaw operation and herbicide application), while community volunteers provided the “grunt” labor to haul brush and hand-pull invasive weeds. Over the life of this project 2,149 community volunteers have contributed 5,002 volunteer hours helping to restore and enhance the classroom’s native plant communities. That is equivalent to 2.4 full-time employee’s worth of labor. CCM’s initial control work was focused on managing woody species such as common buckthorn and Tartarian honeysuckle. As the crews were working through the site, additional invasive or diseased trees were removed to create suitable planting locations for native species. We took this opportunity to target select green ash for removal across the site, as Emerald Ash Borer was discovered in the area in May 2009. The primary herbaceous weed species targeted on site were garlic mustard and common burdock. The most problematic species to manage has been burdock due to its distribution, tenacity, and stature. We have managed to keep nearly all of the burdock plants from seeding out over the last four years. We have used a combination of repeated brush cutting, using a shovel to “spike” the root, herbicide application, and seed head collection and removal. We are having success reducing the burdock population, but this will need to continue to be our top priority in terms of managing the site for invasive species into the future.

Prairie (1.5 acres) and Savanna (2.3 acres) Installation: 1.5 acres of prairie were seeded and plugged in 2012. Shortly after installation, we entered into a drought. Saint Paul Parks staff did their best to keep the site watered during this period. Supplemental seed was frost-sown in late 2012. Due to several acts of vandalism – vehicles driving through the prairie areas – split rail cedar fencing was installed adjacent to the prairies to prevent vehicles from entering these areas. Supplemental plugging occurred in the prairies in the spring of 2014. Oak savanna, 2.3 acres, was enhanced on site through the removal of invasive species and the reintroduction of native seed and plugs during the fall/winter of 2011/2012. Parks and Recreation staff were able to perform a prescribed burn of the savanna in November 2013. The fire dramatically reduced the density of garlic mustard and burdock in the savanna, knocked-back woody species, and invigorated growth of the reintroduced native seed and plugs.

Trail Installation (2,525 feet): Trail installation occurred in the Fall of 2012. Trail alignment was determined by merging existing trails with areas of invasive species removal, while following the intent of the classroom’s master plan. This work had very little impact on desirable native species. Saint Paul Parks and Recreation consulted with the National Center on Accessibility in Bloomington, Indiana to develop a trail implementation plan for the site. After reviewing several case studies, Parks opted to: excavate the existing soils to a depth of 6” with a skid steer, compact the subsoil with a 4 ½ ton vibratory roller, use a paving machine to install 6” of 3/8” minus limestone, and then compact the surface – a minimum of four passes – with the vibratory roller. Parks then seeded the edges of the trails with a site-appropriate seed mix. In all, 2,525 feet of trail were installed. The trail has held up remarkably well. Early on, there were four locations that were experiencing erosion problems. Three locations required only minor trail repair until the surrounding vegetation established. One location required more troubleshooting to stabilize, but was finally corrected once erosion blanket and biologs were utilized to redirect stormwater flow.

Sign Construction and Installation: Four entry signs to the Como Woodland Outdoor Classroom were installed as a part of this project. The design was dictated by a signage and wayfinding master plan for Como Park completed in October 2012. Additionally, 27 interpretative trail markers were installed. These trail markers will correspond to a classroom guide, projected to be published in May 2015.

Propagation Garden Construction (0.85 acres): Propagation garden design was completed and the planting beds and associated aggregate trails were constructed. The beds were designed after plans from the Chicago Botanic Gardens. The beds will provide users of the site with an opportunity to learn about the native plants in the woodland in an up-close and personal setting. The area surrounding the propagation beds provides space for classroom users to congregate and learn.

RESULT 2: Teacher training and student involvement.

Description:

Result Two of this proposal will allow Saint Paul Parks to develop and implement an outreach program to advertise the classroom availability of the site. This plan will include establishment of the site as a MN DNR School Forest. This will allow Parks to tap into the program's resources and establish a long-range support network. Additionally, an 'Educate the Educator' program for local teachers in outdoor environmental education at all levels will be developed.

- Receive DNR School Forest status.
- Host six educator training sessions (two each for elementary, middle, and high school teachers). Involve ten educators per session. Designed to help educators adapt to teaching in an outdoor classroom.
- Student participation in site restoration activities (500 youth/year).
- Coordinate and implement an outreach and marketing plan for the classroom.

Summary Budget Information for Result 2:	**ENRTF Budget:**	**$ 2,058**
	Amount Spent:	**$ 2,058**
	Balance:	**$ 0**

Deliverable	**Completion Date**	**Budget**
1. Receive DNR School Forest status	October 2011	$0
2. Host six educator training sessions	October 2013	$2,058
3. Student participation in site restoration (500 youth/year)	October 2013	$0

Result Completion Date: October 2013

Result Status as of November 2010: School Forest joint powers agreement in draft form. 27 educators involved in training session. 292 youth engaged in restoration activities. Registration system initiated to schedule the outdoor classroom.

Result Status as of July 2011: Great River School is pursuing School Forest status for the Como Woodland Outdoor Classroom. Registration system is available to schedule use of the outdoor classroom. Outreach and marketing plan timeline drafted. Since July 1, 2010: 47 educators involved in two training sessions; 676 youth engaged in education and restoration activities.

Result Status as of November 2011: Great River School is nearing completion of School Forest status for the Como Woodland Outdoor Classroom. Crossroads Elementary is beginning process. Registration system accepted 6 requests for classroom reservations. Since July 1, 2010: 47 educators involved in 2 training sessions; approximately 870 youth engaged in education and restoration activities.

Result Status as of June 2012: Great River School (ISD#4105) achieved School Forest status in October 2011. The City of Saint Paul Public School District (ISD #625) authorized the use of the Como Woodland Outdoor Classroom for use as a School Forest in April 2012. Saint Paul public school, Crossroads Elementary, is now using the Como Woodland Outdoor Classroom as their School forest. Registration system accepted 12 requests for classroom reservations since going live. Since July 1, 2010: 58 educators involved in 3 training sessions; approximately 1,160 youth engaged in education and restoration activities.

Result Status as of November 2012: Registration system accepted 24 requests for classroom reservations since going live. Since July 1, 2010: 155 educators involved in 12 training sessions; approximately 1,491 youth engaged in education and restoration activities. Minnesota Historical Society grant received to develop classroom guide for educators. Guide will be used for marketing and outreach purposes.

Result Status as of April 2013: 28 requests for classroom reservations since implementing a reservation system. Since July 1, 2010: 155 educators involved in 12 training sessions; approximately 1,525 youth engaged in education and restoration activities. Two historical researchers contracted under Minnesota Historical Society grant to develop classroom guide for educators. Research to be completed by September 2013.

Result Status as of October 2013: 39 requests for classroom reservations since implementing a reservation system (there are also a number of known educators using the classroom without pulling free permits). Since July 1, 2010: 155 educators involved in 12 training sessions; approximately 1,882 youth engaged in education and restoration activities. Two historical researchers contracted under Minnesota Historical Society grant to develop classroom guide for educators. Research completed. Parks will be applying for second round of MHS funding to edit research and produce guide.

Final Report Summary:

Great River School (ISD #4105) achieved School Forest status in October 2011. The City of Saint Paul Public School District (ISD #625) authorized the use of the Como Woodland Outdoor Classroom for use as a School Forest in April 2012. Saint Paul public school, Crossroads Elementary (ISD #625), is now also using the Como Woodland Outdoor Classroom as their School Forest.

Saint Paul Parks and Recreation has received 85 requests for classroom reservations since implementing a reservation system in June 2011. The classroom is also actively used by non-permitted groups. Non-permitted groups are allowed to use the site, while permitted groups receive priority if there is a conflict.

Since July 2010, 190 educators were involved in 18 training sessions; approximately 1,913 youth engaged in education and restoration activities.

Saint Paul Parks and Recreation received a Minnesota Historical Society (MHS) grant in 2012 to compile research to develop a guide to the Como Woodland Outdoor Classroom (CWOC) for educators. Research for the guide was completed in September 2013. Saint Paul Parks and Recreation has received a second MHS grant to publish the guidebook for CWOC. The guide is projected to be published in May 2015.

V. TOTAL ENRTF PROJECT BUDGET:

Personnel: $17,058 – *Design and engineering for trails, signage, planting, and classrooms (City of Saint Paul staff) and teacher training*
Contracts: $176,826 – Invasive species management, forest restoration, prairie installation, Trail and signage construction, and propagation garden installation
Equipment/Tools/Supplies: $24,116 – Plant, herbicide, & erosion control materials, fencing materials, and sign materials.
Acquisition (Fee Title or Permanent Easements): $ 0
Travel: $ 0
Additional Budget Items: $ 0

TOTAL ENRTF PROJECT BUDGET: $ 218,000

Result Status as of July 21, 2011: Other Funds spent during the Project Period

Spending: *Total $379,250*	**Anticipated Spending**	**Estimated Spending to Date**
State Funds Being Applied to Project During Project Period: Parks and Trails Legacy Grant funds from the Metropolitan Council to develop the classroom entrance and meeting location.	$ 250,000	$ 238,862.74
Other Non-State $ Being Applied to Project During Project Period: Saint Paul Parks and Recreation, Environmental Services (Operations & Youth Job Corps) staff time.	$ 50,000	$23,000
In-kind Services During Project Period:		
Website content development, curriculum and guide development	$ 14,000	$500
Volunteer labor ($10 per hour)	$ 45,000	

		$10,000
Como Woodland Outdoor Classroom Advisory Committee ($20.25 per hour)	$ 20,250	$4,000

Result Status as of November 28, 2011: Other Funds spent during the Project Period

Spending:	**Anticipated Spending:** *Total $379,250*	**Estimated Spending to Date:** *Total $312,233*
State Funds Being Applied to Project During Project Period: Parks and Trails Legacy Grant funds from the Metropolitan Council to develop the classroom entrance and meeting location. (Includes Legacy funded position time & Community Forest Bonding grant)	$ 250,000	$ 244,725
Other Non-State $ Being Applied to Project During Project Period: Saint Paul Parks and Recreation, Environmental Services (Operations & Youth Job Corps) staff time. (Includes Conservation Corps (YO!) time)	$ 50,000	$ 43,463
In-kind Services During Project Period:		
Website content development, curriculum and guide development	$ 14,000	$ 1,539
Volunteer labor ($10 per hour)	$ 45,000	$ 13,855
Como Woodland Outdoor Classroom Advisory Committee ($20.25 per hour)	$ 20,250	$ 8,651

Result Status as of June 16, 2012: Other Funds spent during the Project Period

Spending:	**Anticipated Spending:** *Total $379,250*	**Estimated Spending to Date:** *Total $327,440*
State Funds Being Applied to Project During Project Period: Parks and Trails Legacy Grant funds from the Metropolitan Council to develop the classroom entrance and meeting location. (Includes Legacy funded position time & Community Forest Bonding grant)	$ 250,000	$ 244,819
Other Non-State $ Being Applied to Project During Project Period: Saint Paul Parks and Recreation, Environmental Services (Operations & Youth Job Corps) staff time. (Includes Conservation Corps (YO!)	$ 50,000	

time ***through 11/28/11***)		$ 49,270
In-kind Services During Project Period:		
Website content development, curriculum and guide development	$ 14,000	$ 1,701
Volunteer labor ($10 per hour)	$ 45,000	$ 20,675
Como Woodland Outdoor Classroom Advisory Committee ($20.25 per hour)	$ 20,250	$ 10,975

Result Status as of November 16, 2012: Other Funds spent during the Project Period

Spending:	**Anticipated Spending:** *Total $379,250*	**Estimated Spending to Date:** *Total $348,518*
State Funds Being Applied to Project During Project Period: Parks and Trails Legacy Grant funds from the Metropolitan Council to develop the classroom entrance and meeting location. (Includes Legacy funded position time & Community Forest Bonding grant)	$ 250,000	$ 245,149
Other Non-State $ Being Applied to Project During Project Period: Saint Paul Parks and Recreation, Environmental Services (Operations & Youth Job Corps) staff time. (Includes Conservation Corps (YO!) time)	$ 50,000	$ 61,457
In-kind Services During Project Period:		
Website content development, curriculum and guide development	$ 14,000	$ 1,762
Volunteer labor ($10 per hour)	$ 45,000	$ 27,879
Como Woodland Outdoor Classroom Advisory Committee ($20.25 per hour)	$ 20,250	$ 12,271

Result Status as of April 24, 2013: Other Funds spent during the Project Period

Spending:	**Anticipated Spending:** *Total $379,250*	**Estimated Spending to Date:** *Total $360,019*
State Funds Being Applied to Project During Project Period: Parks and Trails Legacy Grant funds from the Metropolitan Council to develop the classroom entrance and meeting location. (Includes Legacy	$ 250,000	

funded position time, Community Forest Bonding grant, and MN Historical Society grant)		$ 252,149
Other Non-State $ Being Applied to Project During Project Period: Saint Paul Parks and Recreation, Environmental Services (Operations & Youth Job Corps) staff time & equipment costs. (Includes Conservation Corps (YO!) time)	$ 50,000	$ 64,945
In-kind Services During Project Period:		
Website content development, curriculum and guide development	$ 14,000	$ 1,762
Volunteer labor ($10 per hour)	$ 45,000	$ 27,879
Como Woodland Outdoor Classroom Advisory Committee ($20.25 per hour)	$ 20,250	$ 13,284 (*estimated 4/24/13*)

Result Status as of October 29, 2013: Other Funds spent during the Project Period

Spending:	**Anticipated Spending:** *Total $379,250*	**Estimated Spending to Date:** *Total $378,907*
State Funds Being Applied to Project During Project Period: Parks and Trails Legacy Grant funds from the Metropolitan Council to develop the classroom entrance and meeting location. (Includes Legacy funded position time, Community Forest Bonding grant, and MN Historical Society grant)	$ 250,000	$ 252,996
Other Non-State $ Being Applied to Project During Project Period: Saint Paul Parks and Recreation, Environmental Services (Operations & Youth Job Corps) staff time & equipment costs. (Includes Conservation Corps (YO!) time)	$ 50,000	$ 70,516 (not including YJC & YO for this period)
In-kind Services During Project Period:		
Website content development, curriculum and guide development	$ 14,000	$ 2,062 (*estimated 10/29/13*)
Volunteer labor ($10 per hour)	$ 45,000	$ 39,049
Como Woodland Outdoor Classroom Advisory Committee ($20.25 per hour)	$ 20,250	$ 14,284 (*estimated 10/29/13*)

Result Status as of June 30, 2014: Other Funds spent during the Project Period

Spending:	Anticipated Spending: *Total $379,250*	Estimated Spending to Date: *Total $407,140*
State Funds Being Applied to Project During Project Period: Parks and Trails Legacy Grant funds from the Metropolitan Council to develop the classroom entrance and meeting location. (Includes Legacy funded position time, Community Forest Bonding grant, and MN Historical Society grant)	$ 250,000	$ 255,540
Other Non-State $ Being Applied to Project During Project Period: Saint Paul Parks and Recreation, Environmental Services (Operations & Youth Job Corps) staff time & equipment costs. (Includes Conservation Corps (YO!) time). Includes Xcel and REI grant.	$ 50,000	$ 79,983
In-kind Services During Project Period:		
Website content development, curriculum and guide development	$ 14,000	$ 1,944
Volunteer labor ($10 per hour)	$ 45,000	$ 50,020
Como Woodland Outdoor Classroom Advisory Committee ($20.25 per hour)	$ 20,250	$ 19,653

Explanation of Capital Expenditures Greater Than $3,500:

VI. PROJECT STRATEGY:

A. Project Partners:

Project partners not receiving money from this fund

Como Woodland Advisory Committee: Project advice, website content development, curriculum and guide development. ($0.00)

Ramsey Conservation District: Provide project guidance. ($0.00)

District 10 Community Council and Environment Committee: Provide meeting space and community involvement. ($0.00)

B. Project Impact and Long-term Strategy:

Natural resources restoration of this area will be the first step in the process to provide outdoor environmental education opportunities to over 75 public and private schools within a five-mile radius of the woodland. In addition, the woodland will provide an

additional recreational and educational opportunity for more than 2.3 million visitors to Como Regional Park per year.

In early 2010, Saint Paul Parks and Recreation is adding an Education Coordinator position and a Volunteer Coordinator position to the Environmental Services program. These two individuals will guide development of curricula and signage, and coordinate volunteer groups working within the Como Woodland Outdoor Classroom. Given the history of volunteer involvement on site and the growth of Saint Paul Parks' volunteer program, we are confident that maintenance of this site will become a perennial community and youth-based volunteer effort. Historically, the Environmental Services program has engaged 4,000 community volunteers annually, totaling approximately 13,000 hours of service per year. A larger portion of these hours will be shifted to cover the needs of the classroom as it develops. In 2010 and beyond, Parks will assign a dedicated, paid, summer youth crew to the classroom site to maintain the site and manage exotic species. The Como Woodland Advisory Committee has and will continue to seek support from local foundations and non-profit organizations.

C. Other Funds Proposed to be spent during the Project Period:

Spending: *Total $379,250*		
State Funds Being Applied to Project During Project Period: Parks and Trails Legacy Grant funds from the Metropolitan Council to develop the classroom entrance and meeting location.	$	250,000
Other Non-State $ Being Applied to Project During Project Period: Saint Paul Parks and Recreation, Environmental Services (Operations & Youth Job Corps) staff time.	$	50,000
In-kind Services During Project Period:		
Website content development, curriculum and guide development	$	14,000
Volunteer labor ($10 per hour)	$	45,000
Como Woodland Outdoor Classroom Advisory Committee ($20.25 per hour)	$	20,250

D. Spending History:

Funding History: *Total $87,709*		
City of Saint Paul CIB funds to develop master plan for the Como Woodland Outdoor Classroom in 2008	$	40,000
July 1, 2008 – June 30, 2010 - Saint Paul Parks and Recreation Environmental Services, Forestry, YJC, Support Maintenance staff time and equipment in-kind. (*estimate*)	$	15,000
In-kind volunteer labor, July 1, 2008 – June 30, 2010. Valued at $10 per hour for field activities and $20.25 hours for professional activities. (*estimate*)	$	28,000
Anderson Foundation environmental education grant.	$	505
Minnesota Native Plant Society environmental education grant.	$	279
Audubon Minnesota environmental education grant.	$	500
Saint Paul Audubon Society bird habitat research grant.	$	1,050
City of Saint Paul COPP environmental education grant.	$	2,000
Together Green (National Audubon Society) invasive species removal grant.	$	375

VII. DISSEMINATION:

The outdoor classroom will include entry and interpretative trail signage to guide all user levels. A primary level of entry signage for casual site users will include orientation maps, information about site history, and describe the restoration activities occurring at this location. A secondary level of interpretative trail signage will include numbered posts that correspond to site guides and online lesson plans for educators and explorers of the classroom areas. Lesson plans, visual, and written information documenting project progress will be accessible through the City of Saint Paul website at www.stpaul.gov

During the project period, Parks will apply for DNR School Forest status, host six educator training sessions, and engage student groups and the community in site restoration activities – 500 youth per year. We will also coordinate and implement an outreach and marketing plan for the classroom.

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than **November 2010, May 2011, November 2011, May 2012, November 2012, and March 2013, November 2013**. A final work program report and associated products will be submitted between **June 30 and August 1, 2014** as requested by the LCCMR.

IX. RESEARCH PROJECTS:

Final Attachment A: Budget Detail for 2010 Projects - Summary and a Budget page for each partner (if applicable)

Project Title: *179-F: Get Outside! Urban Woodland for City Kids*

Project Manager Name: *Don Ganje*

Trust Fund Appropriation: $ *218,000*

1) See list of non-eligible expenses, do not include any of these items in your budget sheet

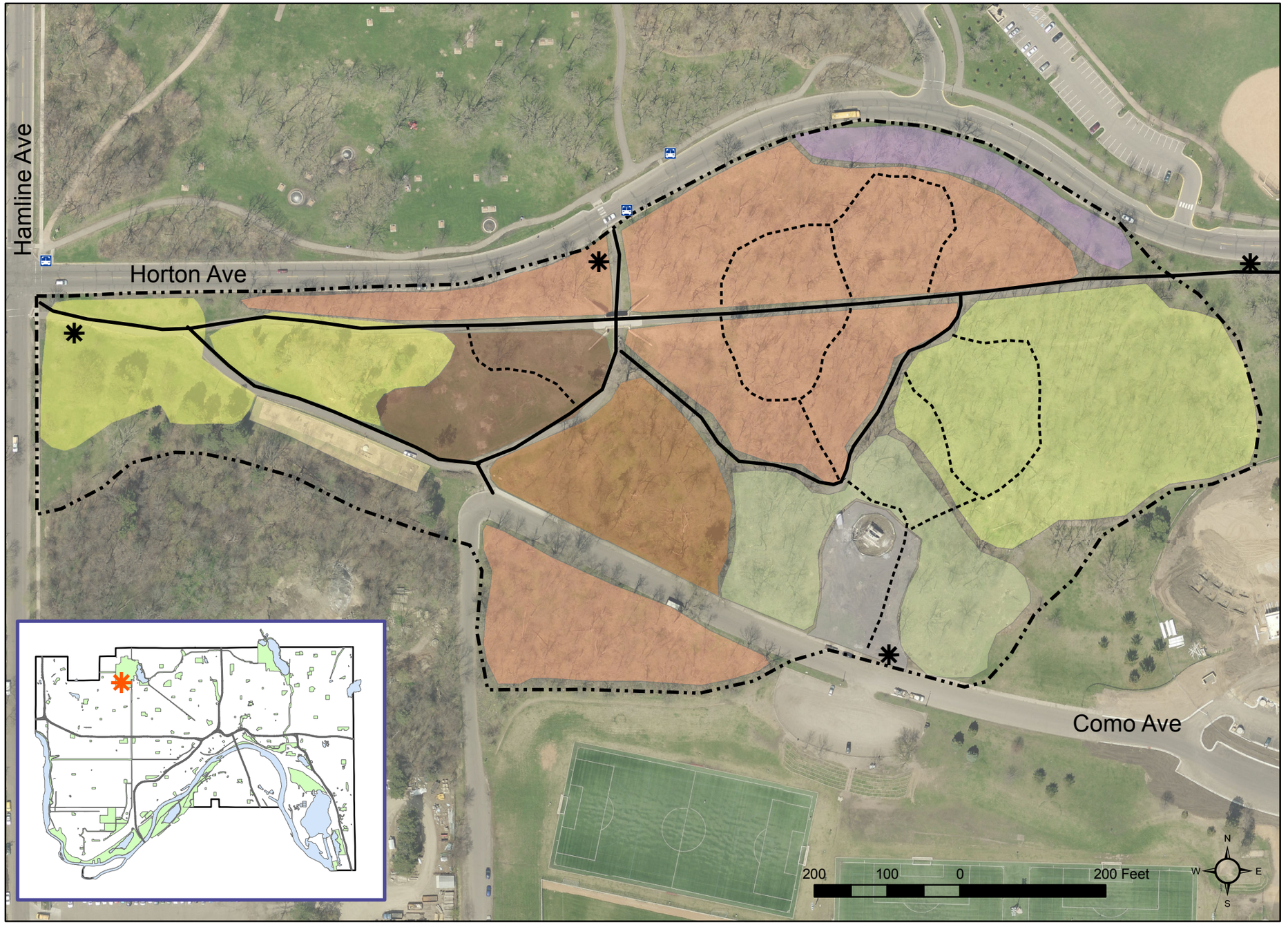
2) Remove any budget item lines not applicable

2010 Trust Fund Budget	Result 1 Budget: approved 6/23/14	Amount Spent	Balance	Result 2 Budget: approved 11/12/13	Amount Spent	Balance	TOTAL BUDGET	TOTAL BALANCE
	Develop outdoor classroom study areas.			*Teacher training and student involvement.*				
BUDGET ITEM								
PERSONNEL: wages and benefits *(List individual names, amount budgeted and %FTE; add rows as needed)*								
Don Ganje ($0, 0% FTE)	0	0	0				0	0
Bryan Murphy ($12,000, 16% FTE)	12,000	12,000	0				12,000	0
Meghan Manhatton ($2,058, 4% FTE)				2,058	2,058	0	2,058	0
Angela Koebler ($3,000, 4% FTE)	3,000	3,000	0				3,000	0
Contracts								
Professional/technical *(with whom?, for what?)*								
Other contracts *(with whom?, for what?) list out: personnel, equipment, etc.*								
Invasive Species Management Contract (Conservation Corps Minnesota, personnel)	30,900	30,858	42				30,900	42
Forest Restoration Contract (Conservation Corps Minnesota, personnel)	40,082	40,082	0				40,082	0
Prairie Installation Contract (Natural Shore Technologies, personnel, materials)	10,813	10,813	1				10,813	1
Trail Installation Contract (Semple Excavating, equipment + operator, materials) & Conservation Corps MN	31,224	31,224	0				31,224	0
Sign Construction Contract (Serigraphics Sign Systems, fabrication & installation)	19,807	18,587	1,220				19,807	1,220
Propogation Garden Construction Contract (Urban Companies, fabrication and installation)	44,000	42,900	1,100				44,000	1,100
Other *(Describe the activity and cost) be specific*								
Plant, Herbicide & Erosion Control Materials (Materials to be installed by contractor, staff, and/or community volunteers)	18,691	17,054	1,637				18,691	1,637
Fencing materials (200' Cedar split-rail fencing to protect prarie, related materials)	1,750	945	805				1,750	805
Sign materials (Trail marker and acknowledgement signs plus related materials)	3,675	3,174	501				3,675	501
COLUMN TOTAL	**$215,942**	**$210,636**	**$5,306**	**$2,058**	**$2,058**	**$0**	**$218,000**	**$5,306**

Como Woodland Outdoor Classroom

1221 Como Avenue
Saint Paul, MN

44° 58' 35", -93° 9' 8"



- Paved Trail
- Gravel Trail
- Signs
- CWOC Boundary
- Transit Stops

CWOC Plant Communities

- Coniferous Woodland
- Oak Savanna
- Oak Woodland
- Propagation Garden
- Shortgrass Prairie
- Tallgrass Prairie
- Terrace Forest
- Transitional Woodland
- Wet Forest

8/9/2014, MM

Manhatton, Meghan (CI-StPaul)

From: City of Saint Paul <cityofsaintpaul@public.govdelivery.com>
Sent: Wednesday, July 25, 2012 10:47 AM
To: Robbins, Adam (CI-StPaul)
Subject: Coca-Cola and Saint Paul Parks and Rec. Placing Recycling Bins at Como Park

Saint Paul Parks and Recreation

Coca-cola and Saint Paul Parks and Recreation Department Partner in Recycling Effort

Coca-Cola Refreshments presents Saint Paul Parks and Recreation with 35 recycling bins and participates in a volunteer event

Saint Paul, July 25, 2012- Today, employees from Coca-Cola and the St. Paul Parks and Recreation will gather for a community service planting event and formal presentation of recycling bins for the park district. The recycling bins will be distributed throughout the parks in the area in an effort to encourage people to recycle their bottles and cans while visiting their local parks. St. Paul Parks Director Mike Hahm will speak at the event along with Coca-Cola's Area Sales Manager, Michelle Fick.

"We are really happy to accept Coca-Cola's donation of these recycling bins," said Mike Hahm, Director of the St. Paul Parks and Recreation Department. "We are always looking for more ways to encourage people to recycle their bottles and cans when they visit our parks and we believe these bins will do just that."

Company has placed more than 150,000 recycling bins throughout North America. Today's donation to Saint Paul Parks & Recreation will add to that figure. "I cannot think of a better way to support our local community than to bring our employees out here to volunteer with park employees and to provide some much-needed recycling bins to the park system." said Michelle Fick from Coca-Cola Refreshments. "We enjoy being part of this community and want to see the park system continue to flourish for many years to come."

Coca-Cola employees also assisted park staff by planting indigenous plants at the Como Woodland Outdoor Classroom. This project was made possible by a 2010 Saint Paul Parks and Recreation grant from the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources. The project was designed to create a 17.5 acre outdoor classroom in Como Regional Park. The classroom will feature 7 distinct Minnesota plant communities: oak woodland, oak savanna, tallgrass prairie, short grass prairie, coniferous forest, sedge meadow, and transitional woodland. In order to pull off this ambitious project, Saint Paul Parks and Recreation need the help of hundreds of volunteers to control invasive species, build trails, plant trees and sow native seed.

For more information about this project, see: http://www.comowoodland.org/

To find out more about Coca-Cola's recycling bins and efforts, visit http://www.cokerecycling.com/.

For additional information, contact:

Media Relations / Public Service Manager

Brad Meyer at 651-266-6377 (office) or 651-894-3258 (cell)

brad.meyer@stpaul.gov

About Saint Paul Parks & Recreation

Saint Paul Parks and Recreation is a nationally accredited and gold medal award-winning organization that manages more than 170 parks and open spaces, an AZA accredited Como Park Zoo and Conservatory, 25 city operated recreation centers, 4 municipal golf courses, more than 100 miles of trails, an indoor and outdoor aquatic facility, a public beach, a variety of premium sports facilities, and Great River Passage - which is the new identity for all public development along Saint Paul's more than 17 miles of Mississippi riverfront. For more information about Saint Paul Parks and Recreation visit www.stpaul.gov/parks.

The Coca-Cola Company

The Coca-Cola Company (NYSE: KO) is the world's largest beverage company, refreshing consumers with more than 500 sparkling and still brands. Led by Coca-Cola, the world's most valuable brand, our Company's portfolio features 15 billion dollar brands including Diet Coke, Fanta, Sprite, Coca-Cola Zero, vitaminwater, Powerade, Minute Maid, Simply, Georgia and Del Valle. Globally, we are the No. 1 provider of sparkling beverages, ready-to-drink coffees, and juices and juice drinks. Through the world's largest beverage distribution system, consumers in more than 200 countries

commitment to building sustainable communities, our Company is focused on initiatives that reduce our environmental footprint, support active, healthy living, create a safe, inclusive work environment for our associates, and enhance the economic development of the communities where we operate. Together with our bottling partners, we rank among the world's top 10 private employers with more than 700,000 system employees. For more information, please www.thecoca-colacompany.com or follow us on Twitter at twitter.com/CocaColaCo.

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COMO PARK
A Saint Paul Neighborhood

District 10 Como Community Council - *eNews* February 18

In This Issue

Upcoming Meetings

Como Woodland Advisory Committee (CWAC) Meeting:

Tuesday, February 22
7:00 PM - 9:00 PM

@ Historic Streetcar Station

Hi neighbors!

To better serve the needs of the Como community, District 10 invites you to participate in our 2010 Evaluation Survey. This survey pertains to the performance of the District 10 Como Community Council from January 1, 2010 through December 31, 2010. All responses are confidential. Results will help us to plan and improve programs and operations of the District Council and will be shared with the city. Responses will be accepted through **Friday, February 25, 11:59 PM.**

We appreciate and value your input!

One survey per person, please.
To participate, please click here.

|Como Woodlands Receives $218,000 Grant|

Restoration work is set to begin on the Como Woodland Outdoor Classroom. The City of Saint Paul received a $218,000 grant from the Minnesota Environment and Natural Resources Trust Fund to transform a 17.75-acre woodland located within Como Regional Park into the Como Woodland Outdoor Classroom.

Click here to read the full story.

Local teens are committed to community service and the Como Woodland

Thursday, November 10, 2011 1:35 PM

Update by: Deb Robinson, Como Woodland Advisory Committee volunteer

Volunteerism is alive and well in the hearts and minds of local school students. As is the case on many Wednesday afternoons during the school year, Great River School (GRS) students were out doing volunteer work in the community. And the benefit of their service on October 26 was the Como Woodland Outdoor Classroom (CWOC) project site. Sixteen teens and their teacher, Enrique Garita, walked from their school to Como Park to help restore the 17-acre woodland.

Great River School volunteers get planting instructions from Meghan Manhatton, St. Paul Parks & Recreation natural resources technician.

Great River School has a long association with volunteerism, which is an important part of their mission to "prepare students for their unique roles as responsible and engaged citizens of the world." Great River School also has a long association with the CWOC going back to 2008 when one of their classes adopted the Como Woodlands as a project and worked on a variety of volunteer activities that benefited the site.

In 2011, Great River School applied for DNR Minnesota School Forest status for the Como Woodland Outdoor Classroom. School Forest status will bring valuable state support and resources to this urban woodland educational facility in exchange for a long-term commitment from students and their school forest committee volunteers.

GRS students planted 20 flats of prairie plants in the Savanna Woodland portion of the outdoor classroom. Four Conservation Corps youth leaders and City of Saint Paul Parks & Recreation's Natural Resources Technician, Meghan Manhatton, provided guidance.

Extra volunteer support on this planting day came from five Honor Society students from Murray Junior High School and their science teacher, Tim Chase. After GRS students finished planting, Murray students spread bales of bluestem grass straw on any bare earth that remained in the planting area. Three adult volunteers connected to the project's Advisory Committee rounded out the crew on October 26.

The Como Woodland Outdoor Classroom received a grant from the Environmental and Natural Resources Trust Fund a few years ago. However, the long-term health of this urban woodland depends on dedicated volunteers like the students of Great River School, Murray Junior High School, and community members – thanks to all.

For more information about the Como Woodland Outdoor Classroom project, visit: www.comowoodland.org
How to get involved with volunteering in Saint Paul's parks and natural areas: www.stpaul.gov/index.aspx?NID=3811
For more information on the DNR School Forest Program, visit: www.dnr.state.mn.us/schoolforest/index.html

Work Begins on Como Park Outdoor Classroom

Submitted by Jessica Miller
Tuesday, February 15th, 7:48 pm

Topics: News

Major changes are coming to a St. Paul park, and it should have a huge impact not only for visitors but for students as well.

Como Park just got a $200,000 dollar state grant, and with the money they plan to build an outdoor classroom.

The classroom will be developed in 18 acres of woods, it will be split up into seven different sections.

The city says there are 75 schools within five miles of the park, and when everything is done its expected to be a popular learning spot.

Tuesday workers with the Minnesota Conservation Corps cut down invasive trees and plants so native grasses and wildflowers can be replanted.

The classroom will include 4000 feet of trails, with separate study areas in each of the seven sections for students to have lessons outside.

Adam Robbins with the St. Paul Parks and Recreation department says the lessons don't have to be about the outdoors.

"It doesn't necessarily have to be about the environment it can be math it can be writing it can be cultural history, anything a teacher is willing to teach outside in an outdoor setting."

The study areas will eventually have kiosks so teachers can download curriculum, and use the kiosks out in the woods to help teach their lessons.

This is all a work in progress, the actual 18 acre classroom won't be done for about two years, but the trails will be ready for visitors this spring.

Volunteers will be needed as the project continues, to find out how you can help, click here.

To find out more about the Minnesota Conservation Corps, click here.

Topics: News

TOP ST. ANTHONY - COMO STORIES

TwinCities.com

Como Park to add wooded classroom

Pioneer Press
Updated: 02/11/2011 11:03:24 PM CST

St. Paul's Como Park soon will offer a new window onto the natural world. The city received a $218,000 grant from the Minnesota Environment and Natural Resources Trust Fund to turn a 17.75-acre wooded area within the regional park into the Como Woodland Outdoor Classroom.

The space is aimed at schoolchildren and adults. The funding will allow the city to remove invasive plant and tree species and create six "study areas" representing six different plant "communities" found in Minnesota.

Beginning this month, Conservation Corps Minnesota members will remove invasive trees.

The Minnesota Environment and Natural Resources Trust Fund is funded through proceeds from the Minnesota State Lottery.

For more information about the project, go to stpaul.gov/ parks/environment.

— Frederick Melo

StarTribune.com

Como Park restoration work set

State trust fund money will be used to start work on the Como Woodland Outdoor Classroom.

Last update: February 11, 2011 - 9:12 PM

Removal of invasive trees will pick up speed later this month at St. Paul's Como Woodland Outdoor Classroom. The city will use p roceeds from a $218,000 grant from the state Environment and Natural Resources Trust fund.

The Como Woodland Outdoor Classroom includes an 18-acre woodland within Como Regional Park. Volunteers have worked at the tree removal process for years, but now the Conservation Corps Minnesota will start removing the trees as designated by the classroom's master plan.

The grant also will be used to develop six study areas representing six unique Minnesota plant communities.

A city news release said, "This classroom will provide environmental education and historical interpretation for school children and adults, habitat for native wildlife, and an u rban woodland oasis for the inner-city community where local place-based, hands-on environmental learning opportunities are rare."

The money comes from a fund established through a state constitutional amendment approved by voters. The trust fund receives 40 percent of the net proceeds from the Minnesota State Lottery and must be used for the environment and natural resources.

ROCHELLE OLSON

Shortcuts To Links In Article

Updated: February 13th, 2011 5:00am

Como Park restoration set to begin in St. Paul

Visitors at Como Park in St. Paul will soon see the beginnings of a more than $200,000 restoration project.

It will begin next week with volunteers removing invasive tree species as the city transforms nearly 18 acres of woodland in the park into the Como Woodland Outdoor Classroom.

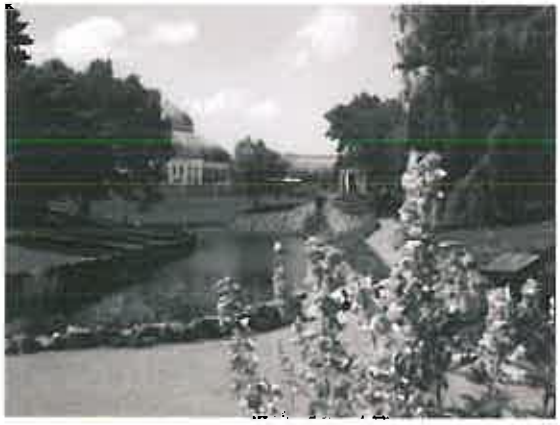
This classroom will provide environmental education for children and adults and habitat for native wildlife. Regular park visitors can expect to see more hikers and groups in the area.

The project is being paid for by the Minnesota Environment and Natural Resources Trust Fund. Currently 40 percent of net state lottery proceeds are dedicated to building the fund to benefit Minnesota's environment and natural resources.

Friends mourn Ham Lake couple killed in house fire
More Iowans going to Minn. for medical care
1st cuts won't be deepest in Minn. budget debate
Vonn takes silver in downhill despite head injury
ND woman sentenced to 18 years for drug conspiracy
Nerds can find Valentine's love in Minneapolis
Minn. residents who stutter praise 'King's Speech'
Program keeps students connected with stuffed toys
Blues-Wild Sums
Clutterbuck gets another goal, Wild beat Blues 3-1

Como Park Restoration Set To Begin In St. Paul

February 13, 2011 8:48 AM



(Credit: CBS)

ST. PAUL, Minn. (AP) — Visitors at Como Park in St. Paul will soon see the beginnings of a more than $200,000 restoration project.

It will begin next week with volunteers removing invasive tree species as the city transforms nearly 18 acres of woodland in the park into the Como Woodland Outdoor Classroom.

This classroom will provide environmental education for children and adults and habitat for native wildlife. Regular park visitors can expect to see more hikers and groups in the area.

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3 COMMENTS

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St. Paul

DEPARTMENT OF PARKS AND RECREATION

CITY OF SAINT PAUL
Mayor Chris Coleman

25 West 4th Street
Suite 400
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For Immediate Release
Contact: Brad Meyer – brad.meyer@stpaul.gov
651-266-6377 – 651-894-3258

Saint Paul's Como Park Receives $200,000 Grant

Restoration work will clean-up and bring environmental education to urban outdoor classroom

(Saint Paul) - Restoration work is set to begin on the Como Woodland Outdoor Classroom. The City of Saint Paul received a $218,000 grant from the Minnesota Environment and Natural Resources Trust Fund to transform a 17.75-acre woodland located within Como Regional Park into the Como Woodland Outdoor Classroom. This classroom will provide environmental education and historical interpretation for school children and adults, habitat for native wildlife, and an urban woodland oasis for the inner-city community where local place-based, hands-on environmental learning opportunities are rare.

Mayor Coleman has long championed Saint Paul's award winning parks system remarking, "The parks system in Saint Paul is second to none and this grant will allow us to further that tradition of excellence. With the support of the Minnesota Environment and Natural Resources Trust Fund, our Parks and Recreation Department will transform Como Regional Park by cleaning-up the woodlands and expanding environmental education. This outdoor classroom will become a destination for local families, furthering Saint Paul as a great place to work, live and play."

Community volunteers have long been involved in removing invasive species from the woodlands within Como Regional Park. This new funding will allow the City to complete invasive species removal within the Como Woodland Outdoor Classroom, and develop six study areas representing six unique plant communities found in Minnesota.

As work begins on constructing the Como Woodland Outdoor Classroom, residents and visitors to Como Regional Park will notice some changes. Beginning later this month, Conservation Corps Minnesota will be selectively removing invasive trees per the Como Woodland Outdoor Classroom Master Plan.

Funding to create this rare asset was provided by the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR). The Trust Fund is a permanent fund constitutionally established by the citizens of Minnesota to assist in the protection, conservation, preservation, and enhancement of the states air, water, land, fish, wildlife, and other natural resources. Currently 40% of net Minnesota State Lottery proceeds are dedicated to building the Trust Fund and ensuring future benefits for Minnesota's environment and natural resources.

To see the full Como plan, to get involved, or to find out more about the project, visit www.stpaul.gov/parks/environment.

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DAILY PLANET

Sunday, Feb 13, 2011 Global/Local Communities Neighborhoods Work & Economy Politics & Policy Arts & Lifestyle Opinion Special Sections

Many projects underway at Como Regional Park

BY KRISTAL LEEBRICK, PARK BUGLE
December 25, 2010

Como Regional Park never sleeps. The 347-acre park has been an ever-evolving work in progress since the first 259.95 acres of farmland were purchased in 1873.

In June, the park opened its new Polar Bear Odyssey exhibit. Construction on the zoo's next new habitat, the Gorilla Forest, is slated to begin in late 2011. Ground broke for the new aquatic facility in October. It will replace the 1960s-era Como Pool. In November, the city's Parks and Recreation Department began work on the Como Woodland Outdoor Classroom project, which will provide an outdoor learning area and the restoration of the Joyce Kilmer Memorial Fireplace site.

Here's an update of some of the projects under way at the park:

WPA-era memorial restored

In the southern area of the park, just west of the pool site, stands a half-hidden stone fireplace dedicated to a New Jersey poet known best for his work "Trees" ("I think that I shall never see / A poem as lovely as a tree . . .").

The Joyce Kilmer Memorial-also known as the "Dutch Oven"-was built by the Works Progress Administration in 1936. That structure, which had been covered with graffiti and in general disrepair, is in the heart of the Como Woodland Outdoor Classroom and is now being restored.

The park received a $250,000 Legacy Grant from the Minnesota Arts and Cultural Heritage Fund to help remove the graffiti and paint on the fireplace, replace the broken stone, rebuild the firebox and mantels, create and install fireplace gates and restore the fire ring, said Bryan Murphy, landscape architect with the Parks and Recreation Department. The restoration, which is scheduled for completion in April, comes just in time for the memorial's 75th anniversary in 2011. A rededication is scheduled for May.

The original memorial, which was funded by the Joyce Kilmer American Legion Post (St. Paul parks superintendent at that time, W. Lamont Kaufman, was a member), was a larger complex that included a cascading waterfall, a wooded grove, the fireplace and a plaque with Kilmer's poem "Trees" hanging from a nearby tree. Only the fireplace remains.

The Como Woodland Outdoor Classroom project includes a 17 3/4-acre woodland restoration with seven woodland "classrooms": oak savanna, coniferous forest, transitional woodland oak woodland, sedge meadow, ephemeral wetland and tall grass prairie. Each area will have a series of trails meandering through it, providing visitors with a view of what these respective woodlands are like, Murphy said. Also, each classroom will contain a small clearing with groupings of logs or boulders for seating to accommodate six to eight students. It is hoped the classrooms will be used by local schools, Murphy said.

A $218,000 Minnesota Environment and Natural Resources Trust Fund grant will be used for the first phase of the outdoor classroom project, Murphy said. That work includes removal and management of invasive species, construction of gravel trails, construction of the small clearings, informational signage, the development of an outreach program and an "Educate the Educator" program for teachers in outdoor environmental education.

Pool construction begins

Despite the increased number of amenities planned for the new aquatic center in the park, the new pool area will not be much larger than the one it is replacing, Murphy said. The old facility totaled 28,949 square feet (that included 7,647 square feet of water surface and 21,302 square feet of deck space). The new facility will be 29,231 square feet, 16,218 of which will be dedicated to water surface and 13,013 to deck space. The bather load will be 548, Murphy said.

Ground was broken for the new aquatic center in October. So far, grading has been done for the parking lot and pool area and excavation for the administrative and shower buildings has begun.

The city recently received a $150,000 Solar Energy Legacy Grant from the Minnesota Department of Natural Resources, which will go toward installing a solar system that will be used to heat the showers, sinks and pool, Murphy said. That system will also offset some of the heating needed for the winter, as the offices that will be built at the pool will be used year-round by the St. Paul Municipal Athletic Office.

Completion is expected by September 2011, Murphy said, and the pool is tentatively planned to open Memorial Day weekend of 2012.

There are three pools planned for the project:

- A six-lane lap pool with an adjacent diving well. The pool will flow into a two-lane 25-meter lap pool, featuring a zip-line (a pulley suspended on a cable that bathers can use to traverse across the pool).
- A splash pool with a zero-depth, beach-like entry that will rise to a depth of 3 feet. The splash pool will have some small water slides along with ground sprays and interactive features where bathers will be able to turn water sprays on and off.
- The third pool will be a lazy river in which guests can float in a tube down a waterway that will split into either a water slide or an area where there will be spray cannons and guests can spray their friends from the sides as they float along.

The project includes the realignment of Como Avenue near the pool. Two new buildings will house showers, restrooms, admissions, an office and concessions.

A number of trees were removed to accommodate the new facility, but Murphy said they were ash trees that would probably have been removed in the next several years due to the local emerald ash borer infestation. More than 200 new trees will be planted in the area. The new aquatic facility will provide more shade than the old pool, Murphy said, as there will be trees and landscaping inside the pool fencing.The new 215-space parking lot is larger than the old lot to accommodate both pool parking and activity at McMurray Field. The pool restrooms will be accessible to pool guests only.

Historic Streetcar Bridge

There is funding to restore the Historic Streetcar Bridge, the footbridge near the Historic Streetcar Station at 1224 N. Lexington Pkwy., Murphy said. No plans have been finalized for the restoration, but it will likely be restored as "a ruins" with some parts of the bridge remaining and the installation of interpretive boards to show how the bridge was used, what it looked like and its history, he said.

West Picnic play area

Parks and Recreation has approximately $250,000 in funding to build a new play area at the West Picnic play area, Murphy said, but no architect has been assigned to the project yet and no plans have been made for the project.


Parks and Recreation
4


COMO WOODLAND
OUTDOOR CLASSROOM
City of Saint Paul, Parks & Recreation
1221 Como Avenue

2010 Project Abstract
For the Period Ending June 30, 2013

PROJECT TITLE: Expanding Outdoor Classrooms at Minnesota Schools
PROJECT MANAGER: Amy Kay Kerber
AFFILIATION: MN DNR, Forestry
MAILING ADDRESS: 500 Lafayette Road
CITY/STATE/ZIP: St. Paul, MN 55155
PHONE: 651-259-5272
E-MAIL: amykay.kereber@state.mn.us
WEBSITE: www.mndnr.gov/schoolforest
FUNDING SOURCE: Environment and Natural Resources Trust Fund
LEGAL CITATION: M.L. 2010, Chp. 362, Sec. 2, Subd. 8f

APPROPRIATION AMOUNT: $300,000

Overall Project Outcome and Results
The School Forest Program is Minnesota's outdoor classroom program. This project provided support to create new School Forest sites; develop and deliver site-specific outdoor education trainings, regional workshops, a multi-day conference, and a summit; create new online and in-person resources to better support School Forests; and investigate long-term support options for the School Forest Program. Funding provided 1.5 FTEs of School Forest educators for three years and an additional .75FTE School Forest Specialist for one year.

Minnesota has 125 School Forests throughout the state. As a result of this project, 22 new School Forest sites were developed on 256 acres of land, complete with proper applications, legal paperwork, School Forest committees, and land management plans. To meet teacher needs, several assessments were conducted (see 2012 School Forest Survey Report) and the results were used to create support materials for online and in-person delivery. The School Forest website was revamped and new sections relating to land management, outdoor education, and lesson plans/activities were created. More than 39,000 visitors used the website. School Forest staff participated in hundreds of crucial in-person site visits, meetings, and presentations to bolster support for new and existing School Forests.

To encourage and support outdoor education activities, this project delivered 21 site-specific outdoor education trainings, reaching 523 teachers. These workshops involved Project Learning Tree materials and content was tied to Minnesota academic standards in math, science, and social studies. One hundred outdoor education kits were developed and delivered. The kits provided tools, materials, and lesson plans to allow teachers to easily prep and teach age-appropriate outdoor activities meeting Minnesota academic standards. In addition, two regional trainings, one multi-day conference, and one summit were developed and delivered. These events provided School Forest teachers the opportunity to delve into outdoor education strategy, discover practical

teaching tips, and network with teachers, natural resource, and education experts; 106 teachers participated in these events.

Over three years, this project provided new outdoor education opportunities to over 400 teachers and 11,000 students at 22 new School Forests. The total project activities reached over 1,500 teachers and 30,000 students statewide at all 124 School Forests.

Project Results Use and Dissemination

The School Forest website (www.mndnr.gov/schoolforest) houses many materials created by this project. It is viewed by thousands of people every month. The School Forest Activity Board, within the website, is home to more than 100 new lesson plans created by School Forest teachers and staff. Of particular note are over 20 newly developed activities and lesson plans that correlate to math standards from Prekindergarten to eighth grade, meeting the need to effectively teach math outside.

Dozens of newspaper articles and websites posts were created regarding the new 22 School Forest sites created during this grant.

The results of the School Forest Survey were presented at the 2013 Minnesota Environmental Education Conference and are being reviewed by DNR staff, teachers and naturalists statewide. This information is being used to create or provide better resources to support teachers interested in outdoor education.

Delivery of the "How to Teach in Your School Forest" trainings have evolved and been modified to meet teacher needs. For example, appropriate outdoor and reflection time is incorporated into each training and several other DNR and partner education programs have begun to use these techniques. In addition, the Minn. Dept. of Education asked School Forest staff and teachers to present much of the outdoor education training delivered as part of their ENRTF Environmental and Outdoor Education project. This provided positive outcomes for all partners involved.

About 70 percent of the 22 new School Forest sites are in an urban area. Results from the 2013 Urban School Forest focus groups were used to identify needs specific to urban sites. Strategies are needed for dealing with vandalism, dogs, invasive species, and high community use on small, urban parcels.

Two School Forest site coordinators were awarded the "Formal Environmental Educator of the Year" by the Minn. Assn. for Environmental Education for their work with their school forests (2012 & 2013). The School Forest program was recognized as one of Governor Dayton's Education Highlights for 2011-2012.

Environment and Natural Resources Trust Fund (ENRTF)
2010 Work Program Final Report

Date of Report: July 30, 2013
Date of Next Progress Report: Final Report
Date of Work Program Approval: June 9, 2010
Project Completion Date: June 30, 2013

I. PROJECT TITLE: Expanding Outdoor Classrooms at Minnesota Schools

Project Manager: Amy Kay Kerber
Affiliation: Minnesota Department of Natural Resources, Forestry
Mailing Address: MN DNR, Forestry
500 Lafayette Road
City / State / Zip: St. Paul, MN 55155-4044
Telephone Number: 651-259-5272
E-mail Address: amykay.kerber@state.mn.us
Fax Number: 651-296-5954
Web Site Address: www.mndnr.gov/schoolforest

Location: Statewide. A map of the current School Forest locations is attached. New School Forests will be added throughout the state as a result of this project.

Total ENRTF Project Budget:	**ENRTF Appropriation**	**$ 300,000**
	Minus Amount Spent:	**$ 300,000**
	Equal Balance:	**$ 0**

Legal Citation: M.L. 2010, Chp. 362, Sec. 2, Subd. 8f

Appropriation Language:
$300,000 is from the trust fund to the commissioner of natural resources to establish additional and enhance existing outdoor school forest and prairie classroom networks throughout Minnesota.

II. FINAL PROJECT SUMMARY AND RESULTS:

Since 1949, the School Forest Program has been Minnesota's outdoor classroom program. School Forests help combat nature deficit disorder by providing a place where preK-12 students learn core subjects (math, science, social studies, etc.) outdoors, while using nature as the base context. School Forests are diverse environments (prairie, forest, wetland, etc.) located statewide in urban and rural places, ranging from 1-300 acres. Schools and communities that establish a School Forest make a long-term commitment to sustain an outdoor classroom to be used by many students on a regular, consistent basis.

By establishing 15 new School Forests, this project will create 115 sites statewide and reach more than 1,200 teachers and 28,000 students. Program support provided to all 115 sites will enhance use and quality of outdoor activities through:

- Creation and delivery of a multi-day intensive School Forest course to increase teacher knowledge of and comfort in teaching outdoors,
- Creation and delivery of a School Forest Summit to increase school-to-school networking, exchange ideas to best support teachers and schools with School Forest sites, deliver content on outdoor education strategies and advance site management,
- Delivery of site-specific trainings to increase school-wide teacher and student participation,
- Expansion of School Forest network through site-to-site contact and Web site development.

Individual site development and support for 75 new and existing School Forests will promote site sustainability and encourage teacher and student use of outdoor classrooms through:

- Creating and strengthening local, partner-rich School Forest Committees,
- Connections to local, state, and national outdoor education resources,
- Integrating existing outdoor education lessons into school curriculum,
- Correlating lessons to Minnesota Academic Standards,
- Providing outdoor teaching tools and learning kits.

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For the Period Ending June 30, 2013

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AFFILIATION: MN DNR, Forestry
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1.5 FTEs of School Forest educators for three years and an additional .75FTE School Forest Specialist for one year.

Minnesota has 125 School Forests throughout the state. As a result of this project, 22 new School Forest sites were developed on 256 acres of land, complete with proper applications, legal paperwork, School Forest committees, and land management plans. To meet teacher needs, several assessments were conducted (see 2012 School Forest Survey Report) and the results were used to create support materials for online and in-person delivery. The School Forest website was revamped and new sections relating to land management, outdoor education, and lesson plans/activities were created. More than 39,000 visitors used the website. School Forest staff participated in hundreds of crucial in-person site visits, meetings, and presentations to bolster support for new and existing School Forests.

To encourage and support outdoor education activities, this project delivered 21 site-specific outdoor education trainings, reaching 523 teachers. These workshops involved Project Learning Tree materials and content was tied to Minnesota academic standards in math, science, and social studies. One hundred outdoor education kits were developed and delivered. The kits provided tools, materials, and lesson plans to allow teachers to easily prep and teach age-appropriate outdoor activities meeting Minnesota academic standards. In addition, two regional trainings, one multi-day conference, and one summit were developed and delivered. These events provided School Forest teachers the opportunity to delve into outdoor education strategy, discover practical teaching tips, and network with teachers, natural resource, and education experts; 106 teachers participated in these events.

Over three years, this project provided new outdoor education opportunities to over 400 teachers and 11,000 students at 22 new School Forests. The total project activities reached over 1,500 teachers and 30,000 students statewide at all 124 School Forests.

Project Results Use and Dissemination

The School Forest website (www.mndnr.gov/schoolforest) houses many materials created by this project. It is viewed by thousands of people every month. The School Forest Activity Board, within the website, is home to more than 100 new lesson plans created by School Forest teachers and staff. Of particular note are over 20 newly developed activities and lesson plans that correlate to math standards from Prekindergarten to eighth grade, meeting the need to effectively teach math outside.

Dozens of newspaper articles and websites posts were created regarding the new 22 School Forest sites created during this grant.

The results of the School Forest Survey were presented at the 2013 Minnesota Environmental Education Conference and are being reviewed by DNR staff, teachers and naturalists statewide. This information is being used to create or provide better resources to support teachers interested in outdoor education.

Delivery of the "How to Teach in Your School Forest" trainings have evolved and been modified to meet teacher needs. For example, appropriate outdoor and reflection time is incorporated into each training and several other DNR and partner education programs have begun to use these techniques. In addition, the Minn. Dept. of Education asked School Forest staff and teachers to present much of the outdoor education training delivered as part of their ENRTF Environmental and Outdoor Education project. This provided positive outcomes for all partners involved.

About 70 percent of the 22 new School Forest sites are in an urban area. Results from the 2013 Urban School Forest focus groups were used to identify needs specific to urban sites. Strategies are needed for dealing with vandalism, dogs, invasive species, and high community use on small, urban parcels.

Two School Forest site coordinators were awarded the "Formal Environmental Educator of the Year" by the Minn. Assn. for Environmental Education for their work with their school forests (2012 & 2013). The School Forest program was recognized as one of Governor Dayton's Education Highlights for 2011-2012.

III. PROGRESS SUMMARY AS OF January 20, 2011:
Many outreach activities have been completed: 53 schools contacted regarding establishment of School Forest; Presentations delivered at 2 conferences; over 100 phone or email conversations with teachers.

Two School Forest sites established. One specialized teacher training delivered at an urban site.

A variety of factors have delayed the hiring of 2 staff to complete work outlined in this grant. Currently in the process of hiring staff with expected start date spring 2011. An extension request to June 30, 2013 has been filed.

Progress Summary as of September 2011:
Outreach activities completed to date: 65 schools contacted regarding the School Forest Program; Presentation delivered at 4 conferences, including 3 booths; hundreds of phone or email conversations with teachers, administrators, and volunteers.

Four School Forest sites established. Two specialized teacher training delivered at the same urban site.

The School Forest Program Manager and former Project Learning Tree Coordinator are now working on this project. An extension of this project has been approved to June 30, 2013.

Amendment Request: September 30, 2011

Work plan amended to: change the number of new school forests from 20 to 15 (and corresponding number of teachers and students adjusted), adjust timelines to accommodate extension request to June 30, 2013, reflect changes in staffing and DNR in-kind funding, and addition of at least one school forest summit in Result 1 and the entirety of Result 4. Amendment Approved: October 6, 2011.

Progress Summary as of July 2012:

Total outreach activities completed to date: 135 schools contacted regarding the School Forest Program; Presentations delivered at 8 conferences, including 6 booths; hundreds of phone or email conversations with teachers, administrators, and volunteers.

In total, twelve School Forest sites established. Nine site-specific teacher trainings delivered. Delivered two regional School Forest trainings and one School Forest Summit to promote site-to-site contact and networking.

New website sections and pages created. Including new outdoor activity pages (correlated to Minnesota Academic Standards), and a Land Management and Stewardship web section.

Collaborated with Minnesota Department of Education Environmental and Outdoor Education project, funded by ENRTF, to enhance MDE project and connect activities between two ENRTF projects.

Amendment Request: July 31, 2012

Amendment Approved: September 17, 2012

The work plan is requested to be amended in Section V to reflect changes in staffing and DNR in-kind funding to provide additional new staff to support project and adjust travel and supply budgets to more accurately reflect project needs. This results in shifts to the amounts budgeted under Results 1, 2, and 3 for personnel, supplies, travel, and other direct costs on Attachment A, and also noted in Section V. Additionally, Attachment A is amended to correct a $6,000 discrepancy/typo between original salary costs as correctly listed in Section V of work plan.

Progress Summary as of December 31, 2012

Total outreach activities completed to date: 147 schools contacted regarding the School Forest Program; presentations delivered at 11 conferences, including 7 booths; hundreds of phone or email conversations with teachers, administrators, and volunteers.

In total, 15 School Forest sites established. 18 site-specific teacher trainings delivered.

New website sections and pages created. Including new outdoor activity pages (correlated to Minnesota Academic Standards), and a Land Management and Stewardship web section.

Hired one 0.75 FTE School Forest Specialist to assist with meeting grant requirements.

Completed online School Forest site coordinator survey, receiving 60 responses. Data gathered from survey informed decisions made regarding website development, February 2013 School Forest Conference planning, training/workshop offerings, and other activities.

Notable: On December 11, 2012, Governor Mark Dayton recognized the School Forest Program as one of the top 11 education highlights of the biennium. Considering the program a key achievement in ensuring that Minnesotans have the education and skills needed to achieve their goals.

Amendment Request: April 11, 2013
Amendment Approved April 18, 2013
The work program is requested to be amended to reflect changes in funding in Section 1 to include focus groups to gather feedback specific to urban School Forest needs and in Section 3 to create 25 additional outdoor education kits and provide additional books at future site-specific workshops. There has been greater interest in Project Learning Tree books at workshops than anticipated and we desire to provide as many teachers as possible with these valuable environmental education materials. In addition, corrections to made to deliverables and ENRTF budget totals under each result to correct discrepancies from the amounts as outlined in Attachment A on the December 2012 Progress Report. These budget items were overlooked in the narrative, but done correctly in Attachment A.

IV. OUTLINE OF PROJECT RESULTS*:*

RESULT 1: Develop and enhance School Forest networking opportunities and support services statewide.

Description: These activities will benefit new and existing School Forests in all areas of the state and increase overall program strength, enabling the School Forest Program to serve more sites in the future with better quality support. Online networking features will be used to create a School Forest network that can communicate among themselves to advance outdoor education activities throughout the state and improve the quality of activities delivered. School Forest Web site features and social networking tools will be used to allow educators to learn and share with each other. Delivery of in-person information is important to establish buy-in and participation in site activities. Due to changes in school staffing, focus, and budget, many existing School Forest Committees need assistance regaining direction. A common challenge is administrative and school board knowledge of outdoor education benefits. Meetings with staff, administrators, school boards, and School Forest Committees will enhance site activity and sustainability and garner support for outdoor education. To determine the most useful services, staff will assess site coordinator needs regarding: new Web site features or content; social networking media; and traditional person-to-person support services. Information gathered will be used to inform the remaining outcomes. At least one School Forest Summit will be created to increase school-to-school networking, exchange ideas to best support teachers and schools with School Forest sites, deliver content on outdoor education strategies and advance site management. Two or three urban School Forest focus groups will be conducted to identify the top priority needs for these unique sites and help the School Forest Program plan long-term support services. An estimated 1,200 teachers and 28,000 students at 115 School Forests statewide will be impacted by activities in result 1.

Summary Budget Information for Result 1:	**ENRTF Budget:**	**$ 59000**
	Amount Spent:	**$ 59,000**
	Balance:	**$** 0

Deliverable	**Completion Date**	**Budget**
1. Assess site coordinator needs	Dec 2012	$3,500
2. Create an interactive web portal for teachers to share School Forest activities and discussions.	March 2013	$4,500
3. Develop School Forest Web site content and on-line features to address high priority teacher needs.	Ongoing, June 2013	$10,000
4. Meet with School Forest Committees, staff, administrators, and school boards to strengthen committee, provide resources, and bolster support for outdoor education.	Ongoing, June 2013	$ 37,000
5. Develop and deliver a School Forest Summit to	June 2012	$2,000

promote stronger school forest committees and increased outdoor education delivery at existing sites.		
6. Conduct 2-3 Urban School Forest focus group sessions to identify specific urban site needs.	June 2013	$2,000

Result Completion Date: June 2013

Result Status as of January 2011:
All activities listed in this result rely on 2 new staff members that have not been hired yet. Expected hiring date is early spring 2011, at this time work will be begin. As a result, expected completion date for site coordinator assessment is June 2011 and the remainder of work will follow from there.

Result Status as of September 2011:
1. School Forest Specialist began development of site coordinator needs assessment. Scope included determining best ways to receive feedback from site coordinators and best delivery method.

2. Updates made to School Forest Website included new outdoor activities on activity board and school forest application.

3. Developed and distributed first enewsletter using govdelivery. The govdelivery system will allow for tracking of open rates, click-through rates, etc. This will inform continuation of enewsletter content and new enewsletter features. Launched Minnesota School Forest Facebook page.

4. School Forest Program Manager met with staff, administrators, school board, or community members in person or via phone from the following School Forests:

1. Longville School Forest
2. Proctor School Forest
3. Pike Lake School Forest
4. Bemidji Middle School Forest
5. Horace May School Forest (Bemidji)
6. Linwood School Forest
7. OH Anderson School Forest (Mahtomedi)
8. Crosswinds School Forest (Woodbury)
9. Seidl's Lake School Forest (South St. Paul)
10. St. David's School Forest (Minnetonka)
11. Scenic Heights School Forest (Minnetonka)
12. Orr School Forest
13. Pine Bend School Forest (Inver Grove Heights)

Majority of discussions were focused on specific requests for help (e.g., land transfer issues, support for working with school administration, engaging more teachers, etc.).

Conversations provided useful insight to determine which sites need more attention to bolster the school community around their school forest.

Delivered a one-hour "Meeting Outdoor Classroom Challenges" interactive session designed to engage teachers at existing School Forests in a problem-solving dialogue around common outdoor classroom challenges. Session delivered at Midwest Environmental Education Conference, Rochester, MN, April 9, 2011. Session attendance: 12.

5. Began conversations with Minnesota Association for Environmental Education Association regarding potential partnership on general environmental education workshops. Began investigation into best delivery of School Forest Summit.

Result Status as of July 2012:
1. Detailed phone interviews conducted with 12 School Forest site coordinators. Conducted one online survey of 15 site coordinators. Conversations and feedback provided insight into:

- what type of questions to investigate with online survey of all sites,
- needs regarding assistance with tying outdoor activities to Minnesota Academic Standards,
- interest in interactive web portal,
- types of materials to provide in School Forest education trunks, and
- topics for School Forest Summit.

Developed questions and format for an extensive online School Forest site coordinator needs assessment to be administered in fall 2012.

2. Designed and took live a new Activity Board for School Forest teachers. http://www.dnr.state.mn.us/schoolforest/coordinator/sfactivities.html
Activity Board features lessons submitted by School Forest teachers, School Forest staff, or partners (e.g., PLT, WET, WILD). Activity Board has lessons/activities categorized by grade bands (PreK, K-3, 4-6, 7-8, 9-12) and subcategorized by subject (math, science, language arts, etc). There are also seasonal activity pages within the Activity Board. Over 25 new activities have been added. Demonstrations of the Activity Board at workshops and trainings has met with very positive responses. However, School Forest staff has not been able to find a work around approach to allow teachers to post their own activities due to security requirements and limitations of the DNR website. As a result, teacher submit activities to School Forest staff, who then post the lessons to the activity board.

Initial site coordinator input has indicated a lower level of interest than anticipated around the idea of an interactive web portal. As a result, staff efforts have focused on meeting other high-priority needs identified.

A high priority need identified in interview investigations was meeting academic standards. This need could not be properly met via online delivery, so program staff developed two School Forest regional trainings specifically addressing how to meet Minnesota Academic Standards while teaching outdoors. More detail on training specifics in goal 3 and attached agenda. Activities demonstrated at regional training and much of content delivered are now available via the School Forest Website or interactive Activity Board. There was an overwhelming positive response to the regional trainings, reinforcing the notion that teachers desire to receive outdoor education materials and information in a face-to-face format. Regional training details:

March 30, 2012	Proctor, MN	21 teachers	12 School Forests
April 12, 2012	Fort Snelling State Park	27 teachers	17 School Forests

3. Many School Forest Website updates and changes made, including:

- New Training and Events Section – to facilitate teacher engagement with School Forest site specific trainings, provide a way for teachers to engage and inform administrators on training relevance, and promote other workshop opportunities.
- New Land Management Section – outlines the variety of land assistance the DNR can provide to School Forests and explains the importance and potential use of a stewardship plan.
- Created highlight posts for 8 new School Forests.

Links to new or updated web pages:
School Forest Locations http://www.dnr.state.mn.us/schoolforest/listing.html
Land Section http://www.dnr.state.mn.us/schoolforest/land.html
Land Options http://www.dnr.state.mn.us/schoolforest/land-options.html
Land Considerations http://www.dnr.state.mn.us/schoolforest/land-considerations.html
Land Management http://www.dnr.state.mn.us/schoolforest/land-management.html
Stewardship Plans http://www.dnr.state.mn.us/schoolforest/stewardship.html
Training and Events Section http://www.dnr.state.mn.us/schoolforest/resources/training-events.html
School Forest Summit and Conference
http://files.dnr.state.mn.us/education_safety/education/schoolforests/summit-schedule.pdf
School Forest Workshops
http://www.dnr.state.mn.us/schoolforest/resources/workshop.html
Sample School Forest Highlight Post
http://www.dnr.state.mn.us/schoolforest/sf_newschool.html#centennial

4. Since September 2011 progress report, School Forest staff met with school staff, administrators, school board, or community members in person or via phone from the following School Forests:

1. Floodwood School Forest

2. Linwood School Forest
3. Parkview School Forest, Roseville
4. O.H. Anderson School Forest, Mahtomedi
5. Bailey School Forest, Newport
6. Bay View School Forest, Proctor
7. Forestview School Forest
8. City Academy Big Urban Woods School Forest
9. Trinity Lone Oak School Forest, Eagan
10. Askov School Forest, Askov
11. Circle of Life School Forest, White Earth
12. Oak Grove School Forest, Bloomington
13. Oneka-Hugo School Forest
14. Rockford School Forest - focused 7th grade curriculum
15. Longville School Forest – land ownership issues
16. Bayview School Forest, Waconia

Majority of discussions were focused on specific requests for help (e.g., outdoor/site development, support for working with school administration, engaging more teachers, etc.). Conversations provided useful insight to determine which sites need more attention to bolster the school community around their school forest. As a result, more attention has been given to schools such as Parkview, Linwood, and Trinity Lone Oak – these sites are working to better school and community engagement or reinvigorating their School Forest Committees.

5. School Forest staff developed and delivered one School Forest Summit in conjunction with the state environmental education (EE) conference hosted by the Minnesota Association for Environmental Education (MAEE). The School Forest and MAEE partnership yielded many successful results:

- All School Forest teachers chose to attend the MAEE Conference and thus were exposed to many high quality EE programs that could not have been provided by the School Forest Program alone.
- Reduced Summit costs and reduced environmental impact by combining efforts.
- Development and inclusion of a strong outdoor classroom strand in MAEE Conference (by School Forest staff).

School Forest Summit
June 21, 2012 Itasca State Park 18 teachers 14 School Forests
MAEE Conference
June 21-22,2012 Itasca State Park Appx. 100 participants

Content presented at the School Forest Summit was all targeted toward strengthening School Forest Committees and advancing leadership skills of site coordinators. These two areas have been identified as high need by School Forest staff. Summit evaluations

provided strong positive comments and interest in future offerings in these areas. Thus, the topics will also be included in School Forest Short Course in 2013. See enclosed Summit agenda for further details.

All activities complete for Deliverable 5 Goal 1.

Result Status as of December 2012:
1. Completed site coordinator needs assessment. Major pieces of assessment included:
Phone interview of 12 site coordinators.
New training evaluation tools aimed at gathering information from participants to help advance the program overall and for training delivery feedback.
Teaching outdoor comfort assessment used at every School Forest training to provide more extensive data on training effectiveness.
New questions to School Forest Annual Report form designed to capture long-term evaluative data about site use and needs.
Online site coordinator survey developed, implemented, and analyzed.
24 question survey delivered in September 2012.
60 sites responded out of 118.

Data from online survey has been analyzed and is currently being finalized in a report format. Survey Report will be included in next progress report. A few significant findings from the survey were:

- "Ready-made activities" ranked the highest out of seven options to encourage teachers to use the School Forest more often.
- Site coordinators ranked "online resources" as their top choice for resources to assist their School Forest committee.
- "Site visits with foresters focused on land management advice" was ranked the highest out of eight land management resources.
- Urban sites ranked "stewardship plans" second highest out of eight land management resources, compared to rural sites that ranked it sixth

Data gathered from survey informed decisions made regarding website development, February 2013 School Forest Conference planning, training/workshop offerings, and other activities.

2. Continued advancement of School Forest Activity Board. Advancements include:
- 22 new math activities posted – Math activities were identified by teachers as a high-priority need. The math activities involved a new approach of establishing grade-level specific lessons, with accompanying student worksheets, for each grade for grades K-6. The lessons, when viewed as a collection, create a scope and sequence of outdoor math activities that are specifically tied to Minnesota academic benchmarks.

- Over 10 new activities (excluding math) added to activity board.
- Activity Board link made more visible on School Forest website: links in multiple locations, including one on main menu.

Adopt-a-Tree journal modified and posted for download. This journaling/writing/observation skills-based activity meets needs identified by teachers as a high-priority. The document had previously only been available in paper format.

Site coordinator input indicated a lower level of interest than anticipated around the idea of an interactive web portal. As a result, staff efforts have focused on meeting other high-priority needs already identified and met in July 2012 progress report.

3. Redesign of School Forest website underway. Site coordinator assessment has informed many of the decisions made for new website pages and content. Currently updating and creating the following pieces for the School Forest website:

- Revamping Becoming a School Forest Section – creating easier to follow pages with information on all the pieces schools need to consider before or complete as part of their application. Such as, School Forest committees, mission statements, legal paperwork pertaining to land ownership, etc.
- Updating How to Teach Outside Section - to help reduce "first timer's fear" identified as a barrier to outdoor teaching in the School Forest survey.
- New About Us Section – basic page to inform viewers on what the School Forest Program is in a nutshell and provide a brief history.
- New School Forest Map – still under development, this map will run off of google maps and allow users to scroll over the state and click on site markers to get School Forest site details.

Four School Forest highlights written and posted to SF website
http://www.dnr.state.mn.us/schoolforest/sf_newschool.html

Links to new or updated School Forest website sections and pages:
Note - many of the pages are still in final testing phase.
Becoming a School Forest
Why http://www.dnr.state.mn.us/schoolforest/become/why.html
How to Start http://www.dnr.state.mn.us/schoolforest/become/begin.html
Application http://www.dnr.state.mn.us/schoolforest/become/application.html
About Us http://www.dnr.state.mn.us/schoolforest/about.html
School Forest Locations http://www.dnr.state.mn.us/schoolforest/listing.html
How to Teach Outside http://www.dnr.state.mn.us/schoolforest/teachoutside.html
Activity Board http://www.dnr.state.mn.us/schoolforest/coordinator/sfactivities.html

4. Since the July 2012 progress report, School Forest staff met with school staff, committees, administrators, and school boards, or community members in person or via phone to strengthen committee, provide resources, and bolster support for outdoor education with the following School Forests:

1. Oneka Elem (Oneka-Hugo School Forest), Hugo
2. Dowling School Forest, Minneapolis
3. Pine Bend School Forest, Inver Grove Heights
4. Dean Mackey School Forest, Baxter
5. Crossroads Como Woodlands School Forest, St. Paul
6. Bayview School Forest, Proctor
7. Pike Lake School Forest, Proctor
8. Transitions School Forest, White Bear Lake Township (School Forest staff support helped this school get a $9,960 grant from national Project Learning Tree to advance their School Forest)
9. Pillager School Forest, Pillager
10. Lakewood School Forest, Duluth
11. Frazee School Forest, Frazee
12. Hidden School Forest, Prior Lake
13. Five Hawks School Forest, Prior Lake
14. Hugo Elementary (Oneka-Hugo School Forest)– to designate additional acres near Hugo Elementary as their School Forest
15. Creative Arts High School, St. Paul
16. Jefferson Elementary, Blaine
17. Westwood Elementary, Blaine
18. Chaska Elementary, Chaska
19. St Charles School Forest, St. Charles
20. Northland School Forest, Remer
21. Crosswinds School Forest, Woodbury
22. Linwood School Forest, Forest Lake
23. Bailey School Forest, Newport
24. St. Louis County School Forests, Orr, Cook, Cotton

Majority of discussions were focused on specific requests for help (e.g., outdoor/site development, vandalism, support for working with school administration, engaging more teachers, etc.). Some meetings and discussions are on-going support to address time consumption issues that would not otherwise have been address without this grant. For example: Vandalism and site maintenance at Pine Bend School Forest; Northland School Forest restructuring due to district consolidation; St. Louis County district has closed several schools and opened new buildings, creating many changes to the School Forests in their district; Dowling School Forest facilitating process to get staff, parents, and administration all on the same page.

Helped six schools that identified specific needs in the School Forest online survey:

- Linwood School Forest, Wyoming
- Lakewood School Forest, Duluth
- Crosswinds School Forest, Woodbury
- Goodridge School Forest, Goodridge
- Frazee-Vergas School Forest, Frazee
- Centennial School Forest, LinoLakes.

School Forest Program staff identified site signage as a high-priority need to increase public visibility, reduced vandalism, and raise comfort levels of teachers using the sites. The School Forest program has initiated a project to develop and deliver School Forest signs using DNR funding.

Final Report Summary June 2013:

School Forest site coordinator needs were assessed through phone interviews, event participation evaluation forms, and online survey tools. A summary of data and information gathered through the formal online survey is attached. Sixty site coordinators participated in the survey, a 49 percent response rate. A variety of valuable information to guide future program development was gathered.

- The School Forest Program needed to increase connections between new site coordinators and program resources. An introductory email and support mailing have been developed to better connect new site coordinators with program resources (both online and in-person options).
- Site committees were ranked as high importance by newer schools for helping with land management. Overall, site coordinators ranked “online resources” as the best way to assist them with committee management.
- Coordinators were turning to the School Forest website to find content on: Minnesota forests/trees, land management, teaching outdoors, committee management, and site features (benches, boardwalks, shelters, etc.). Thus, the land management, teaching outdoors, and committee management sections were revamped. And program staff is currently developing a site features section and considering what forest and tree content will be useful for site coordinators.
- Connections to and assistance from foresters and natural resource professionals are important to site coordinators.
- Site coordinators indicated a strong preference for face-to-face interaction with School Forest Program staff to support educational and management needs.

In addition to the planned site coordinator assessment, School Forest staff was able to complete a specialized Urban School Forest focus group assessment. Nineteen

teachers, volunteers, and site coordinators from urban School Forest sites participated in two focus groups. Insights gathered from the sessions include:

- Most participants were not aware of land management principles and what actions they needed to consider for their site. There was a lack of knowledge on what a healthy forest looked like or what plants and animals the site might contain. Instead, most spoke of site features they desired to build when asked about land management.
- Visibility (being able to see students at all times) was of high importance to most participants. Some spoke about the visibility at the transition area (from playground to forest) while others spoke about visibility while learning within the forest.
- Most participants wanted to increase their knowledge of plant identification and land management practices, with particular emphasis on invasive species.
- A majority of comments were focused on the desire for volunteers and assistance from organizations in completing land management goals.
- There was a lack of knowledge on invasive species and a desire to increase understanding about the importance, management practices, and harm caused by various species.

The School Forest Program website was revamped to meet site coordinator needs and better serve public inquiries about the program. This involved developing many new pages and redrafting existing sections, such as: Land Management, School Forest Committee, and How to Teach Outside. School Forest staff has received many comments regarding the quality and usefulness of the information presented on the website.

The School Forest website had 39,986 total pageviews and 28,664 unique pageviews during the grant period. There was a 44 percent increase in Web traffic when comparing the year preceding the grant initiation and the last year of grant activity. And, an 82 percent increase in unique pageviews, which indicates more people viewing the website.

Year	Total Pageviews	Unique Pageviews
July 2009-June 2010	8,400	6,571
July 2012 – June 2013	19,076	12,557

According to Web statistics, the sections most visited in descending order were: Safety and Legal, Teaching Outside, Activity Board, Map, How to Start, and Program Benefits and Criteria.

To strengthen School Forest site committees, connections with school administration, and bolster support for outdoor education activities, School Forest staff met with site coordinators and volunteers at 40 School Forests. This contact also led to 11 existing

School Forests revitalized with committees reestablished, and activities resumed or enhanced. A few highlighted outcomes from this type of support:

- Work with Crossroads School Forest committee led to discussion and investigation into school needs that resulted in the discovery of a need for a site closer to their campus/school to reduce travel time and increase teacher comfort. Crossroads Elementary, St. Paul, is now pursuing this effort, with principal support, to establish a School Forest at a City of St. Paul park located just a few blocks from their building.
- Invigorated School Forest activities at Lewiston-Altura High School, gaining a new site coordinator and increasing knowledge of the program to a new, supportive principal.
- Discussed safety preparedness and emergency response actions for lock-down situations when students are in the School Forest at Floodwood, Humboldt, Parkview, and Baudette School Forests.
- Jefferson Elementary School Forest was revitalized after contact with program staff. A solid committee was formed and they established a plan to increase site use and outdoor education activities. The effort included designating the whole school yard as a School Forest to provide easier access and an age-appropriate space for young learners. To celebrate, the entire school took part in an Arbor Month planting, with each class planting two trees on the school grounds.

Face-to-face, on-site meetings provided the opportunity to meet with site partners, such as principals, facilities/maintenance staff, parents, and neighbors. These conversations were sometimes serendipitous, and often conveyed a perspective not shared by the site coordinator (usually a teacher), which helped School Forest staff identify and address specific needs. In-person meetings and discussions between site volunteers and School Forest staff are vital to the success of individual sites and the program. These interactions can take place through site visits, trainings, focus groups, summits, or conferences.

RESULT 2: Establish 15 new School Forest sites throughout Minnesota.

Description:
Each School Forest site comes with its own set of legal parameters and community issues and must be dealt with independently. School Forests will be established as long-term, self-sustaining outdoor classrooms throughout all regions of the state. Particular emphasis will be given to engage schools in urban areas and southwest Minnesota. This involves a lot of leg work and thought on the front end. There is no cookie cutter approach. Each site will have its own natural resource features: forest, prairie, wetland, etc. Establishment of each site will involve significant staff time in the following areas: land acquisition; application process; teacher, administrative and school board meetings; school forest committees; teacher support; connections to local, regional, state, and national resources; Natural Resources Stewardship Plans; and site development. As needed, staff will participate in site-specific special events to raise school and community awareness of School Forest and its educational importance. Based on current program enrollment, it is expected that an additional 4,000 students and 200 teachers will participate in the School Forest Program upon completion of result 2.

Summary Budget Information for Result 2: **ENRTF Budget: $ 115,050**
Amount Spent: $ 115,050
Balance: $ 0

Deliverable	**Completion Date**	**Budget**
1. Establish 15 School Forests statewide. 5 sites by December 2011 15 sites by June 2013	June 2013	$58,050
2. Establish15 well-supported School Forest Committees.	June 2013	$55,250
3. Begin development of 10 Natural Resources Stewardship Plans. (*All 15 new School Forests will have a Stewardship Plan within 2 years of entering the program.)*	June 2013	$ 1,750

Result Completion Date: June 2013

Result Status as of January 2011:
Delayed hiring of staff to complete work in this result has resulted in minimal work completion.

1. Two School Forests sites established:
   A. Humboldt High School – urban site with unique educational demands; using School Forest as part of overall plan to restructure school after 5 years of failing to meet adequate yearly progress.

B. Smokey Timbers – second school forest site for Miltona Science Magnet School to expand nature education offerings. This new 27-acre site offers water access and overnight opportunities and is provided in partnership with local, non-profit Smokey Timbers Foundation.

Gave presentations and involved in detailed discussion to establish a School Forest with:

1. Dowling Elementary, Minneapolis
2. City of St. Paul, Como Woods Project
3. Big Urban Woods & Ramsey County, St. Paul
4. St. Michael Albertville School District, potentially 3 sites at different schools
5. Birch Grove Elementary, Tofte
6. River's Edge Academy, St. Paul
7. Proctor Bay View Elementary – expansion on existing site

2. Two School Forest Committees established at Humboldt High School and Miltona Science Magnet School.

3. City of St. Paul forester is working with Humboldt to development a management plan and DNR forester is working with Miltona to establish a stewardship plan.

Result Status as of September 2011:

1. Two School Forest sites established. Both sites required facilitation of a Joint Powers Agreement between the landowner and the school district.

A. St. Michael Albertville Middle School Forest – 35-acre parcel of remnant big woods adjacent to school site and is rich with animal wildlife. Site is known as "Becker Big Woods." Parcel owned by city of St. Michael as a result of a 1995 DNR Partnership Grant. Site will be co-managed by city and school. Teachers from multiple disciplines engaged.

B. City Academy Big Urban Woods – urban 5-acre site owned by Ramsey County, adjacent to county yard waste site and 1 block from school. This high school is developing many science and social studies lessons to use the School Forest, including a year-long project focused on assessing carbon sequestration rates of their forest. Two additional schools are considering establishing a School Forest on the same site.

Gave presentations and involved in detailed discussion to establish a School Forest with:

1. Crossroads Elementary, St. Paul – Como Woods site
2. Rockford Middle School
3. St. Johns Elementary, Duluth
4. Hermantown Elementary
5. St. James Elementary, Duluth
6. Great River Academy, St. Paul – Como Woods site
7. Natural Science Academy, Cottage Grove

Continued discussions and support for establishing a School Forest with:

1. Dowling Elementary, Minneapolis
2. Big Urban Woods & Ramsey County, St. Paul
3. River's Edge Academy, St. Paul
4. Proctor Bay View Elementary – expansion on existing site

2. Two School Forest Committees established.
St. Michael Albertville Middle School Forest Committee includes City of St. Michael staff and educators. This committee is interested in engaging the adjacent elementary school in outdoor activities!

The City Academy School Forest Committee has extensive community involvement, including leaders from St. Paul citizen groups and Ramsey County staff.

3. Becker Big Woods has a forest management plan developed by the City of St. Michael following DNR Stewardship Guidelines. The Big Urban Woods site is working with Ramsey County Forestry staff to establish a forest management plan. Initial focus will be on removal of hazard trees and trail development.

Result Status as of July 2012:
1. In total, 12 new School Forests have been established. See attached, updated map of current School Forest locations for statewide site distribution.
New School Forests established between October 1, 2011 and July 31, 2012:

1. Rockford School Forest – Site will be used by all middle school students. This 4-acre site includes a large wetland.
2. *Great River Como Woodlands School Forest - Great River is a high school Montessori. Students walk or bike to this highly urban 17-acre School Forest, which is owned and managed by the City of St. Paul.
3. Oneka Elementary is a large suburban grade 3-5 school. The Oneka-Hugo school forest is located adjacent to the school and included wetlands and a boardwalk.
4. *Crossroads Elementary will use the 17-acre Como Woodlands School Forest. Two schools are housed in the same building and both schools will use the school forest.
5. Dowling School Forest is located adjacent to the Michael Dowling School and Mississippi River Gorge in Minneapolis. This 21-acre site contains an arboretum of trees planted by FFA students in the 1950s. It also contains the longest –running Victory Gardens in the state.
6. Hugo Elementary is a large suburban grade K-2 school which will use the Oneka-Hugo School Forest, which is located 3 miles from their building.
7. Triton School Forest – site consists of 11 acres of pond, prairie, and trees on school grounds in Dodge Center.

8. *American Indian Magnet School will use the Big Urban Woods School Forest, managed by Ramsey County.

*Joint Powers Agreements (JPA) were required for use of land. Process facilitated by School Forest Program Manager in conjunction with city, county and school staff. JPAs clarify which entity (school or land owner) is responsible for liabilities, site maintenance, etc. and provide for long-term partnerships.

Special Note:
This reporting period marks the formal establishment of several important partnerships. School Forests have been established by multiple schools on two different public parcels in St. Paul –owned by Ramsey County (Big Urban Woods) and City of St. Paul (Como Woodlands). These partnerships significantly increase public use and value of two degraded sites and are creating highly engaged, local student and family populations as site stewards.
In addition, significant partnerships with St. Paul Public Schools and the Minneapolis School District were finalized by establishment of School Forests within their districts. Both of these large and diverse school districts have been challenging bureaucracies to navigate. However, School Forest staff and individual school staff now all have a better understanding of administration interests, needs, and support levels. Most importantly, the site coordinators are feeling well supported by administration and DNR staff as a result of all the groundwork and activity that went into establishing the sites.

School Forest Closures
As a result of school closings or consolidations, nine School Forests have been terminated or consolidated with another site. This list represents all changes from the beginning of the grant. Further closures and consolidations are not anticipated.
Terminated School Forests:

- Askov School Forest
- Emily School Forest
- North School Forest, Talmoon
- Cook School Forest
- Orr School Forest
- Circle of Life School Forest, White Earth
- Delpha Hayes White School Forest, Park Rapids

Consolidated School Forests:

- Copley & Minerva consolidated to become Bagley School Forest
- Lake George & Two Inlets consolidated to become Park Rapids School Forest

Gave presentations and involved in detailed discussion to establish a School Forest with:

1. Minnesota Ag Academy, Shoreview
2. Transition High School, White Bear Lake Township

3. Bamber Valley Elementary, Rochester
4. Glacier Hills Elementary, Eagan
5. Cedar Park STEM Academy, Apple Valley
6. Garlough Elementary, West St. Paul
7. A Chance to Grow/Jane Goodall High School, Silver Creek Township

Continued discussions and support for establishing a School Forest with:

1. River's Edge Academy, St. Paul
2. Proctor Bay View Elementary – expansion on existing site
3. Natural Science Academy, St. Paul Park
4. American Indian Magnet School, St. Paul
5. Dowling Elementary, Minneapolis

2. School Forest Committees established:

1. The Rockford School Forest Committee involves teachers, a school naturalist (as a result of School Forest work!), and is lead by two teachers who are on part-time sabbaticals/TOSAs to coordinate outdoor and environmental education efforts.
2. Great River Como Woodlands School Forest Committee is comprised of City of St. Paul staff, students, teachers and parents. There is high student involvement in planning and site activity.
3. Oneka-Hugo School Forest committee includes teachers from both Oneka and Hugo elementary schools, local SWCD staff, local business owners, principals, & ground staff. Both Oneka and Hugo Elementaries share the same School Forest Committee.
4. Crossroads School Forest Committee involves lead teachers from both the Montessori and regular elementary schools, vice principal, and City of St. Paul staff.
5. Dowling School Forest Committee is led by several highly engaged and active parents and includes a few teachers and the principal. Currently working with the City of Minneapolis to increase participation for management and planning on this important remnant forest in a highly urban area.
6. Hugo Elementary shares a School Forest Committee with Oneka Elementray, see #3.
7. Triton School Forest Committee involves both the agriculture and science departments and school principal.
8. American Indian Magnet Big Urban Woods School Forest has a small committee of teachers that work with Ramsey County, a very active community volunteer base, and the School Forest Committees from Concordia Creative Learning Academy and City Academy (who also use the same site). Currently, this larger Big Urban Woods School Forest Committee is focusing on establishing a

framework, calendar, and meshing varying education and management objectives for the site.

3. To date, 3 School Forests have Forest Management Plans or Natural Resource Stewardship Plans. All plans follow the DNR Stewardship Management Guidelines.
   1. Miltona
   2. Great River Como Woodlands
   3. Crossroads Como Woodlands

The following School Forests have management plans in development or awaiting assistance from a DNR or local forester on plan development:

1. Triton School Forest
2. Big Urban Woods, for all three schools
3. Dowling School Forest
4. Hugo-Oneka School Forest
5. Trinity Lone Oak School Forest

Result Status as of December 2012:

1. In total, 15 new School Forests have been established. See attached, updated map of current School Forest locations for statewide site distribution.
New School Forests established between August 1, 2012 and December 31, 2012:

1. Glacier Hills School Forest in Eagan will use the 4.05-acre wooded area and field (current prairie restoration project) on school grounds.
2. *Transitions Bellaire School Forest. This grade 7-12 school serves high-needs students. They will use the adjoining 9-acre Bellaire Park, owned by White Bear Lake Township, that contains wooded trails and a wetland. Plans are underway to transform an abandoned tennis court into an outdoor classroom/meeting area, using a Project Learning Tree grant.
3. *Concordia Creative Learning Academy – CCLA is an inner-city charter school. School Forest activities have helped engage students and improve science test scores. CCLA is using the 5-acre Big Urban Woods School Forest, managed by Ramsey County. CCLA School Forest was designated last spring but was mistaken left off in previous progress reports.

* Designates sites requiring a Joint Powers Agreement for the school to use land owned by another entity – city or county land. JPAs involve an extensive amount of staff time to facilitate, but allow the school and landowner to clear up liability, use expectations, etc at the beginning of the partnership.

Gave presentations and involved in detailed discussions to establish a School Forest with:

1. Murray Junior High, St. Anthony Park
2. Hugo Elementary, Hugo (to designate additional property near Hugo Elem as their School Forest)
3. Robbinsdale School of Engineering, Arts, and Mathematics, in Golden Valley
4. Merritt Elementary, Mountain Iron
5. Twin Oaks Middle School, Prior Lake
6. Edgewood, Moundsview
7. Duluth East High School, Duluth
8. Lester Park Elementary, Duluth
9. Proctor Middle School, Duluth
10. Edgewood STEAM School, Mounds View

Continued discussions and support for establishing a School Forest with:

1. Garlough Elementary, West St. Paul
2. Glacier Hills Elementary, Eagan
3. Cedar Park Elementary, Apple Valley
4. River's Edge Academy, St. Paul
5. Proctor Bayview Elementary – expansion on existing site

2. To date, 15 School Forest Committees have been established, including the five committees that were established during this reporting period:

1. Lakewood School Forest – the current committee consists of most of the teachers and the principal. Plans are underway to involve parents on the committee.
2. Pine Bend School Forest – the committee has 2 teacher co-chairs who are actively recruiting other interested teachers, parents, and community members.
3. Glacier Hills School Forest – this committee consists of 4 key teachers, the district magnet coordinator, and the principal.
4. Transitions Bellaire School Forest – the committee involves the school principal, district education specialist, school teachers, and lead township planner.
5. Jefferson School Forest – the committee involves the instructional coach, inquiry specialist, administrative intern and school teachers.

3. To date, 5 School Forests have Forest Management Plans or Natural Resource Stewardship Plans. All plans follow the DNR Stewardship Management Guidelines. Plan created during this reporting period:

1. O.H. Anderson School Forest, Mahtomedi

The following School Forests have management plans in development or awaiting assistance from a DNR or local forester on plan development:

1. Triton School Forest
2. Big Urban Woods, for all three schools
3. Dowling School Forest
4. Hugo-Oneka School Forest
5. Trinity Lone Oak School Forest
6. Pine Bend School Forest
7. Dean Mackey School Forest
8. Glacier Hills School Forest
9. Goodridge School Forest

Final Report Summary June 2013:

Twenty-two new School Forest sites, encompassing 256 acres of land, were established during this project. See attached map of site locations. This accomplishment exceeds the target of 15 new sites by 47 percent. The majority of new sites were urban areas. This reflects a growing interest of parents and teachers to connect urban students with nature and to use outdoor education as a means to address the achievement gap. Since the last progress report, School Forests have been established at the following schools:

1. Cedar Park School Forest, Apple Valley
2. Proctor Middle School Forest
3. Edgewood School Forest, Mounds View
4. Duluth East High School Forest
5. Lester Park School Forest, Duluth
6. Mountain Iron School Forest
7. Proctor High School Forest

Each new School Forest in the program has either entered with or recently established an effective and diverse School Forest Committee to provide solid support for site development and student and teacher participation in the future.

- Edgewood School Forest, Mounds View, developed a committee that includes several teachers, the district HR director, a U of M Forestry Professor, a paraprofessional, the principal, and two middle school students. Notably, the site coordinator is an art teacher who understands the importance of using nature to

inspire creativity and design. The School Forest committee has established a great working relationship with maintenance staff and district administration.

- Dowling School Forest, Minneapolis, has a School Forest committee that works closely with the school's Green Team. The committee is made up of parents, community volunteers, teachers, and the school principal. They frequently interact with the district's Science Content Coordinator and school board members to ensure activities meet district needs. Committee members also volunteer onsite with students in the woods.

To promote sustainable site management, all new School Forests are required to work with a DNR forester to create and follow a land management plan. The intended project outcome was to initiate a natural resources Stewardship Plan at 10 sites. At the close of the project:

- five plans have been completed
- five plans are in final development stages, expect completion in fall 2013
- eight sites are in early development or awaiting assistance from a DNR forester to begin

This work and information provided in the Urban School Forest focus groups, has illustrated the need for creation of new land management plan approach to better fit urban School Forest land management concerns. Issues unique to these urban parcels: typically small acreage (less than 20 acres), high invasive species concern, loose/off-leash dogs, high community visibility, higher frequency of vandalism, and significantly high use rates by students and the community.

About 70 percent of School Forests established during this grant period are in urban areas and the School Forest Program continues to receive inquiries from a high percentage of urban schools. There is a need to identify or create a management plan format that addresses the needs of urban School Forests. The traditional Stewardship Plan used by the DNR, U.S. Forest Service, and other partners addresses large acres of land in rural areas that have different management pressures.

A healthy committee is crucial to school engagement with the school forest site. Also, when a site lead leaves or retires, it is crucial that the School Forest Program maintain contact with the school to help the new site lead get up to speed and to make sure that sites continue to have a site lead and committee.

RESULT 3: Integrate outdoor environmental education activities into school curricula.

Description: There are many fantastic environmental and outdoor education programs that supply activities and lessons for schools to use in School Forests. Common barriers to using these activities are: teacher comfort teaching outdoors; teacher knowledge of materials and how to incorporate them into school curricula; lack of tools and supplies to conduct outdoor lessons. Teachers will learn ways to overcome such barriers through in-person outdoor education trainings. A series of School Forest site-specific workshops and specialized trainings will advance teacher comfort in teaching outdoors, provide access to climate change curriculum, and provide free access to programs such as Project Learning Tree, WILD, and WET. Project Learning Tree (physical environments and forests), WILD (wildlife), and WET (water) are the leading national environmental education activity guides, which are correlated to the Minnesota academic standards, and are designed to help students learn how to think, not what to think, about natural resources. An intensive multi-day School Forest course (residential course at a location like the Cloquet Forestry Center) will provide teachers with appropriate outdoor activities tied to the Minnesota academic standards from all DNR education programs and partner programs. Sessions will include outdoor lesson plans, outdoor recreation skills and connections, outdoor teaching skills, ways to teach about climate change, and outdoor education tools. A significant portion of the course will be dedicated to tying outdoor education lessons into existing school curriculum, so teachers leave with a well thought out action plan to incorporate outdoor education into their regular teaching schedule. School Forest sites will be encouraged to send a team of teachers to the course to promote school-wide approaches. Outdoor education kits will be developed and will contain lesson plans and outdoor education tools (diameter tapes, magnifying glasses, thermometers, etc.). The kits will be designed to allow teachers to "grab and go" outside and engage kids in the outdoors. All activities will be correlated to the Minnesota academic standards. Based on current program enrollment, an estimated 75 School Forest sites, reaching 900 teachers and 18,750 students, will be served directly through activities in result 3.

Summary Budget Information for Result 3: ENRTF Budget: $117,050
Amount Spent: $ 117,050
Bdalance: $ 0

Deliverable	**Completion Date**	**Budget**
1. Develop and deliver 20 site-specific workshops and specialized trainings. 3 by December 2011 10 by September 2012 20 by June 2013	June 2013	$42,575
2. Develop and deliver one intensive, multi-day	June2013	$33,915

School Forest course.		
3. Develop and distribute 100 outdoor education kits. 10 by June 2012, 75 by June 2013	June 2013	$38,560

Result Completion Date: June 2013

Result Status as of January 2011:
Developed and delivered specialized trainings for

A. Humboldt High School Forest in St. Paul for 70 teachers, August 25-26, 2010. This 2-day, site specific training was focused on ways to tie outdoor education activities with academic standards and state common and formative assessment requirements. Delivered in conjunction with Hamline University and Five Hawk School Forest staff. The training provided a great opportunity to focus on meeting the unique needs of a truly urban, inner-city school with natural resource and outdoor education while meeting academic standards in all disciplines (social studies, math, science, language arts, etc). Humboldt has a large population of students with disabilities and over 70% of their student body is from an underserved audience. Teacher and administrative response to the training was very positive.
B. Miltona Science Magnet for 15 teachers, August 16, 2010. In lieu of training exclusively for their own staff, Miltona asked for an early childhood focused outdoor workshop offered at Miltona school and was open to schools from the surrounding community. This workshop was offered in conjunction with a one-day workshop sampler of environmental education to support elementary schools. Four of the attending teachers were from Miltona. Miltona School Forest was used as the site for the training and as a result many other teachers had the opportunity to experience the benefits of an outdoor classroom.

Result Status as of September 2011:
1. Developed and delivered a specialized river-focused workshop with Project WET for Humboldt High School. This second training was offered because Humboldt educators identified the need to have educational materials focused on their Mississippi River theme as one of their greatest challenges to using their outdoor classroom.

Developed a “How to Teach in Your School Forest” for Baudette School Forest. Unfortunately, due to a staff medical emergency, this training was canceled. It will be delivered in Spring 2012.

2. No activity.

3. Developed one outdoor education trunk for Baudette School Forest. But delivery was canceled – see above. Will be delivered in Spring 2012.

Coordinated delivery of classroom sets of field desks made by DNR Volunteers to the following schools:

1. Princeton School Forest
2. Linda Mickelson Outdoor Learning Center (Red Lake Falls)
3. Frazee School Forest
4. Waubun School Forest
5. St. David's School Forest (Minnetonka)
6. Bagley School Forest
7. Stillwater Area Environmental Learning Center
8. The Hidden School Forest (Prior Lake)
9. Baudette School Forest

A photo of the field desks is attached. These wooden field desks are an excellent tool to allow students to carry and use writing materials in their school forest. And they make a decent stool for smaller students when a break is necessary.

Result Status as of July 2012:

1. Six site-specific trainings were developed and deliver between October 1, 2011 and July 31, 2012. Each training is designed to meet staff needs, make best use of site features, and address any special natural resource or land use considerations (e.g., community recreation, boy scout or master gardener involvement). Two main formats were developed:

A. "How to Teach in Your School Forest" Workshop – full-day site-specific event with significant outdoor delivery time involving instruction on best practices for outdoor education, integration with Minnesota Academic Standards, Project Learning Tree Guide, meet your DNR forester, and other components.
   1. Floodwood School Forest
   2. City Academy Big Urban Woods School Forest, St. Paul
   3. Bay View School Forest, Proctor – delivered 2, one-day trainings to accommodate staff
   4. Lake of the Woods School Forest, Baudette
   5. Trinity Lone Oak School Forest, Eagan – part 1 of two part training, part 2 scheduled for Feb 8, 2013 to finish up training.

B. School Forest Session – specialized 2-4 hour training.
   6. North Shore Community School in Duluth. Training was designed to share additional activities to augment the work that is already occurring.

Site-specific trainings in reporting period: 6
Total trainings to date: 8
Teachers reached through site-specific trainings in reporting period: 85
Total teachers trained to date: 200

Connection to other ENRTF projects:
A. Minnesota Department of Education's (MDE) Environmental and Outdoor Education Project

- Developed and delivered a half-day training on teaching outdoors for MDE's Environmental and Outdoor Education Project during their December 2011main workshop. Three of six MDE grantee schools are School Forest sites.
- Developed and delivered one short session on outdoor education, School Forest and DNR education resources at MDE 2012 Environmental and Outdoor Education summer series. Anticipate delivery of 3 more short sessions.

B. City of St. Paul Como Woodlands Outdoor Classroom Project

- Worked with City of St. Paul staff and Como Woodlands Advisory Committee member to recruit schools to establish a School Forest at Como Woodlands Outdoor Classroom. This initiative took quite a bit of effort, but resulted in a strong partnership with the City of St. Paul and a better understanding of desired site use.
- To date, two schools have established Como Woodlands as their School Forest:
    - Crossroads Elementary
    - Great River Academy (high school)
- Students either walk or take the city bus to Como Woodlands and use the site as an enhancement to activities conducted on their school grounds. Great River Academy is investigating option for mentoring and teaching at Como Woodlands with Crossroads students.

2. No activity.

3. Outdoor education kits
School Forest Specialist designed and developed contents for outdoor education kits. Each kit is equipped with a base kit with tools and activities applicable for all sites. School Forest site coordinators choose additional items to round out the trunks with items most useful for their particular site.
Assembly of the 75 outdoor education kits began in July 2012 and will be completed in fall 2012. Delivery of outdoor education kits will begin in Fall 2012 and be completed by June 2013.
School Forest Base Kit:

- Plastic storage trunk
- Full PLT activity: "We All Need Trees" (includes lesson plan and all materials needed to do activity: variety of tree products)
- Full PLT activity "How Big is Your Tree?" (includes lesson plan and all materials needed to do activity: 15 rulers, class set of laminated student tree measurement sheets)

- Full PLT activity “Tree Cookies” (includes lesson plan and all materials needed to do activity: 12 assorted tree cookies, paper plates)
- Class set (25) of “Minnesota’s Forests and Trees: A Primer”
- Class set (25) of Beginner’s Guide to Minnesota Trees
- Class set (25) of Adopt a Tree journal
- Class set (25) of magnifying lenses

Additional Items that site coordinators may choose to round out kit:

- Class set (25) of binoculars
- Minn. PLT early childhood activity guide
- Minnesota tree identification books
- Woodworking/Landscaping for wildlife book set
- Clinometer (forestry tool used to measure tree height)
- Class set clipboards
- Compasses
- Diameter tapes (forestry tool used to measure tree diameter)
- “Minnesota: A History of the Land” DVD
- First Aid Kit
- Increment borer (forestry tool to age sample trees)
- Class set (25) of measuring tapes
- Durable metal tree/plant identification tags
- Flagging tape
- Air/Water thermometers
- Soil Thermometers

Note: All items have been ordered for kits, but billing and payment is not finalized. Majority of costs for this deliverable will present on next progress report.

Field Desks

In total, 22 classroom sets of field desks have been made and delivered to Minnesota School Forests.

Coordinated delivery of classroom sets of field desks made by DNR Volunteers to the following schools between October 1, 2011 and July 31, 2012:

1. Aitkin School Forest
2. Linwood School Forest
3. Pillager School Forest
4. Pine River School Forest
5. Trailview School Forest, Mora
6. Milaca School Forest
7. Lakewood School Forest, Duluth
8. Floodwood School Forest

9. Bay View School Forest, Proctor
10. Stonebridge School Forest, Stillwater
11. County Line School Forest, Mora
12. Cromwell School Forest
13. Bailey School Forest, Newport

Result Status as of December 2012:

1. To date, 18 "How to Teach in Your School Forest" trainings have been delivered at School Forest sites. Between August – December 2012, the following sites received a training:

A. "How to Teach in Your School Forest" Workshop – full-day site-specific event with significant outdoor delivery time involving instruction on best practices for outdoor education, integration with Minnesota Academic Standards, Project Learning Tree Guide, meet your DNR forester, and other components.

7. Transitions Bellaire School Forest, White Bear Lake Township
8. Rockford School Forest, Rockford

7. School Forest Session – specialized 2-4 hour training.

* Miltona School Forest – 2nd training for this site, does not count toward total number of trainings.
9. Linwood School Forest, Forest Lake
10. Como Woodlands School Forest, Crossroads Elementary, St. Paul
11. Bay View School Forest, Waconia
12. St. David's School Forest, Minnetonka
13. Lakewood School Forest, Duluth
14. Oneka-Hugo School Forest, Oneka Elementary, Hugo – part 1 of two-part training, part 2 scheduled for April 2013.
15. Oneka-Hugo School Forest, Hugo Elementary, Hugo – part 1 of two-part training, part 2 scheduled for April 2013. Two school share the same School Forest, two trainings initiated
16. Pine Bend School Forest, Inver Grove Heights

Site-specific trainings in reporting period: 11
Total trainings to date: 18
Teachers reached through site-specific trainings in reporting period: 234
Total teachers trained to date: 434

2. A two-day, intensive School Forest course is planned for Feb. 5-6, 2013 at Cloquet Forestry Center. The goal of this event is to empower School Forest leaders to become more self-sufficient and give them tools to advance their School Forest and engage

other teachers. We are encouraging groups of 1-4 teachers from each School Forest to attend so that teams can actively strategize and advance their own School Forest.

This course consists of general sessions, short classes, and facilitated networking and team work time. All topics were carefully selected to reflect teachers' highest needs and concerns as identified through the online survey, conversations, and meetings. Topics include: leadership, committee building, how to teach outside, specialized teaching outside in to an urban audience, assessing needs and finding funding, how to get and use a stewardship plan to improve your School Forest, activity sharing, and using digital photography to engage learning. In addition to the sessions, significant time is reserved for teacher teams to discuss and strategize next steps for their School Forest, and for participants to actively network and share ideas and outdoor activities.

The Cloquet Forestry Center is an ideal location because it is located near many School Forests, is easy to drive to from the Metro area, provides on-site meals and lodging, has easy access to demonstration forests, and is an academic campus with their own school forest.

3. Outdoor Education kits assembled and delivered to:
    1. Pike Lake School Forest
    2. Lakewood School Forest
    3. Bayview School Forest, Proctor
    4. Pine Bend School Forest, Inver Grove Heights
    5. Transitions Bellaire Park School Forest, White Bear Lake Township
    6. Westwood Hills School Forest, Blaine
    7. Pillager School Forest, Pillager
    8. Baudette School Forest
    9. Parkview Center School Forest
    10. Floodwood School Forest
    11. Forestview School Forest
    12. Five Hawks School Forest, Prior Lake
    13. Scenic Heights School Forest
    14. Hidden School Forest, Prior Lake
    15. Miltona School Forest
    16. Becker Big Woods, St. Michael-Albertville
    17. Rockford School Forest
    18. Oak Grove School Forest, Bloomington

Field Desks
In total, 30 classroom sets of field desks have been made and delivered to Minnesota School Forests. Coordinated delivery of classroom sets of field desks made by DNR Volunteers to the following schools between July 31 and December 31, 2012:
    1. Brownsdale School Forest

2. O.H. Anderson School Forest, Mahtomedi
3. New Visions School Forest, Minneapolis
4. Dowling School Forest, Minneapolis
5. American Indian Magnet School, St. Paul
6. Royalton School Forest
7. Concordia Creative Learning Academy, St. Paul
8. Bay View School Forest, Waconia

Final Report Summary June 2013:

In total, 21 site-specific workshops were delivered during this project. All trainings were delivered at the School Forest site and focused on ways to teach outside. Trainings were customized to fit the needs and concerns of each school's staff. Anecdotally, participants seemed to gain the most knowledge from time spent actually doing the activities outdoors (in varying weather), discussing or demonstrating outdoor classroom management, and addressing teacher personal comfort working with kids outdoors. Workshop delivery times varied based on school needs and availability. About half of the sites, 48 percent chose a full day workshop involving six to eight hours of instruction. The remaining workshops were two to four hours in length, typically delivered after school, and had less outside delivery components. Workshops completed since the last progress report were conducted at:

17. Greenway School Forest, Coleraine
18. Oak Grove School Forest, Bloomington
19. Frazee-Vargas School Forest,
20. American Indian Magnet Big Urban Woods School Forest, St. Paul
21. Chaska School Forest

By and large, the trainings were a positive experience for school staff. Evaluations indicate that most participants' comfort levels teaching outdoors increased as a result of their workshop experience. Project Learning Tree, Project WILD, and/or other natural resource education materials were provided at workshops. Being able to leave the training with curriculum materials tied to Minnesota academic standards was of value to participants and will increase the likelihood of teachers replicating the activities with their students. In total, 523 teachers participated in trainings statewide.

Many of the "full day" workshops, consisting of six to eight hours of instruction, were delivered over multiple days. Multi-day trainings allowed teachers opportunities to practice taking student outdoors in between visits from School Forest staff. "More is better" is a guiding principle of professional development. Long-term sustainable

professional development, rather than one-shot workshops, is needed to change teacher behavior and attitudes and ultimately student performance.

The School Forest Summit and regional trainings provided site coordinators from different schools the opportunity to network, share ideas and activities, and respond directly to teaching concerns, such as testing requirements and time limitations.

In total, 100 outdoor education kits were delivered to School Forests. Seventy-five kits were focused on exploring a School Forest using natural resource tools and activities in science, math, and language arts. An additional 25 kits provided activities and resources to explore plants and soils in a School Forest. The outdoor education kits included a variety of tools, materials, and lesson plans to allow teachers to "grab and go" outside with minimal prep time. This need was identified in the School Forest survey and was a focus of the last 25 soil investigation kits developed and distributed in 2013. For teachers new to or unsure about taking students outdoors to learn, the kits provided the opportunity to do an activity with the proper tools, following a lesson plan that meets Minnesota academic standards in math, science, or social studies. Such support pieces allow the teacher to focus prep time on how to best deliver the lesson and not waste time on gathering appropriate tools and materials. All of the 22 new School Forest sites received at least one of the outdoor education kits. All materials distributed in the kits were adorned with the proper ENRTF logo on permanent labels whenever possible. School Forest staff plan to survey School Forest teachers regarding the use of outdoor education kits in the future to better understand the real use of the materials and improve the resources provided.

Result 4: Identify Long-term Sustainability Plan

Description
This project will give staff the opportunity to investigate internal and external options to ensure long-term sustainability for the School Forest Program. Staff will engage leaders from the Division of Forestry and other lead education divisions within the DNR (Parks and Trails, Wildlife, etc.) in discussions regarding strategic support for the program. Staff will meet with external partners to investigate potential government-private partnerships to best support the program, such as universities, environmental education no-profits and foundations.

Summary Budget for Result 4:	**ENRTF Budget:**	**$8,900**
	Amount Spent:	**$ 8,900**
	Balance:	**$** 0

Deliverable	Completion	Budget

	Date	
1. Meet with internal education partners, identify potential "home" for program.	June 2013	$3,000
2. Meet with external partners, identify substantial supporters and potential long-term partnerships to provide for ongoing program support.	June 2013	$1,900
3. Develop a long-term support plan to keep the School Forest Program viable for future generations.	June 2013	$3,000

Result Completion Date: June 2013

Result Status as of January 2011: Not applicable, result 4 added in July 2011.

Result Status as of September 2011:

1. Developed a project definition and plan to establish an internal Forestry Education Transition Group following the DNR Projects System. The group will examine options for an internal home for School Forest and Project Learning Tree. While both programs are highly valued within the DNR, the Division of Forestry is focusing efforts on core programs that are not specific to education.

2. Preliminary discussions with U.S. Forest Service staff were had regarding the future of the School Forest Program.

3. No activity

Result Status as of July 2012:
1. Continued internal conversations regarding options for School Forest and Project Learning Tree Program. Formal project scoping options has not begun yet.

2. No additional activity. Anticipate activity on deliverable during next reporting period. Majority of staff time has been dedicated to Goals 1-3, in keeping with teacher needs and interest.

3. No activity. Anticipate activity on deliverable during next reporting period. Majority of staff time has been dedicated to Goals 1-3, in keeping with teacher needs and interest.

Result Status as of December 2012:

1. Continued discussion with Division of Forestry Management Team regarding short-term funding options and long solutions to support School Forest and Project Learning Tree programs. Submitted two grant applications as short-term funding options.

2. No additional activity. Majority of work under this result has been focused on deliverable 3.

3. Coordinating solutions to potential land ownership changes as a result of Minnesota State Statute 282. This statute addresses conveyance of tax-forfeited parcels. Recent changes to *M.S. 282* have resulted in the following challenges to the School Forest Program:

- All tax-forfeit conveyed land owned by a governmental sub-unit (e.g. city or school) for at least 30 years shall be considered held in free clear title as of January 1, 2014.
- All tax-forfeit conveyance – for any reason – must be sold at market value.
- Revertor restrictions requiring tax-forfeit conveyed lands returning to county were removed.

There are 44 existing School Forest parcel affected by *M.S. 282*, and one project currently on hold as a result of the changes.
The changes to *M.S. 282* present the following challenges to long-term School Forest viability:

- Of the 44 existing tax-forfeit conveyed School Forest parcels, 38 will have no restrictions, obligations, or revertors on January 1, 2014 because they have been owned by the school district for at least 30 years. This means the school district can whatever they like with the land, but the sites in jeopardy.
- Looking to the future: County Boards are hesitant to convey any land to a school district if they will own clear title to the land (no restrictions or revertors) after 30 years. This means a district could sell the land or build on it as they see fit.
- School Districts will have to pay market value for future School Forest parcels, instead of the previous nominal processing fee.

The School Forest Program manager has been leading a DNR effort to fix the misintended changes to *M.S. 282.* Changes to *M.S. 282* and *M.S. 89.41* (School Forest statute) are anticipated during the spring 2013 legislative session.

Final Report Summary June 2013:

Throughout the course of discussions with internal and external partners, the School Forest Program was identified as a high-value education program – something that is unique to Minnesota, provides maximum benefit for natural resource education, and is applicable to all students. Such discussions furthered the DNR's interest in retaining the School Forest Program. Moving forward, the DNR will continue to support the School Forest Program within the Division of Forestry.

Statutory concerns regarding tax-forfeited parcels were resolved and appropriate changes to *Minnesota Statutes,* chapters 89.41 and 282.01 were made. Note: ENRTF funding was not used to support legislative interaction on this activity.

V. TOTAL ENRTF PROJECT BUDGET:

Estimated amounts for deliverables are listed below. Amounts may vary per deliverable/task but will not exceed total budget for the category.

Personnel: Total: $240,250
School Forest Program Manager, salary and benefits: 0.75 FTE for 2 years = $95,900
School Forest Specialist, salary and benefits: 1 FTE for 2 years = $118,000
School Forest Specialist, salary: .75 FTE for 1 year = $26,350, remainder of salary provided by DNR

Equipment/Tools/Supplies: Total: $51,950
20 Site Specific Workshops and Specialized Trainings and focus groups: $11,700
Includes: PLT, WILD, and WET guides, handouts, teaching supplies for facilitator (field guides, thermometers, etc.)
1 Multi-day residential School Forest Course: $13,500
Includes: overnight expenses (lodging and food), curriculum guides, handouts, teaching supplies for facilitators (increment borer, clinometers, etc)
100 Outdoor Education Kits: $26,750
Includes: bin, lesson plans, and teaching tools to conduct lessons (magnifying glasses, diameter tapes, thermometers, etc.)

Acquisition (Fee Title or Permanent Easements): $ 0

Travel: $7,000 in Minnesota
Travel expenses for DNR staff to: meet with school staff and administration, school boards, and School Forest Committees regarding startup and maintenance of site; site-specific workshops; specialized trainings; and setup and delivery of multi-day School Forest course.
Travel includes food and lodging estimates, where appropriate for overnight trips to meet with schools a great distance from office. Majority of travel cost is mileage.

Additional Budget Items: $800
Other Direct Costs: $800
Booth fees to attract new schools to the School Forest Program: $100
Mailing for distribution of outdoor education kits, lesson plans, etc.: $700

TOTAL ENRTF PROJECT BUDGET: $300,000

Explanation of Capital Expenditures Greater Than $3,500:

VI. PROJECT STRATEGY:

A. Project Partners:

Staff from the University of Minnesota Extension Service, Minnesota Pollution Control Agency, the Minnesota Association for Environmental Education, and many environmental learning centers will assist with delivery of workshops and trainings. City, county, and U.S. Forest Services natural resources staff will assist with School Forest site development and maintenance. Over 100 Minnesota school districts will participate in the project to provide local on-site support and site management. This request does not include funding for these partners.

B. Project Impact and Long-term Strategy:

This project provides a solution to nature deficit disorder. Approximately 28,000 students and 1,200 teachers throughout Minnesota will have frequent outdoor learning experiences in nearby nature. Students will learn core subjects (math, science, social studies) through the lens of nature in their School Forests. Repeat visits to School Forests will promote a sense of identity in and connection to nature for both students and teachers, thus creating current and future natural resource stewards.

The School Forest Program began in 1949, through a legislative statute. The Minnesota DNR has invested many resources into the creation and maintenance of School Forests throughout the state and plans to continue to provide support for decades into the future. All School Forests served and created through this project will be able to rely on the DNR as a backbone of program support. The DNR has committed to providing the following services to all School Forests in good standing:

- Support mailings
- Forester and education staff assistance
- Education materials and workshops for teaching outdoors
- Program Web site and handbook
- Natural Resource Stewardship Plans
- Forestry education updates & other communication
- Conference or other networking/development opportunities

In addition, the School Forest Program model establishes strong local School Forest Committees that will provide site support for many years to come. By entering the School Forest Program, schools commit to the following responsibilities:

- Conduct at least 5 educational activities annually
- Submit an annual report
- Provide a School Forest Committee and Site Coordinator
- Provide appropriate funding to support site activities
- Follow recommendations outlined in Stewardship Plan
- Designation of site land use for outdoor classroom purposes
- Secure ownership of land or a management agreement with land owner indicating conditions of use that meet School Forest Program criteria

In Summary, DNR and local school staff and School Forest Committee members work together to keep the site running and ensure children are experiencing nature.

C. Other Funds Proposed to be Spent during the Project Period:
DNR In Kind

DNR Web Support (.15 X 2 yrs)	$24,375.00
DNR: Natural Resources Stewardship Education Coordinator (.10 X 2 yrs)	$16,250.00
DNR Ed Staff (.15 X 2 yrs) curriculum & workshop delivery	$24,375.00
Local DNR Staff (.06 X 2 yrs) site management & land acquisition	$ 10,000.00
Contract consultant foresters site management & stewardship plans	$10,000.00
Teacher Support Teacher substitute stipends, school forest conference/summit expenses, additional school forest course expenses	$20,000
Forestry Management Staff (.05 X 2 yrs) Support for Result 4	$8,125
DNR For Ed Staff (.5 X 1 yr)	$ 40,625.00
Travel	$10,000
Printing	$500
Booth fees	$500
School Forest Specialist (.75 X 1 yr)	$10,000
DNR In Kind	**$174,750**

DNR Goverance & Shared Services **$50,375.00**
(1.75FTe X $81250/FTE X 2 yrs) - ($234000 grant salary covered)
Actual DNR Goverance & Shared Services as of September 2011 $22,181.00

Other In Kind **$110,000.00**

School, community, business, parent support
($50/hour X 100/hrs/site X 22 sites)

D. Spending History: None

VII. DISSEMINATION:

This project will expand and enhance the Minnesota School Forest Program Web site (www.mndnr.gov/schoolforest). Information and tools created by the project will be available at this Web site.

Presentations at 2 state and 1 national education conferences are planned.

Results will be promoted to the public through news releases. Targeted articles for educators and natural resource staff promoting and explaining the project will be submitted to appropriate education and natural resource magazines and newsletters.

Status as of January 2011:

1. Let's Focus on EE Workshop, Miltona, MN August 16, 2010. One-hour "How to Set Up an Outdoor Classroom" presentation to approximately 40 people.
2. National Green Schools Conference, Minneapolis, MN October 12-16, 2010. One-hour "Outdoor Classrooms and School Forests" presentation to approximately 30 people. School Forest booth exhibit providing interaction with over 700 people. Event provided a good opportunity to show case outdoor classrooms in front an audience that traditionally thinks of "green education" as just green buildings and energy! School Forest booth exhibited at full conference.

Status as of September 2011:

1. Minnesota Science Teachers Conference, Mankato, MN, April 1, 2011. One-hour "How to Set Up an Outdoor Classroom" presentation to approximately 15 people. School Forest booth exhibited in conjunction with DNR Education booth at full conference.
2. Midwest Environmental Education Conference, Rochester, MN, April 9, 2011. One-hour "Meeting Outdoor Classroom Challenges" interactive session designed to engage teachers at existing School Forests in a problem-solving dialogue around common outdoor classroom challenges. Session attendance: 12. School Forest booth exhibited in conjunction with DNR Education booth at full conference.
3. "Big Urban Woods Will Be Outdoor Classroom" article in St. Paul Pioneer Press, April 22, 2011.

Status as of July 2012:

1. Education Minnesota, St. Paul, MN October 2012. One-hour "Outdoor Classrooms" presentation to approximately 25 educators. School Forest booth exhibited in conjunction with MN DNR booth.

2. Minnesota Association of Agriculture Educators/FFA Conference, January 2012, St. Cloud, MN. Two-and-a-half hour "Forestry and Outdoor Classrooms" workshop presented to approximately 70 middle and high school teachers.
3. Minnesota Science Teachers Association Conference, March 2012, Duluth, MN. One hour "How to Set up an Outdoor Classroom" presentation to approximately 50 people. School Forest booth exhibited in conjunction with MN DNR booth.
4. Minnesota Association for Environmental Education Conference, June 2012, Itasca State Park, MN. Conference opening session to approximately 100 people. School Forest booth exhibited.

Status as of December 2012:

1. Education Minnesota Conference. Oct 18, 2012. Presented "Teaching Outdoors: Getting Started," a one-hour presentation, to approximately 60- teachers. Booth exhibited in conjunction with DNR Education booth.
2. St. Paul Public School teachers attending Outdoor Education course at Belwin Environmental Learning Center, August 2012.
3. Environmental and Outdoor Education workshop at Como Park, August 2012. Support for Minn. Dept. of Education current ENRTF grant on Outdoor and Environmental Education.
4. Newport Bailey School Forest constructed an outdoor teaching pavilion and sponsored a fun walk. Coverage appeared in the *South Washington County Bulletin* on September 18, 2012.
5. An article, "School Forest Adapts to Forces of Nature," appeared in the *Bemidji Pioneer* on August 3, 2012. The story focuses on how the Horace May School Forest is cleaning up after the July blowdown.
6. Governor Dayton highlights the School Forest Program as one of 11 big accomplishments that helped students and teachers achieve the education and skills needed to succeed in a global economy. December 2012.
7. Press releases distributed for Glacier Hills School Forest Nov.15, 2012, Oneka-Hugo School Forest March 5, 2012, Crossroads School Forest August 15, 2012.
8. Rob Marohn was awarded 2012 Formal Environmental Educator of the Year from the Minnesota Association for Environmental Education. Mr. Marohn was nominated by School Forest program staff-- much of the award was based on his efforts to advance the Bay View School Forest. Coverage of this award and Rob's work appeared in School Forest and MAEE communications, the *Proctor Journal* on February 27, 2012.
9. *White Bear Press* featured an article on February 14, 2012 about students participating in a horse-logging demonstration at the O.H. Anderson School Forest in Mahtomedi.

10. "Volunteers Deliver Field Desks to Pine River-Backus," appeared in the *Lake County Echo* and *Pine City Journal* on May 2, 2012. Volunteers constructed and delivered 25 field desks to use in the Pine River-Backus School Forest.
11. UPM Blandin and Lion's Club plant over 5,000 tree seedlings with area fourth graders *Grand Rapids Herald* May 2012.
12. "School Forest Takes Shape," appeared in the *Quad City Press* on April 24, 2012. This article focused on students planting trees at the Centennial School Forest in Lino Lakes.
13. "Oneka Establishes a School Forest" appeared in the *The Citizen* on March 14, 2012 and on the KSTP website on March 8, 2012.

Final Report

Activities and events from this project were covered in dozens of articles and website postings/blogs, and presented at several education conferences. The listings included in this section are not exhaustive, but represent major dissemination activities. Below is a list of dissemination activities between January-June 2013.

1. Outdoors notes: Seeing the forest and the trees," *The Post-Bulletin, Rochester,* Jan. 3, 2013.
2. "DNR touts its school forest success rate," *DL-Online*, Jan. 4, 2013.
3. "Duluth fifth-graders develop official school forest," *Duluth News Tribune*, Jan. 15, 2013.
4. "School Forest sought for Lester Park School in Duluth," *Duluth News Tribune*, Jan. 16, 2013.
5. Karl Kaufmann awarded "Formal Environmental Educator of the Year" from the Minnesota Association for Environmental Education. Mr. Kaufmann was nominated by School Forest program staff because of his work running the Pillager School Forest. Coverage of this award and Karl's work appeared in School forest and MAEE communications, and the *Staples World* and *Crow Wing Current*, March 7, 2013.
6. "Crossroads Elementary Makes Como Woods 'Outdoor Classroom'," *Midway Monitor,* April 2013.
7. "Edgewood Middle School Establishes 125th Minnesota School Forest," *KSTP.com,* June 4, 2013 and *Minnesota Ag Connection*, June 6, 2013.
8. "Jefferson's School Forest grows with help from students, Target, DNR, Smokey Bear," May 9, 2013, *Anoka-Hennepin School District*
9. "Mountain Iron School Forest Established," *WDIO.com,* May 31, 2013.
10. "Edgewood Middle School celebrates School Forest," *Sun-Focus*, June 18, 2013
11. 4th graders learn about forest management, *Stewardship newsletter,* Minn. Department of Natural Resources, Spring 2013

12. "What Teachers Need to be More Active in the School Forest Program," session presented at Minn. Assn. for Environmental Education Conference, June 14, 2013
13. "School Forests: Outdoor Classrooms for Schools" learning lab presented at National Agriculture in the Classroom Conference, June 28, 2013.
14. "20-minute interview about Bailey School Forest," *River Cities June 2013*, South Washington County Telecommunications.

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than January 2011, September 2011, July 2012, and December 2012. A final work program report and associated products will be submitted between June 30 and August 1, 2013 as requested by the LCCMR.

IX. RESEARCH PROJECTS: N/A

Attachment A: Budget Detail for 2010 Projects

Project Title: Expanding and Strengthening Outdoor Classrooms at Minnesota Schools

Project Manager Name: Amy Kay Kerber

Trust Fund Appropriation: $ 300,000

2010 Trust Fund Budget	Revised Result 1 Budget April 11, 2013	Amount Spent as of June 30, 2013	Balance June 30, 2013	Revised Result 2 Budget April 11, 2013	Amount Spent as of June 30, 2013	Balance June 30, 2013	Revised Result 3 Budget April 11, 2013	Amount Spent as of June 30, 2013	Balance June 30, 2013	Result4 Budget:	Amount Spent as of June 30, 2013	Balance June 30, 2013	TOTAL BUDGET	TOTAL BALANCE
	Develop and enhance School Forest networking opportunities and support services statewide.			Establish 15 new School Forest sites throughout Minnesota.			Integrate outdoor environmental education activities into school curricula.			Identify Long-term Sustainability Plan				
BUDGET ITEM														
PERSONNEL: wages and benefits														
School Forest Program Manager (.75 FTE)	21,500	21,500	0	45,000	45,000	0	21,500	21,500	0	7,900	7,900	0	95,900	0
School Forest Specialist (.9 FTE)	24,000	24,000	0	61,000	61,000	0	32,000	32,000	0	1,000	1,000	0	118,000	0
School Forest Specialist (.75 FTE, 1 year)	10,000	10,000	0	6,350	6,350	0	10,000	10,000	0	0	0	0	26,350	0
Other direct operating costs														
Mailing: distribution of grant products	0			0	0		700	700	0	0	0	0	700	0
Booth Space at Education Events	0			100	100	0	0			0	0	0	100	0
Printing				0	0		0			0	0	0	0	0
Supplies *(list specific categories)*														
Site-Specific Workshops and Focus Groups	2,000	2,000	0	0	0		9,700	9,700	0	0	0	0	11,700	0
School Forest Course	0			0	0		13,500	13,500	0	0	0	0	13,500	0
Outdoor Education Kits	0			0	0		26,750	26,750	0	0	0	0	26,750	0
									0					
Travel expenses in Minnesota	1,500	1,500	0	2,600	2,600	0	2,900	2,900	0	0	0	0	7,000	0
COLUMN TOTAL	**$59,000**	**$59,000**	**$0**	**$115,050**	**$115,050**	**$0**	**$117,050**	**$117,050**	**$0**	**$8,900**	**$8,900**	**$0**	**$300,000**	**$0**

Minnesota School Forest
2012 Survey Report

April 2013

Funding for this project was provided by the Environment and Natural Resources Trust Fund.

Introduction

A School Forest is an outdoor classroom where preschool through high school students learn core subjects, such as math, science, social studies, through the lens of the natural world. There are 120 School Forests in Minnesota, comprising over 7,000 acres of land with over 30,000 students and 2,000 teachers participating annually in outdoor education activities. (December 2012). Each site has at least one designated site coordinator who is responsible for main communication with the School Forest Program, managing site activities, and completing the annual report.

To better serve School Forests, in September 2012 a survey was administered to investigate site coordinators' needs related to School Forest committees, land management, administrative support, and teacher engagement. The survey also researched the importance of resources provided in the School Forest Program's website and monthly e-newsletter. School Forest Program staff sought to gather information to improve program resources to better meet the needs of School Forests around the state and to determine differences based on location (urban or rural), grade level, and newness to the program (less than five years).

Demographics

Of the 122 site coordinators[1] who were emailed, 66 began the survey. Six completed less than half of the survey leaving a total of 60 complete surveys, a response rate of 49 percent. Respondents reported their school community location as 62.7 percent rural and 37.3 percent urban/suburban[2] (n=58); 76 percent of sites had been in the School Forest Program for more than five years, while 24 percent have been in the program less than five years (n=59). Half of the respondents considered their schools to be Pre-kindergarten/elementary and the other half middle/high school level (n=58).

The survey population was similar to the total population of School Forest sites. Based on current program enrollment data, the total population consists of 120 sites with 124 site coordinators. Currently 68 percent of sites are located in rural areas and 32 percent are urban. 82 percent of sites have been in the program more than five years, and 18 percent less than 5 years. 54 percent are primarily Pre-kindergarten through eighth grade elementary schools, 45.2 percent are primarily middle/high schools, and 0.8 percent are Universities.

[1] At the time of the survey there were 119 School Forest sites. Three sites were Kindergarten through twelfth grade schools, which had two site coordinators; one for elementary and one for high school, for a total of 122 main site coordinators.

[2] For the purposes of our study the 14 suburban and 8 urban schools were combined for data analysis and will be referred to as urban schools.

Newsletter

Respondents prefer to have the newsletter sent electronically by e-mail (91.7 percent). A majority prefer it continues to come once a month (70 percent). Most coordinators think the newsletter has importance with 60.4 percent saying it is important to very important and 38.3 percent somewhat important. Only two responded it had little to no importance.

Of the e-newsletter features, coordinators were asked to identify the resources of most interest excluding activities and grant information (Figure 1). Web statistics, site coordinator comments, and other evaluations have indicated these two areas are of high interest. Thus activities and grant info have been, and will continue to be, a major part of program resources and offerings. Most site coordinators valued the *Resources* section of the e-newsletter (80 percent). The *Resources* section contains information on teaching tools, curriculum, and technologies that can enhance outdoor and natural resource education. Information on teacher trainings and general program information were ranked next highest (48.3 percent). In another question, which asked site coordinators what features were of least interest, 50.9 percent chose *Question of the Month,* which was over 20 percent higher than any other feature.

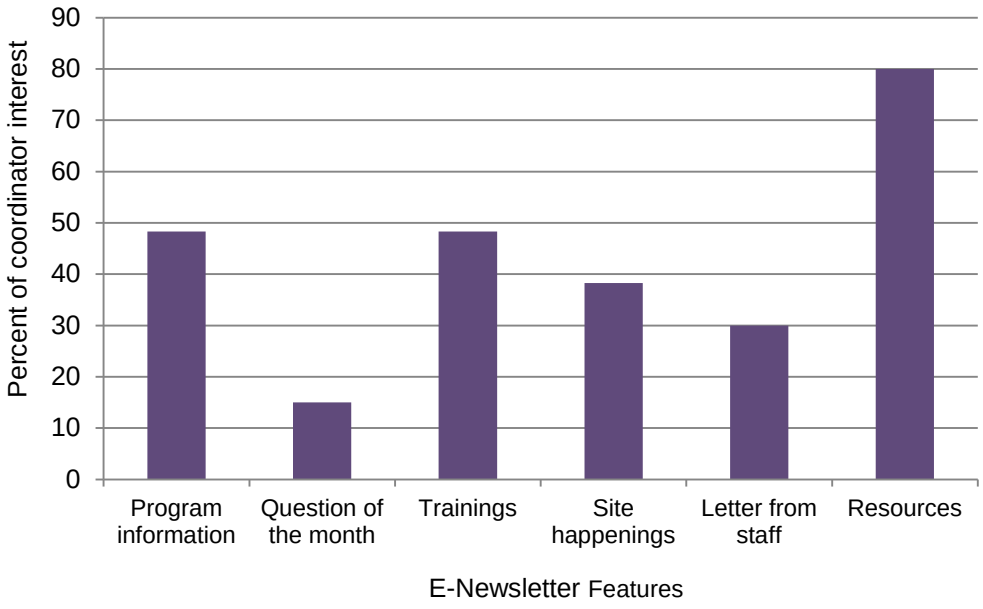


Figure 1. E-Newsletter Features by Coordinator Interest

Newsletter Conclusions and Recommendations

- The newsletter is valued and should continue to be sent monthly by email.
- *Question of the Month* is of least interest and should be removed.
- The *Resource* section is of high interest/importance and high investment in development should continue.

- Teacher trainings and general program information are also of high interest to site coordinators and should continue to be invested in.

Website

Most site coordinators are using the website five or less times per year (Figure 2). Of the seven respondents who did not visit the website, four stated they did not know about it (three of those noted they were new in the program). Another three participants wrote they did not have time to use the website. The *Coordinator's Section* password protection rarely or never prevents coordinators from accessing it (67.3 percent). Only 6.9 percent have trouble accessing this secured section of the website often (n=58).

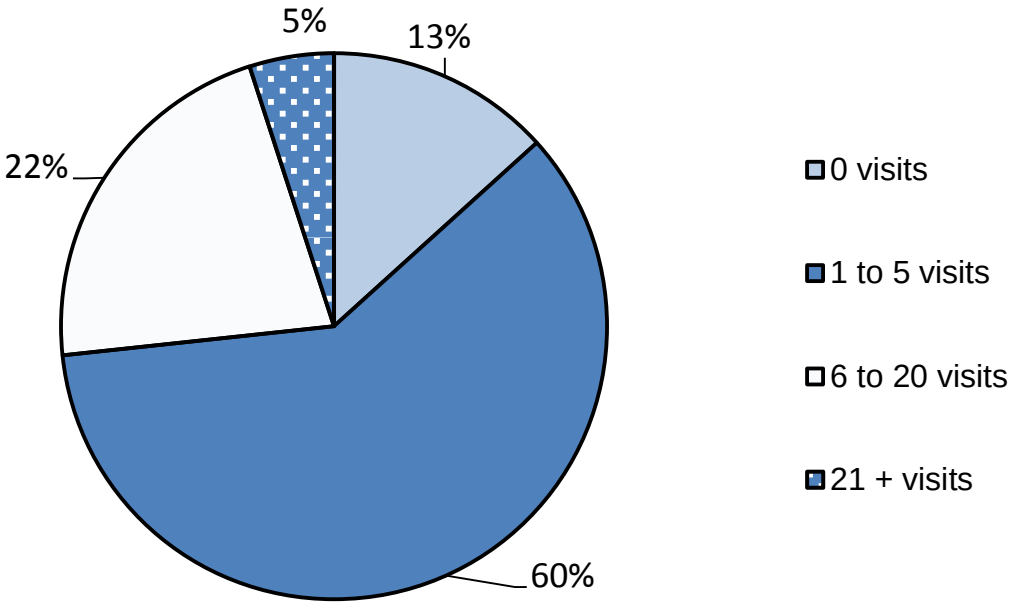


Figure 2. Coordinator Reported Visits to the School Forest Website from September 2011-September 2012

When using the website, most coordinators (71.2 percent) are seeking outdoor education activities (Figure 3). Over half are using it to gather information on Minnesota trees and forests (59.6 percent) and grant opportunities (55.8 percent). Five coordinators wrote in features that were hard to find/not on the website noting: animal and plant identification, high school curriculum, more wide-ranging activities, and connections to standards and research. It is worth noting that at the time of the survey, the School Forest website did not have a Minnesota forest and trees or site features section. School Forest staff

felt both of these sections were of interest to program participants based on conversations and workshop evaluation comments, and thus they were included in the survey.

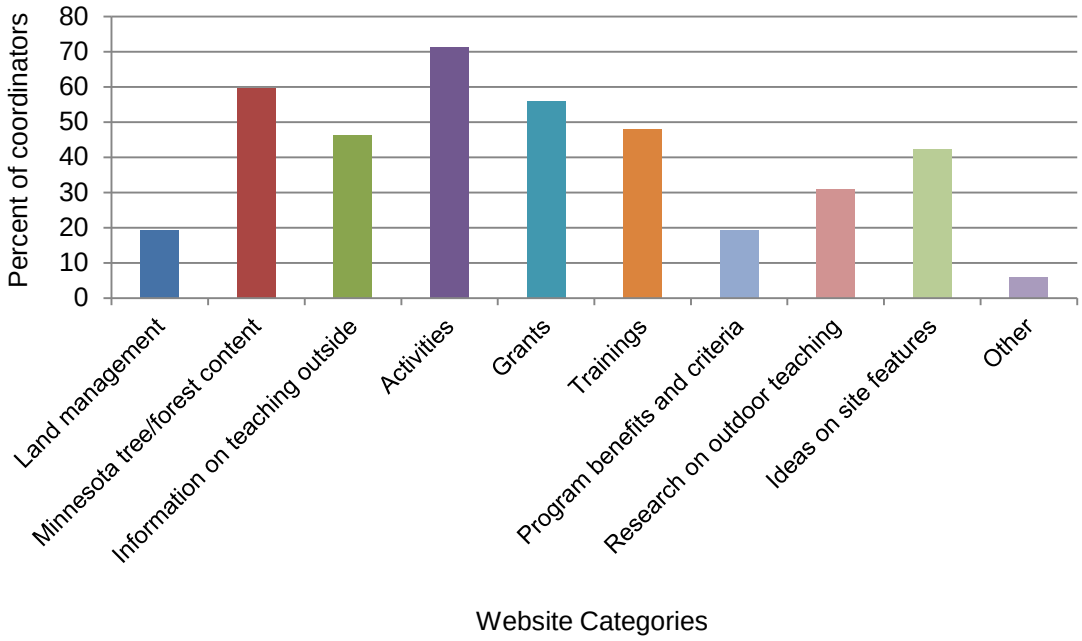


Figure 3. Popular Website Categories

When asked what else they would like to see on the website, seven coordinators mentioned activities and curriculum including "…Any MN native American resources…to help with new common core English…," geocache and tree inventory curriculum. Two mentioned having contact information for people. Another two stated the desire for more Minnesota tree and forest information. Two noted site features or happenings and one coordinator mentioned wanting photography of students and stakeholders.

Compared to rural School Forests, site coordinators from urban School Forests had a higher percentage that used the website in these areas: how to teach outside, program benefits, and land management (Table 1).

Table 1. Difference Between Rural and Urban Site Coordinators Use of School Forest Website.

Information on the website	Percent of urban coordinators	Percent of rural coordinators	Percent Difference
Land management issues	27.3	10.8	16.5
Information on how to teach outside	63.6	27	36.6
Program benefits and criteria	31.8	8	23.8

More site coordinators from new School Forests used the website to gather information on program information and trainings, while site coordinators at established School Forests had a higher percent interested in Minnesota tree/forest content and research (Table 2).

Table 2 Difference Between New and Established School Forest Site Coordinator Use of School Forest Website.

Information on the website	Percent of established sites	Percent of newer sites	Percent Difference
MN tree/forest content	64.9	38.5	26.4
Trainings	45.9	61.5	15.6
Program benefits and criteria	10.8	38.5	27.7
Research that supports outdoor teaching	37.8	15.4	22.4

Website Conclusions and Recommendations

- The password protection does not prohibit a majority of site coordinators, but should be communicated frequently to new site coordinators.
- Most site coordinators are using the site to find activities, Minnesota tree/forest information and grant opportunities. The *Activity Board* and *Grant* sections should be updated. A survey to determine what Minnesota tree content teachers are looking for should be done to help develop a new website section.
- Almost half of coordinators are looking for information on how to teach outside and teacher trainings. Development and updates should continue in these areas.
- The features teachers are looking for and could not find on the website, or features that have a limited amount of information are: Minnesota tree and forest information, site features (benches, trails, amphitheaters, etc.), and activities/lessons. These should be taken into consideration for future website development.

Teacher Engagement

Site coordinators estimated the percentage of teachers using the School Forest, which ranged from 0 to 95 percent (mean = 28.5 percent, median = 20 percent). Elementary schools (39.1 percent) have a higher percentage of teachers using the forest compared with middle/high schools (17.2 percent) – almost a 22 percent difference between the two groups. When asked to choose the top three barriers that keep teachers from using the site 58.3 percent responded “don’t know what to do out there” and 48.3 percent chose “first-timers fear” (Figure 4). Administrative support was the lowest perceived barrier (5 percent). Rural site coordinators chose “distance to School Forest” almost twice as often as urban schools. It is worth noting, that school consolidations and location of available tax-forfeited land for School Forest establishment, has left many rural School Forests 5-20 miles removed from their current school buildings.

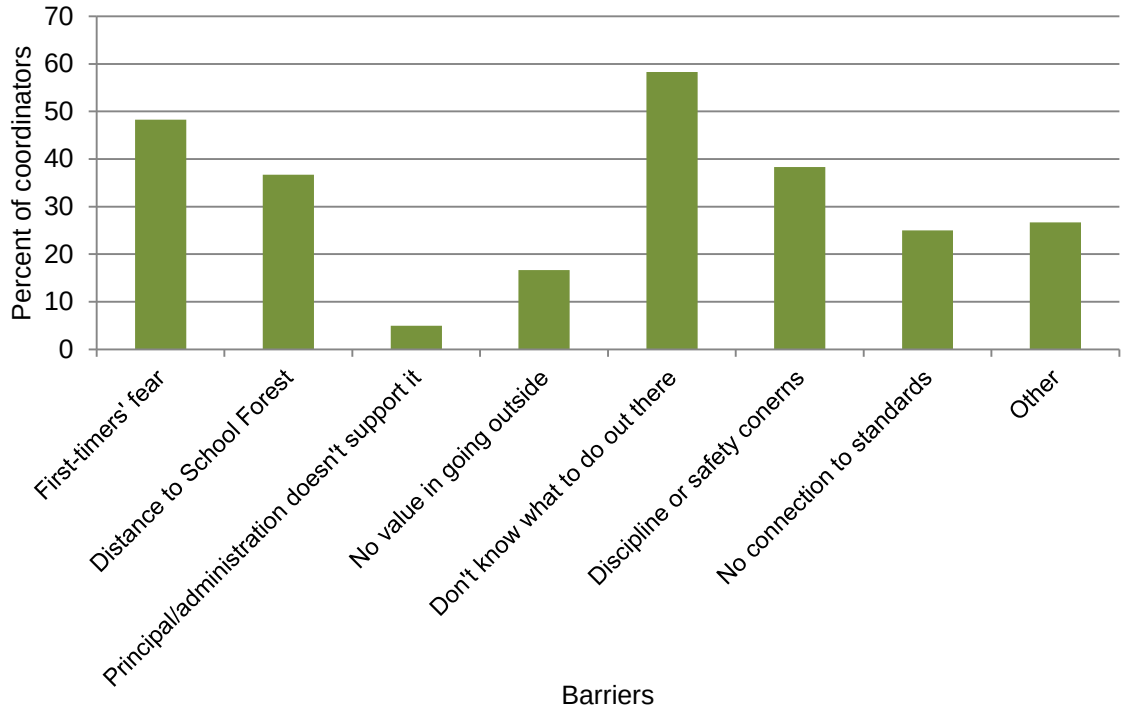


Figure 4. Coordinator's Perception of Barriers to Other Teachers Using the School Forest

Sixteen coordinators wrote in a barrier. Most of the responses were time related (10). Two mentioned that working outside was new to their teachers. There was one comment on all of the following: cost of bussing, poison ivy, logistics, not being easy, "only biologists use it," need more activities, and they're working alone.

Resources to encourage teachers to use the School Forest were ranked by importance (Table 3). Ready-made activities came in first, followed by a naturalist co-leading lessons, and activity correlations with academic standards.

Table 3. Resources to Encourage Teachers to Use School Forests

Total score is the sum of all weighted rank counts found using a weighed calculation. Items ranked first are valued higher than following ranks.

Resources to encourage teachers	Total Score	Overall rank
Ready-made activities to do outdoors	340	1
A naturalist to co-lead a few lessons with teachers	260	2
Activity correlations with academic standards	246	3
Site-specific School Forest workshop with outdoor activities	219	4
Better site features: trails, signs, outdoor seating, etc.	190	5
A walk in the woods for teachers led by School Forest staff	149	6
1-2 hour presentation by School Forest staff at a staff meeting	128	7

Coordinators were asked about additional ideas on how to engage teachers. Twenty six responded with topics including: workshop/training (5), help getting teachers outside (3), paid time off to work on School Forest (2), assisting with individual teachers' classes (3), help understanding of how outdoor activities correlate to standards (3), activities and new ideas (2), and more research (2), connections to local individuals (2), administrative support (1), and committee involvement (1).

Coordinators responded that 97 percent of School Forests have teachers using the forest with students. One school responded no one was using the School Forest and another school only had the community using it. Urban sites have a higher percentage of community members (difference of 21.5 percent) and a lower percentage of students using it on their own time (difference of 13.2 percent) (Figure 5).

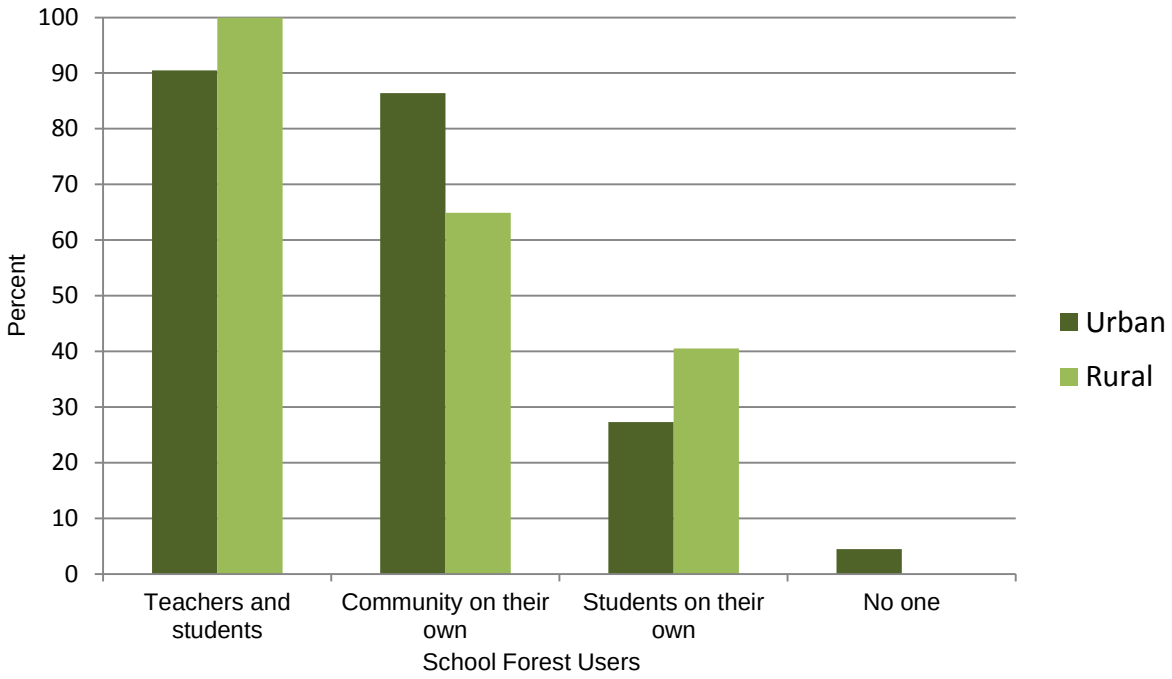


Figure 5. School Forest User Types at Time of Survey

Teacher Engagement Conclusions and Recommendations

- Middle/high schools have a lower percentage of teachers using the forest. The program should continue to develop and obtain higher skilled activities to provide on the *Activity Board* and during workshops, and investigate ways to encourage middle/high school teacher participation.

- Site coordinators perceive the biggest barriers to teachers using the School Forest is not knowing what to do and first-timers' fear. These should be addressed through workshop, newsletter, and website pieces.
- Principal/administration support was the lowest perceived barrier. The program should continue with its current assistance of schools on a case-by-case basis.
- Distance to the forest, discipline, and safety concerns were also high and should be addressed.
- The top three resources to engage more teachers were: Ready-made activities, a naturalist co-leading lessons, and activity correlations with academic standards. Activities and activity correlations should continue to be invested in. The program should consider the naturalist idea and how best to approach schools on the feasibility and necessity of this resource.

Administration

A five point Likert-scale was used to determine administration knowledge and support of the School Forest (1 being knowledgeable or supportive and 5 being not at all). Principals' knowledge of the School Forest site had an average of 2.9 (σ =1.2), mostly neutral with only 37.3 percent of coordinators selecting above neutral for knowledge. However, principals' support had an average of 1.8 (σ =1) showing most coordinators (72.9 percent) thought that principals had above neutral support for the School Forest. Superintendents were scored similarly. Their knowledge had an average of 2.9 (σ =1.1) with only 44.1 percent of coordinators choosing above neutral on knowledge. Superintendent's support had an average of 2.0 (σ =1.2) with 74.6 percent choosing an above neutral score. Compared with rural schools urban superintendents had a lower knowledge and support.

Administration Conclusions and Recommendations

- Site coordinators perceived both principals and superintendents to have higher support than knowledge of the School Forest. New ways to increase knowledge of the program to administration should be considered.
- Urban superintendents are perceived to have a lower level of knowledge and support compared with rural superintendents. This might be attributed to the larger number of schools within urban school districts.

Site Management

Resources to help coordinators become better land managers were ranked in order of importance. Site visits from a forester focused on management advice came in first (Table 4). It was followed by "connections to groups/people who can help manage land" and "help clearing trails, removing invasives, building benches, etc.," third. Urban sites ranked stewardship plans second, much higher, compared with rural sites, which ranked it sixth. Newer schools ranked committees second while more established schools ranked them fifth. "Help with maintenance" was ranked third by older schools, compared to a ranking of seventh for newer schools.

Table 4. Land Management Resource Needs

Total score is the sum of all weighted rank counts found using a weighed calculation. Items ranked first are valued higher than following ranks.

Land management resources	Total score	Overall rank
Site visits with a forester focused on management advice	300	1
Connections to groups/people who can help manage	293	2
Help clearing a trail, removing invasives, building benches, etc.	258	3
Tools (weed wenches, chainsaws, brush hogs, etc.)	253	4
Active and engaged School Forest committee	249	5
Stewardship/Management plan	246	6
Skill training (feeling trees, removing invasives, cutting trails, etc.)	193	7
Web resources on site management specific to School Forest	191	8

When asked what other land management needs they have, six coordinators wrote about forestry assistance including: timber stand improvement, logging, changing the tree population, surveying the boundaries, maintenance, and removal of invasive species. Two mentioned assistance with site issues: vandals and dogs. Another two wrote about needing tools and materials. There was also one mention for each of the following: working with stakeholders, needing to look into their plan, and understanding legal and management responsibilities.

When choosing the top three resources for assisting School Forest committees, 56.1 percent of coordinators reported online resources would be most important (Figure 6). Almost half chose "training/support on leadership and committee management" (49.1 percent) and "going on a tour/walk in the School Forest" (45.6 percent). Six coordinators wrote in responses including: time (2), money (1), help re-establishing (1), School Forest staff available as a resource (1), and too new to know (1). There was a greater number of urban sites that chose School Forest staff "sitting in on a committee meeting" (21 percent more) while more rural chose "presenting specific content at a meeting: hunting, activity ideas, land management" (14 percent more). Preferences for rural sites to choose presenting specific content more than urban sites may have been due to the content options listed in the survey. Urban audiences wouldn't be in need of content delivered on hunting or land management like rural sites would.

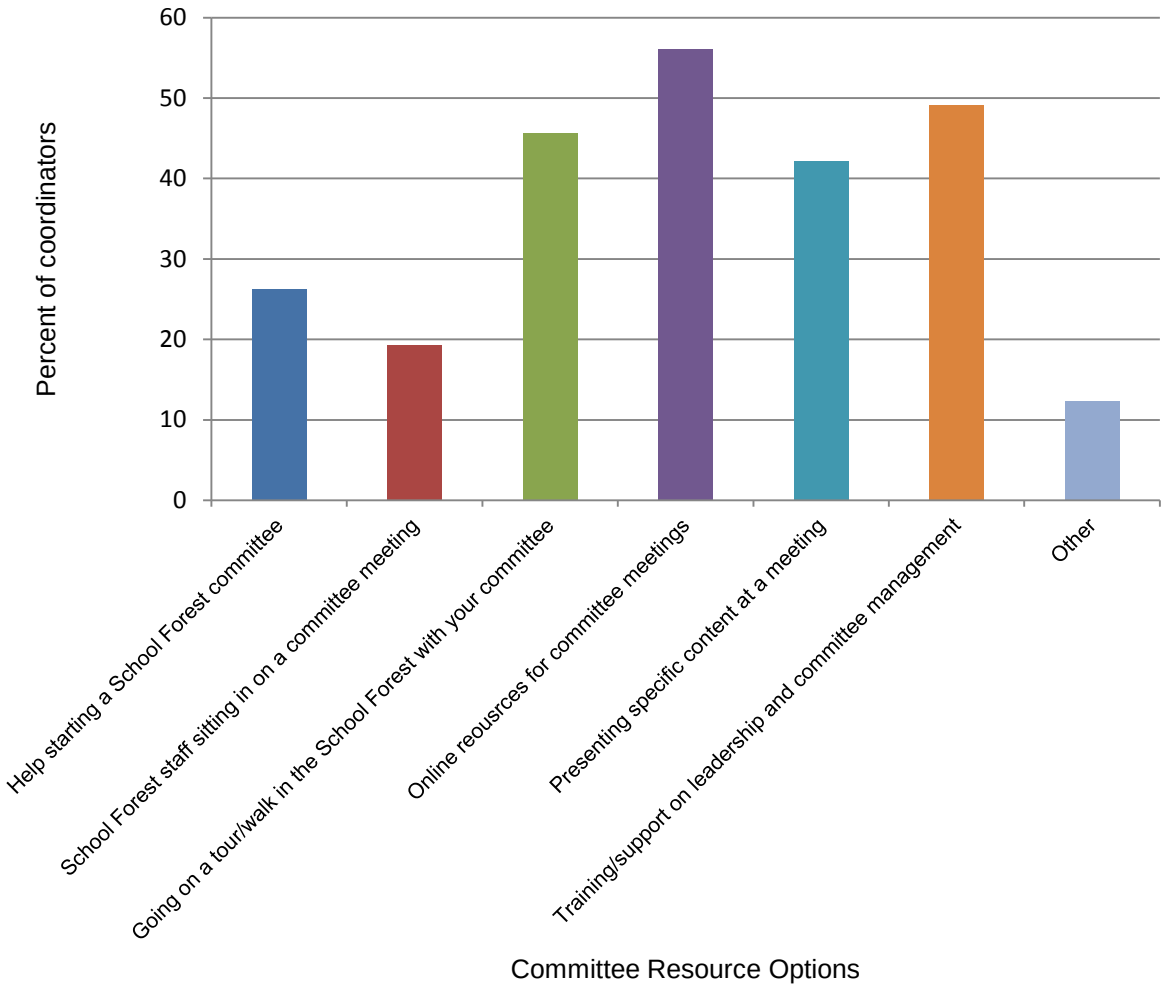


Figure 6. Coordinator Preferences for Committee Resources

Site Management Conclusions and Recommendations

- The highest ranked resources to support land management were: site visits with foresters focused on management advice, connections to groups/people who can help manage, and help clearing a trail, removing invasives, building benches, etc. The program should think of ways to best create connections to foresters and groups/individuals who can help with management.
- Urban sites ranked stewardship plans higher than rural sites. Most of the urban sites are newer and do not already have stewardship plans. The program should consider how best to meet the needs of a growing number of urban sites.
- Newer School Forests consider committees to be more important for land management compared with more established schools. Development of the website to contain more committee information should be considered.

- “Help with maintenance” was ranked higher for more established schools. The best way to connect schools with natural resource groups and professionals who can help with site maintenance should be invested in.
- “Online resources”, “training/support on leadership and committee management”, and “going on a walk/tour of the School Forest with your committee” were the top three choices for assisting School Forest committees. The program should provide more online resources, think of ways to provide training and support for committee management, and continue to invest in visits with School Forest committees.
- Both urban and rural site coordinator responses indicated interest in School Forest staff participating in School Forest committee meetings – either just sitting in on a meeting or presenting specific content. Continued investment in site visits should continue, but with an emphasis on attending School Forest committee meetings instead of meeting with the site coordinator alone. The program should have specific presentation options for both urban and rural sites.

Minnesota School Forest 2012 Survey Report Conclusions and Recommendations

April 2013

The School Forest Program wanted to determine how to best meet the needs of the many sites around the state. Through the 2012 September survey recommendations on how to invest time and resources were found. The newsletter was valued by site coordinators and should continue to be sent once a month, by email. *Question of the Month* ranked lowest in importance, and will be removed to allow time to invest in other more valued sections. The *Resources*, *Trainings for Teachers,* and general program information were all of high interest and investment in these areas should continue.

Although most site coordinators are only visiting the website less than five times a year, the password-protected area does not seem to be limiting them. And, less than one percent of site coordinators did not know about the website. To improve the current welcome process for new coordinators, a standardized email and mailed welcome packet should be considered. The welcome e-mail should include links to the program's website, coordinator's section, and activity board with login and password information. This would allow coordinators an easy way to forward the information on to teachers and administrators. The welcome packet would provide the school's program history, recently distributed program outdoor education materials, and general program resources.

When considering website revisions, it should be noted that activities are the number one thing coordinators were searching for. Regular activity updates to keep the *Activity Board* fresh with new ideas will be helpful. The second most common thing site coordinators are using the website for is to find information on Minnesota trees and forests. This is not something currently offered on the website. A survey to determine what content or materials coordinators want would be useful in narrowing the focus to what is of most interest. A new *Minnesota Forests* section of the Website should be added. Because over 50 percent of coordinators look for grants, the program should also consider revising and updating the *Grants* page. Currently grant info is primarily promoted via the monthly e-newsletter. *Site Features*, another option that is not currently offered on the website was rated at 42 percent. Urban schools rated site features at almost 50 percent and also ranked it forth in their land management resource options. Creating a *Site Features* section would benefit schools by providing ideas on benches, trails, classroom pull out spaces, pit toilets, bog walks, etc. Other popular pages that should have continued investment include the *How to Teach Outside* and *Training Opportunities*.

Elementary schools reported a 22 percent higher rate of teachers using the forest for teaching than middle/high schools. This might be attributed to elementary teachers instructing multiple subjects (math, science, social studies, etc.), which provides both content and time flexibility to accommodate School Forest use. While not addressed in this survey, there is a common misperception that science is the only subject easily taught in the forest. This misperception may prevent middle/high school teachers in none science disciplines from considering using their School Forest. The School Forest program offers outdoor lessons in all subject areas and should continue to develop and obtain high skilled activities in more subject areas.

The largest barriers for teachers not using the outdoors, based on site coordinators' perception, were "don't know what to do out there" and "first timer's fear." These should be addressed by continuing to offer training and workshops, website content, and e-newsletter pieces on teaching outdoors. Almost 40 percent also have concerns about safety and discipline. The right content and way to deliver this topic should be considered. It might be useful to have some time allocated for safety and discipline concerns during workshops or a focus for the e-newsletter one month. Another high barrier was "distance to the forest," primarily chosen by rural schools. The program should try to figure out if there is a way to decrease this barrier for schools.

To help engage more teachers the program should consider what most coordinators wanted: ready-made activities. Since the survey, trunks were developed and delivered to 75 schools that included teaching tools, resources, and activities to use in the forest. To further meet this need it's recommended that more ready-made, outdoor-focused activities be developed and distributed to schools. The third highest resource was correlated activities. During the last year, the program has developed multiple standard-based activities in math and science. It's recommended that the program should continue to develop and post standard-based lesson plans including language arts, social studies, and higher math skills.

It should be addressed that the second largest resource coordinators wanted was having a naturalist co-lead activities. School Forest staff observations have shown that using a naturalist doesn't promote a teacher to do activities on their own. The program should dissuade schools from replacing teacher-lead lessons with a naturalist. Instead, the program should communicate the vital role naturalists can provide to increase teacher ability to teacher outside on their own and bolster teacher motivation. While naturalists are not needed at all School Forests, some sites may benefit from a naturalist's assistance. It is the School Forest program's desire that under the tutelage of a naturalist, beginning teachers will start to use the School Forest on their own.

Site coordinators perceived principals and superintendents to be more supportive than knowledgeable about their School Forests. It's common to hear from teachers they need help encouraging administration to be supportive but this result shows the issue may be more with administration knowledge. Going forward, the program should consider new ways to increase knowledge of the program and its benefits to administration.

The type of land management resources coordinators wanted were site visits with foresters and connections to natural resource groups and professionals. These match some comments coordinators wrote on what they want to have on the website: connections to people and foresters. It may not be possible to list forester contact on the website due to the frequent shift in DNR forester work areas. However, a better way to keep track of and communicate what forester is responsible for each site should be implemented. The program should also think about new ways to remind coordinators to contact their forester or program staff if they need assistance or connections. Urban sites differed by ranking stewardship plans as the second most important compared with rural sites, which ranked stewardship plans sixth overall. Urban schools in the survey included a large number of newer schools which might account for the increased importance of stewardship plans. With an increase in Twin Cities

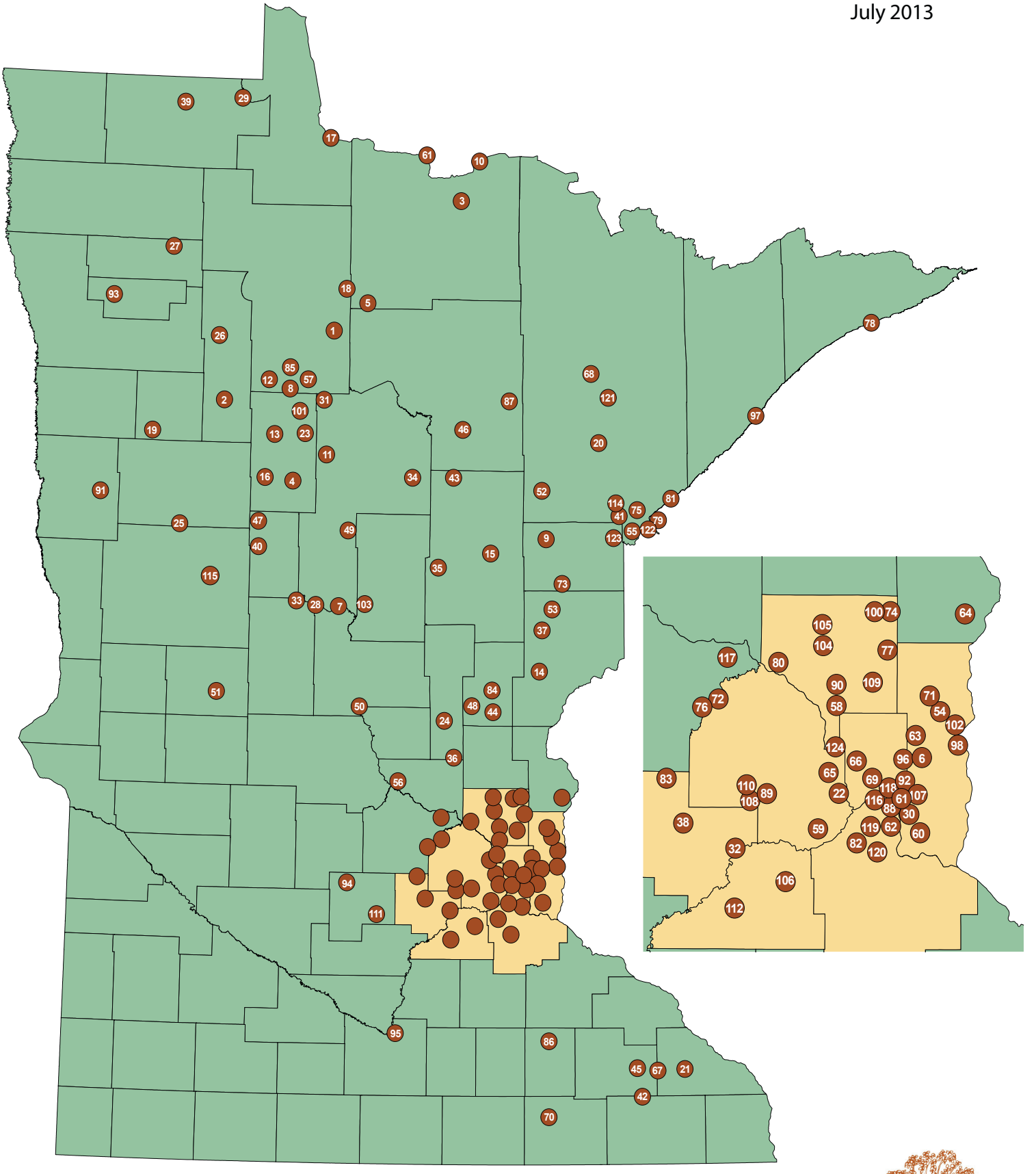
urban sites over the last few years and only one DNR foresters assigned to this area, hiring an urban forester would assist in meeting land management needs. Rural sites also ranked “help with maintenance” higher than urban sites. Looking at the comments from coordinators, most rural schools already have stewardship plans and have an idea of what management is needed in their forest but want forester assistance or help from natural resource professionals to make this happen.

Newer schools ranked committees higher than older schools for helping with land management. This could be due to School Forest staff recent emphasis on committees, leading to newer coordinators desiring support from a committee to make decisions on land management and site use. When revising the website, additional content on committee management should be included. The program could add a *Managing Your* C*ommittee* section within the *Coordinator’s Section.* This will help meet site coordinator needs for assistance with their committees. “Online resources” was ranked the highest among coordinators for assisting them with their committees and “training/support on leadership and committee management” was ranked second. The program should consider training and support options for the committee chair.

“Going on a walk/tour of the School Forest with your committee” was ranked third. Urban sites chose having program staff sit in on meetings while rural sites preferred staff present specific content at meetings. All three response areas suggest that the program should continue to offer site visits during committee meetings. The program should consider offering specific content that may be of interest to urban or rural School Forest committees.

School Forest Locations

July 2013



SCHOOL FOREST PROGRAM

School Forest Photos July 2010-June 2013

	Milaca School Forest, 2011. Students conducting site maintenance – following a DNR Stewardship Plan. Tree planting and invasive species removal.
	Lakewood School Forest, Duluth, 2012. Students studying birds.

		Dowling School Forest, Minneapolis, 2012. Students planting in new garden beds.
		Edgewood School Forest, Mounds View, 2013. Student planting tree at School Forest celebration.

	Oneka -Hugo School Forest, 2013. Teacher training.
	Rockford School Forest, 2012. Teacher participating in outdoor education activities – reflection time.

2010 Project Abstract
For the Period Ending June 30, 2013

PROJECT TITLE:	**Integrating Environmental and Outdoor Education in Grades 7-12**
PROJECT MANAGER:	Jeff Ledermann, Environmental and Outdoor Education Coordinator
AFFILIATION:	Minnesota Department of Education
MAILING ADDRESS:	1500 Highway 36 West
CITY/STATE/ZIP:	Roseville, MN 55113-4266
PHONE:	651-582-8602
E-MAIL:	jeff.ledermann@state.mn.us
WEBSITE:	www.education.state.mn.us, www.seek.state.mn.us
FUNDING SOURCE:	Environment and Natural Resources Trust Fund
LEGAL CITATION:	**M.L. 2010, Chap. 362, Sec. 2, Subd. 8g; M.L. 2011, 1st Special Session, Chapter 2, Article 3, Subd. 18. Carryforward (b)**

APPROPRIATION AMOUNT: $300,000

Overall Project Outcome and Results

With research indicating that students are increasingly disconnected from nature, the Minnesota Department of Education (MDE) in cooperation with the Department of Natural Resources was funded to hire a full-time coordinator to lead a project to train and support grade 7-12 teachers to integrate environmental and outdoor education (EOE) into the instruction of academic standards. Professional development and grants of up to $8,500 were provided to six pilot schools to support 50 teachers and administrators in their use of the environment and outdoors as a context for student learning, which resulted in engaging over 1,000 students in EOE on a regular basis. A full report of the project, including evaluation of the training and student learning and model lessons, will be submitted to LCCMR.

Beyond the original goals of the project, the project coordinator also developed partnerships with several EOE providers to coordinate and offer five, additional, day-long regional workshops at minimal cost that were attended by 108 additional educators not from the pilot schools.

The project coordinator also developed and implemented Minnesota's participation in the first two years of the U.S. Department of Education's Green Ribbon Schools Program that recognizes schools for efforts to reduce their environmental impact and implement EOE throughout their curriculum. Minnesota led the nation with the most applicants in 2013 and seven Minnesota schools and districts were among 156 schools that received the national award to date. Workshops led by the coordinator at the sites of Minnesota's three 2012 national honorees were attended by over 100 people.

A position at MDE to integrate EOE has provided credibility and prioritization of EOE at Minnesota schools and within the department. It has resulted in better coordination among Minnesota's many EOE providers and plans exist for future coordination with MDE standards and health program staff.

Project Results Use and Dissemination

Information about the project, including the final report and model lessons, will be posted on the SEEK (Sharing Environmental Education Knowledge) website at www.seek.state.mn.us, hosted by the Minnesota Pollution Control Agency.

In addition to the numerous EOE workshops and training led by the coordinator, the coordinator has directly reached over 2,300 other educators through technical assistance and teaching, including participating in several workshops, programs and events. The coordinator also made regular efforts to promote activities related to the project and the benefits of environmental and outdoor education whenever possible throughout the duration of the project. EOE information, resources and achievements, such as the Green Ribbon Schools honorees, were regularly shared through MDE's Superintendents mailings and department listserves, and newsletters and listserves by SEEK, Minnesota Association for Environmental Education, Minnesota Science Teachers Association, Green Schools Coalition, Children and Nature Connection, Minnesota Sustainable Communities Network and many others.

The coordinator had occasional opportunities to do some media activities, including a 20 minute interview about the value of EOE on the April 1, 2013 show of the podcast, Mom Enough, which has a national following of several thousand listeners. The interview can be found at http://momenough.com/2013/04/lets-get-outside-tips-for-parents-and-teachers-from-an-environmental-educator-and-creative-dad. Local media from the communities of the pilot schools and Green Ribbon School honorees also developed news stories covering the value of EOE activities.

The introductory EOE regional workshops developed with the DNR, Jeffers Foundation and other local partners have led to additional opportunities for coordinated workshops. In particular, the Jeffers Foundation has expressed interest in continuing to work with MDE on future workshops patterned after those developed during the project.

The evaluation of the project, which was conducted by Dr. Julie Ernst, University of Minnesota – Duluth, was a great opportunity for her to expand on her nationally-recognized environmental education research. She is hoping to publish a research paper at some point summarizing the evaluation of the project, which will hopefully help inform and guide future research in the field.

Environment and Natural Resources Trust Fund (ENRTF)
2010 Work Program Final Report

Date of Report: June 28, 2013
Final Report: June 28, 2013
Date of Work Program Approval: June 9, 2010
Project Completion Date: June 28, 2013

I. PROJECT TITLE: Integrating Environmental and Outdoor Education in Grades 7-12

Project Manager: Jeff Ledermann, Environmental and Outdoor Education Coordinator, After June 30, 2013 – Beth Aune, Director, Academic Standards and Instructional Effectiveness
Affiliation: Minnesota Department of Education
Mailing Address: 1500 Highway 36 West
City / State / Zip: Roseville, MN 55113-4266
Telephone Number: 651-582-8795
E-mail Address: jeff.ledermann@state.mn.us, beth.aune@state.mn.us
Fax Number: 651-582-8876
Web Site Address: http://education.state.mn.us

Location: A work station for the project coordinator will be established at the Minnesota Department of Education, 1500 Highway 36 West, Roseville, Minnesota. Project activities will be implemented statewide.

Total ENRTF Project Budget:	**ENRTF Appropriation**	**$ 300,000**
	Minus Amount Spent: (through 6/28/13)	**$ 300,000**
	Equal Balance:	**$ 0**

Legal Citation: M.L. 2010, Chap. 362, Sec. 2, Subd. 8g
M.L. 2011, 1st Special Session, Chapter 2, Article 3, Subd. 18.Carryforward (b)

Appropriation Language:
$300,000 is from the trust fund to the commissioner of education in cooperation with the commissioner of natural resources to train and support grade 7-12 teachers to integrate environmental and outdoor education into the instruction of academic standards.

The availability of the appropriation for the following project is extended to June 30, 2013: (2) Laws 2010, chapter 362, section 2, subdivision 8, paragraph (g), Integrating Environmental and Outdoor Education in Grades 7-12.

II. FINAL PROJECT SUMMARY AND RESULTS:

This project uses environmental and outdoor education (EOE) strategies to develop academic knowledge and skills. Professional development and program incentive grants will be provided to help teachers use the environment and outdoors as a context for student learning in science,

mathematics, social studies and physical education. Activities of this project align with the state goals for environmental education (Minn. Statute § 115A.073), strategies outlined in *A Greenprint for Minnesota*; and recommendations of the *Outdoor Education Legislative Report-2009* submitted by the Outdoor Education Advisory Committee.

Goals:

1. Students will master state academic standards through environmental and outdoor education approaches.
2. Students will develop environmental and outdoor knowledge and skills.

Results:

1. Project coordination and professional development for secondary teachers will be delivered regionally through a "train-the-trainer" model.
2. Incentives for innovative environmental and outdoor education models will be provided through mini-grants.

Outcomes:

1. At least 30 middle and high school teachers from five regions will gain knowledge, skills and resources to help students meet the project goals.
2. Five to ten proposals from secondary schools will receive funding to implement model environmental and outdoor education programs that implement the project goals. These programs will reach at least 750 students, 200 or more of whom are considered to be underachieving or at risk of underachieving.

Overall Project Outcome and Results

With research indicating that students are increasingly disconnected from nature, the Minnesota Department of Education (MDE) in cooperation with the Department of Natural Resources was funded to hire a full-time coordinator to lead a project to train and support grade 7-12 teachers to integrate environmental and outdoor education (EOE) into the instruction of academic standards. Professional development and grants of up to $8,500 were provided to six pilot schools to support 50 teachers and administrators in their use of the environment and outdoors as a context for student learning, which resulted in engaging over 1,000 students in EOE on a regular basis. A full report of the project, including evaluation of the training and student learning and model lessons, will be submitted to LCCMR.

Beyond the original goals of the project, the project coordinator also developed partnerships with several EOE providers to coordinate and offer five, additional, day-long regional workshops at minimal cost that were attended by 108 additional educators not from the pilot schools.

The project coordinator also developed and implemented Minnesota's participation in the first two years of the U.S. Department of Education's Green Ribbon Schools Program that recognizes schools for efforts to reduce their environmental impact and implement EOE throughout their curriculum. Minnesota led the nation with the most applicants in 2013 and seven Minnesota

schools and districts were among 156 schools that received the national award to date. Workshops led by the coordinator at the sites of Minnesota's three 2012 national honorees were attended by over 100 people.

A position at MDE to integrate EOE has provided credibility and prioritization of EOE at Minnesota schools and within the department. It has resulted in better coordination among Minnesota's many EOE providers and plans exist for future coordination with MDE standards and health program staff.

Project Results Use and Dissemination

Information about the project, including the final report and model lessons, will be posted on the SEEK (Sharing Environmental Education Knowledge) website at www.seek.state.mn.us, hosted by the Minnesota Pollution Control Agency.

In addition to the numerous EOE workshops and training led the by the coordinator, the coordinator has directly reached over 2,300 other educators through technical assistance and teaching, including participating in several workshops, programs and events. The coordinator also made regular efforts to promote activities related to the project and the benefits of environmental and outdoor education whenever possible throughout the duration of the project. EOE information, resources and achievements, such as the Green Ribbon Schools honorees, were regularly shared through MDE's Superintendents mailings and department listserves, and newsletters and listserves by SEEK, Minnesota Association for Environmental Education, Minnesota Science Teachers Association, Green Schools Coalition, Children and Nature Connection, Minnesota Sustainable Communities Network and many others.

The coordinator had occasional opportunities to do some media activities, including a 20 minute interview about the value of EOE on the April 1, 2013 show of the podcast, Mom Enough, which has a national following of several thousand listeners. The interview can be found at http://momenough.com/2013/04/lets-get-outside-tips-for-parents-and-teachers-from-an-environmental-educator-and-creative-dad. Local media from the communities of the pilot schools and Green Ribbon School honorees also developed new stories covering the value of EOE activities.

The introductory EOE regional workshops developed with the DNR, Jeffers Foundation and other local partners have led to additional opportunities for coordinated workshops. In particular, the Jeffers Foundation has expressed interest in continuing to work with MDE on future workshops patterned after those developed during the project.

The evaluation of the project, which was conducted by Dr. Julie Ernst, University of Minnesota – Duluth, was a great opportunity for her to expand on her nationally-recognized environmental education research. She is hoping to publish a research paper at some point summarizing the evaluation of the project, which will hopefully help inform and guide future research in the field.

III. PROGRESS SUMMARY AS of January 30, 2013

Progress Report – January 30, 2013

Implementation of environmental and outdoor education activities continue at the six pilot schools that received mini-grants as part of the project. All six of the pilot schools have been contacted numerous times by project staff in the last few months and have submitted interim reports to MDE. They appear to be on track with spending the mini-grant funds and implementing their projects. Staff are planning to visit each of the sites over the next few months.

The coordinator continued with the work mentioned previously regarding regional environmental and outdoor education day-long workshops to other teachers and administrators not in the pilot schools. In addition to the first workshop in Rochester, workshops were held at Collegeville, St. Paul, Sandstone and North Mankato. The workshops have been attended by a total of 106 teachers.

The project coordinator has also successfully led the second year of Minnesota's participation in the U.S. Department of Education's Green Ribbon Schools Program that recognizes schools for efforts to reduce their environmental impact, increase energy efficiency, provide safe and healthy environments for students and staff, and implement sustainable education throughout their curriculum. Fourteen applications were received this year and MDE is in the process of determining finalists for this year's award.

Since the start of the project, the coordinator has now shared EOE information and resources to over 2000 educators through technical assistance and teaching, including participating in several workshops, programs and events.

Amendment Approved - As approved by LCCMR staff on August 8, 2012

We have reviewed and approve your amendment request for M.L. 2010, Chap. 362, Sec. 2, Subd. 8g to more accurately reflect areas where the funds are being spent. The approval is according to the attached revised Attachment-A that:

1. Shifts $20,363 of "Personnel" funds from Result-2 to Result-1 and reduces overall "Personnel" by $10,000 and shifts those funds to "Travel, "Supplies" and "Substitute" teachers
2. Reduces the amounts for "Contracts" by $348 and shifts those funds to "Travel, "Supplies" and "Substitute" teachers
3. Increases "Supplies" by $2,000 up to $3,000
4. Increases "Travel" $3,648 up to $5,776
5. Increases "Substitutes -for teachers participants" by $4,700 up to $7,000

Progress Report – July 30, 2012

The project coordinator has continued to work closely with the administrators and 30 teachers at the six pilot schools that received mini-grants as part of the project. Since the May 8, 2012 project amendment, five of the six schools have taken advantage of the opportunity to receive the additional allocation (up to $3500 per school) for additional teacher training and curriculum development. All six of the pilot schools have been visited by project staff in the last few months and appear to be on track and demonstrating valuable results from their participation in the project.

Tapping into existing networks, the coordinator also developed partnerships with several EOE providers over the past few months to coordinate and offer a series of regional environmental and outdoor education day-long workshops at very minimal cost to other teachers and administrators not in the pilot schools. The first workshop was held July 11 in Rochester and was attended by 17 teachers. Three others are also scheduled for later this summer and fall with over 60 additional teachers already registered to participate.

The project coordinator also successfully developed and implemented Minnesota's participation in the pilot year of the U.S. Department of Education's Green Ribbon Schools Program that recognizes schools for efforts to reduce their environmental impact, increase energy efficiency, provide safe and healthy environments for students and staff, and implement sustainable education throughout their curriculum. Three Minnesota schools were among 78 schools that received the national award.

Since the start of the project, in addition to the previously mentioned teachers that have participated through the pilot and summer trainings, the coordinator has reached over 1300 other educators and 170 students through technical assistance and teaching, including participating in several workshops, programs and events.

Amendment Request – July 30, 2012:
An amendment to the agreement is necessary to adjust the budget to align with actual expenditures by pilot schools to attend the December 2011 training and more accurately reflect distribution of funds between Result 1 and Result 2. Most of the substitute reimbursements by the pilot schools were not submitted at the time of the amendment on May 8, 2012 and not accurately estimated for that budget revision. There is no change to the overall budget of the project, and the revised budget now more accurately reflects actual and expected costs to date. These changes only result in small shifts between some of the funding categories and more closely reflect that approximately 80% percent of project coordination of the project has been occurring in Result 1 and 20% in Result 2.

Amendment Approved - As approved by LCCMR staff on May 8, 2012

We have reviewed and approve your amendment request for M.L. 2010, Chap. 362, Sec. 2, Subd. 8g as follows:

Use the funds for the originally proposed second round of group training for the teachers to instead provide one or both of these teachers training or curriculum updating options:

1. Individual/customized training for teachers including funds to pay for workshops or training sessions and related travel expenses. Potentially could also pay for substitute teachers but not for teacher stipends.

2. Funds for teacher's time to adapt and revise their curriculum to integrate environmental and outdoor education in to it. This could potentially include a stipend for teacher's time to produce the updated curriculum products.

These options will be accomplished by making up to $3,500 available on a reimbursement basis to each of the following six schools that originally received grants – up to a total of $21,000:

- Concordia Creative Learning Academy, St. Paul
- Kennedy Community School, St. Cloud Public Schools
- Rockford Middle School Center for Environmental Studies
- River's Edge Academy, St. Paul
- Simley High School, Inver Grove Heights
- Waconia High School

The Attachment-A spreadsheet will be revised to move the funds totally $21,000 originally to be used for the second round of training to the new category "Round 2 teacher development and/or curriculum updating grants." This will be done as follows:

- Reduce the "Supplies" category to $1,000, down from $4,000.
- Reduce the "Travel expenses in Minnesota" category to $2,128, down from $14,428.
- Reduce the "Substitutes" category to $2,300, down from $8,000.
- Add a new contracts category of $21,000 for "Teacher training and/or curriculum updating."

Any funds not needed for these activities are to be returned to the ENRTF at the end of the grant period.

Amendment Request – May 8, 2012

An amendment to the agreement is necessary to reflect an adjustment to the workplans and budgets to align with a newly- identified need related to teacher training. Upon consultation with the project advisory committee, it was determined that the schools selected through the mini-grant RFP would be the recipients of the training to maximize the impact of the project, provide additional incentive for schools to apply and get the best results at the selected schools. As noted in Result/Activity 1, Outcome 4, the intention was to provide teachers with two rounds of training delivered by the Minnesota Department of Education (MDE). The following six schools were selected project pilot schools and awarded mini-grants in the amount of up to $5,000 in late November 2011 and thirty-two teachers and administrators participated in the first group training on Dec. 8-9 at Camp Courage near Maple Lake, MN:

- Concordia Creative Learning Academy, St. Paul
- Kennedy Community School, St. Cloud Public Schools
- Rockford Middle School Center for Environmental Studies
- River's Edge Academy, St. Paul
- Simley High School, Inver Grove Heights
- Waconia High School

It became clear at the training from discussions with the attendees and further consultation with the advisory group, trainers and evaluators that another large group training wouldn't as efficiently and effectively serve the needs of the schools as well as specialized or customized trainings. The participating schools and teachers all have diverse needs that includes different natural resources on or near campus (water, woods, prairie), different student groups (middle, high, charter, alternative) and different project focus (water sampling, trail development, outdoor recreation, gardening, etc.). While the initial training was effective at laying the ground work and

preparing them to launch their projects and programs, additional professional development needed to be customized.

The proposed amendment would be to use existing training funds from Result/Activity 1 to amend the existing school mini-grant agreements to provide each of the pilot schools with an additional $3500 for professional development activities that will allow them to most effectively integrate environmental and outdoor education into their projects and programs. MDE contract and grant staff have determined that because of the new information and needs to revise the agreements, an amendment to the original awards would be appropriate.

The specific activities that we would like to include in the additional amendment of the mini-grants to the schools are the same activities that were going to be provided as part of the group training or compatible with their original mini-grant award. The focus is of the additional award is professional development that improves their capacity to integrate environmental and outdoor education. Professional development activities would need to be submitted to MDE and approved by the project coordinator. Activities may include:

- Hiring EOE consultants to deliver environmental and outdoor education programming to staff – examples would include the DNR delivering on-site Project Learning Tree trainings or Eco Education training teachers to assist students with community-based projects.
- Sending staff to relevant environmental and outdoor education training – examples would workshop fees for Hamline University's River Institute or traning by Outward Bound on leading students on extended experiential field trips
- Providing substitutes for teachers to develop and/or adapt school curriculum to integrate environmental and outdoor education – examples would include substitutes made available for teachers during the school year to adapt or revise their standards-based curriculum to include lessons that are moved outside or include teaching a unit with an environmental context. Revised and adapted lessons would become part of their standard curriculum moving forward.

Funding would be used to cover fees for consultants, workshop fees to attend trainings, substitute teachers, travel associated with attending training (mileage, meals and lodging). All funding for the mini-grants and amendments are distributed as reimbursements, and twenty percent of the award funds will be held until final reports are submitted at the end of the project.

Progress Report – January 25, 2012

With the previously mentioned delays now behind us, substantial progress has been made on the project in the last several months. An agreement with an evaluator that is a nationally-known environmental education researcher was completed. Three highly-qualified and experienced regional trainers were hired and are on the job. The request for proposals to schools for the mini-grants was released in late August and 21 proposals were submitted by the end of September. With the input of the advisory committee, a diverse group of six schools were selected to participate in the project and grants agreements were completed in November. In early December 32 teachers and administrators from the project schools participated in a two-day training and completed pre and post surveys related to the training. Project coordinator, the evaluator and

teachers are currently working to finalize student evaluation. Teachers are finalizing project plans and will begin implementation soon.

Amendment Approved - As approved by LCCMR staff on August 10, 2011

Progress Report – August 3, 2011

The project has been delayed once again by the State shutdown, but in the previous quarter a request for proposals for the project evaluator was released. 15 potential contractors requested the full solicitation, and MDE has selected a vendor. We are in the process of a negotiating and completing an agreement. Evaluator should be in place within the next month.

The advisory committee met for the first time on April 27, 2011. A wide range of environmental and outdoor education (EOE) professionals and organizations are represented on the committee and have agreed to serve on various sub-committees to provide input and guidance to the project.

Notice of the trainer positions were posted in June 2011 and widely promoted throughout the state environmental and outdoor education networks. Eighteen potential candidates submitted letters of interest in the positions, including several that appear to be highly-qualified. Once the amended workplan is approved, trainers will be selected and work will begin in earnest to recruit and select schools for the targeted professional development and mini-grants.

Since the start of the project, the coordinator has been busy promoting the project, coordinating with other MDE staff to integrate EOE into their work, providing resources, technical assistance and teaching, including participating in several workshops and programs that directly reached over 200 teachers and 100 students.

Amendment Request – July 26, 2011:
An amendment to the agreement is necessary to adjust the workplans and budgets to align with the delayed start of the project (see extension request) and subsequent extension. The additional project time required a corresponding change to the coordinator's wages and benefits and several of the other project budget items.

Extension Approved: July 20, 2011

Progress Report – March 18, 2011

Due to circumstances stated below, the start of the project was delayed and a one-year extension of the project was requested on December 22, 2010.

Due to a hiring freeze, the posting for the coordinator position was delayed until December. Initially the posting specified that only current state employees were eligible. When it was determined that there were insufficient applicants, the eligibility requirements were expanded by removing the limitation of being a state employee. Sixty applicants were screened for eligibility, and interviews were held in January.

Jeff Ledermann was selected as the project coordinator and started work at MDE on March 16, 2011. As a result there have been no other activities and expenditures from the grant previous to Jeff's start date.

Extension Request - December 22, 2010

IV. OUTLINE OF PROJECT RESULTS*:*

RESULT/ACTIVITY 1: Professional development for secondary education teachers delivered regionally through a "train-the-trainer" model

Description: The purpose of the professional development component is to equip teachers with the knowledge, skills and resources necessary to help students:

1. Master state and local academic standards through an environmental and outdoor education approach.

2. Develop their environmental and outdoor skills and knowledge.

The professional development content will include the following objectives for teachers:

1. Understand and use environmental concepts to inform decisions about maintaining a sustainable lifestyle and taking actions on environmental issues.

2. Improve outdoor skills to foster appreciation of the outdoors and lifelong recreational habits that contribute to emotional and physical well-being.

3. Identify possible environmental and outdoor applications of Minnesota's K-12 academic standards in one or more of the following subjects: science, mathematics, social studies and physical education.

4. Learn about instructional strategies that utilize the outdoors and environment as an integrating context.

5. Develop action plans that demonstrate understanding and application of the professional development program objectives.

The objectives and content of the professional development will be further refined by the leaders of the professional development program as described in the next section. The following are some examples of content that could be included in the teacher training. Teacher could learn how to help students:

- Apply knowledge of the ways that species adapt to their environment by exploring the shelters that various animals use in the forest and learning how to build shelters for human survival in the wilderness.

- Learn about food chains in a lake ecosystem and how to apply that knowledge to determine locations and fishing strategies for catching a particular species.

- Map a small plot of land for identification of plants and animals that live there using mapping, data collection and geometry skills.

- Develop a personal fitness plan through a comparison of outdoor activities in terms of caloric expenditure, environmental impact, and contribution to mental and emotional well-being.

- Design projects to study a natural area and create management plans toward achieving student-developed goals (e.g., improving a stream for trout habitat or developing a trail for bird observation and cross-country skiing).

The Minnesota Department of Education will hire one full-time unclassified staff to coordinate the efficient use of regional and state resources in the design and implementation of professional development and program grants that use an environmental and outdoor education approach. Under the coordinator's leadership, a statewide system of professional development will be created using a "train-the trainer" model. An *advisory committee* will be formed consisting of: 1) Licensed teachers from multiple disciplines including, but not limited to, science, physical education, social studies and mathematics who possess interest and/or knowledge in environmental and outdoor education; 2) Providers of outdoor education and environmental education such as environmental learning centers, outdoor industry partners, and members of conservation and sporting organizations with expertise in certain facets of outdoor recreation.

In collaboration with the project coordinator and advisory committee representatives, a set of *regional trainers*, selected by the project coordinator, will plan professional development activities (training modules) and develop resources that can be used in various regions of the state. The trainers will be educators who have knowledge and skills of best practices in professional development, especially in the areas of environmental and outdoor education. Under the direction of the project coordinator, the *trainers* will provide professional development to middle school and high school teachers in their respective regions with preference given to interdisciplinary school teams of teachers. The regional trainers will continue to provide follow-up and ongoing technical assistance for teachers in their region for the duration of the grant period. The coordinator will select educators with secondary classroom knowledge and experience, especially in the areas of environmental and outdoor education, to be regional trainers.

Summary Budget Information for Result/Activity 1:

ENRTF Budget: **$** 221,241
Amount Spent: **$** 217,293
Balance: **$** 3,948

Deliverable/Outcome	Completion Date	Budget
1. Coordinator and advisory committee develop the program plans including: A. The structure, content, scope and delivery of professional development; B. Names of possible regional trainers; C. Strategies for the recruitment of teachers; and D. Resources for use in teacher training. This outcome will involve the project coordinator and the advisory committee of approximately 12 people.	September 31, 2011	$ 42,359
2. Regional trainers participate in planning meetings with project coordinator, select advisory committee members and project partners to accomplish the following: A. Create a template and structure for the regional professional development plans (i.e., training modules); B. Develop the evaluation plan for the professional development to be provided to teachers; and C. Plan a two-day workshop for teachers. This outcome will involve the project coordinator and 5 state trainers and the evaluator.	November 31, 2011	$ 27,301
3. Regional trainers with project coordinator, select advisory committee members and project partners provide two-day training to a minimum of 30 middle and high school teachers who collectively serve 750 or more students in the Fall of 2011. In the Summer and Fall of 2012, through additional grant funding of $3,500 per school, the selected pilot schools will	January 20, 2011 and November 4, 2012	$ 77,213

support additional, customized teacher training and professional opportunities to the teachers based on the needs of the participants to best address the goals of the project. All professional development plans will require prior approval by project coordinator. Participants commit to implement environmental and outdoor education with their students and attend follow-up sessions during the school year. This outcome will involve at least 30 teachers plus 3 regional trainers, the coordinator and evaluator.		
4. Teachers implement environmental and outdoor education experiences and regional trainers provide group follow-up sessions and ongoing teacher support during the 2011-2012 and 2012-2013 school year. Teachers will submit their lessons to the regional trainers for possible inclusion on the SEEK (Sharing Environmental Knowledge) website. This outcome will involve at least 750 students, 6 regional trainers, the coordinator and evaluator.	May 15, 2013	$ 52,004
5. Conduct an evaluation of the professional development program component. Write a report of the professional development program activities, including results and recommendations for teacher training and student learning experiences that should continue beyond the LCCMR grant period. Identify model lessons that could be posted on the SEEK (Sharing Environmental Knowledge) website. This outcome will involve the evaluator and the coordinator, the 12 advisory board members and 3 regional trainers.	May 31, 2013	$ 22,364
TOTAL for two years (Result 1)		**$221,241**

Result Completion Date: June 30, 2013. Work Program progress reports will be submitted not later than August 2011, January 2012, July 2012 and January 2013.

Final Report Summary:

The final Advisory Committee meeting was held May 22, 2013 at Rockford Middle School, one of the project's pilot schools. The committee toured Rockford Middle School's newly restored outdoor learning area, visited a classroom preparing for an outdoor education trip and listened to a presentation by Rockford staff on their participation in the pilot and the benefits it provided to

their students. Most significantly, since becoming an environmentally-focused school, Rockford went from dwindling enrollment a couple of years ago to significantly increasing enrollment. While their STEM approach has also been popular, they attribute much of the interest to their focus on the environmental and outdoor education. The Advisory Committee also heard a summary of the project coordinator's recent activities and summaries of each of the pilot schools' outcomes during the project. They also provided input on the primary promising activities that will be highlighted in the final report

Five of the six pilot schools took advantage of the additional resources for training offered through amendments to the original grant awards so they could be tailored to their individual and school needs. Using the state's academic standards as starting point, the trainers and coordinator worked with the regional trainers to find opportunities and resources to help support their revision and adaptation of their school's curriculum in multiple content areas. Identifying resources and outdoor locations on or near their campus was also a focus. Many schools noted the benefits of working with local partners to enhance their EOE efforts.

The schools have pledged to continue to work on expanding the integration of the environmental and outdoor education throughout their curriculum by revising and adapting lessons that were started during the project. Every school has implemented many EOE lessons that integrate multiple content areas and are highlighted in the final report. While the project coordinator was able to collect ten model lessons from the participating teachers that are also posted on SEEK (www.seek.state.mn.us), it was a challenge to get samples of model lessons from the teachers that could be shared with others. Many teachers reported they were overwhelmed with other teaching demands over the last few months of the school year and had difficulty finding time to compile the lessons in a consistent format, which was supplied by the project coordinator.

With some prodding, all of the schools also completed the necessary student and teacher surveys so the evaluator could complete her work to fully assess the impact of the project. The evaluator found the professional development support during the project did have a significant impact. Many educators entered the project with a relatively high knowledge of the environment, but the evaluation found that the training provided significantly increased teachers' pedagogical knowledge and skills, as well as their self-efficacy beliefs, relating to integrating environmental and outdoor education into the academic curriculum. The teachers also provided many specific suggestions relating to desired outcomes, format, and resources that are highlighted in the evaluation report and can be used to guide future professional development efforts.

The project coordinator also led Minnesota's involvement in the second year of the national Green Ribbon Schools (GRS) recognition program. Fourteen applications were submitted in December 2012 and three schools and one district were submitted by MDE for consideration for the national honor. Jeffers Pond Elementary in Prior Lake, Heritage Middle School in West. St. Paul, School of Environmental Studies in Apple Valley and the Prior Lake – Savage Area School District were among the 78 schools to receive the national designation as a Green Ribbon School. The U.S. Department of Education and several other federal officials are planning to visit Minnesota's honorees in July of 2013.

Regarding the budget, total personnel costs for the project ended up slightly higher than the amended budget estimates due to state employee contract settlements resulting in wage and benefit increases over the last several months. However, these expenses were primarily offset by

schools not using all of their grant awards and slight reductions in the total project expenses for supplies, travel and substitute teachers. MDE covered the additional $853 that the project was over the project budget appropriation of $300,000.

Many organizations provided in-kind support to the project by donating staff time, meeting space and support to the project, especially for the teacher training. MDE contributed office space and use of an agency vehicle for the project coordinator throughout the project, which amounted to approximately $20,000.

Result Status as of January 30, 2013:
The fourth Advisory Committee meeting was held October 2, 2012 at Garlough Environmental Magnet School in West St. Paul, one of Minnesota's first Green Ribbon Schools. The committee provided input on how to capture model EOE lesson plans or some other sort of documentation from the teachers in the pilot projects that could be shared with other educators (likely posted on SEEK). Advisory Committee members also supported promotion of the regional workshops and continue to help with promotion and evaluation of the Green Ribbon Schools Program.

The six pilot schools have all submitted interim reports, which indicated they completed progress on training and curriculum development associated with their projects. They have also continued to cooperate with the evaluator to assess outcomes of the student and teacher involvement in the project.

The project coordinator has also led Minnesota's involvement in the second year of the national Green Ribbon Schools (GRS) recognition program. Applications were due for the 2012-13 awards in late December, and 12 schools and two districts applied for the recognition. To create more awareness of the program, highlight last year's Minnesota GRS winners and to provide the opportunity for educators to see first-hand the benefits of GRS schools, the coordinator worked with many green school providers and the host schools to pull together free, three-hour workshops at each of the 2012 GRS winners. Over 100 educators attended the workshops in West St. Paul, St. Joseph and Duluth last October and November. MDE Assistant Commissioner Rose Chu also participated and recognized the efforts of the 2012 winners. MDE is in the process of evaluating this year's applications and will be forwarding finalists to the U.S. Department of Education in February.

The project coordinator, regional specialists and several EOE partners continue to offer day-long workshops at minimal cost for educators at several locations throughout Minnesota. Since the last report, workshops have been held at St. John's University Arboretum in Collegeville, Como Park in St. Paul, Audubon Center of the Northwoods in Sandstone and South Central Service Cooperative in North Mankato. They have been attended by 102 educators. Evaluations from the workshop have been extremely positive. All of the attendees have felt that the workshops were "effective" or "very effective" in helping them integrate EOE into their classroom. Comments from participants:

- Fabulous orchestration of presenters and info!
- Excellent workshop! Worth my time!
- Thank you for a wonderfully organized and informative workshop. Hats off to Jeff and his team. Job well done.

- It was great to practice what we preach – re-use water bottles, bulk food, getting outside!
- The resources were excellent.
- Thank you – super interesting – loved the fact that we saw the neatest resources and met the tops in the field of EOE.
- Lots of great resources and ideas. Very worthwhile and a beautiful location.
- This was absolutely wonderful and so affordable. I hope you do more these classes during all seasons. Thank you so much for such an inspirational day and for treating us like professionals.
- Wonderful workshop with lots of information, resources and ideas to get kids outdoors.
- It was nice to see examples of activities/ideas that can be integrated immediately.

Result Status as of July 30, 2012:
The third Advisory Committee meeting was held May 3, 2012 at Jeffers Pond Elementary in Prior Lake. The committee provided valuable feedback into the summer EOE workshops. Several Advisory Committee members also provided input into the design of the Green Ribbon Schools Program. They also supported the promotion of the program and evaluation of Green Ribbon School applicants.

So far, five of the six pilot schools have submitted requests for the additional funding for training and curriculum development. Most of the trainings and curriculum development is occurring this summer, but it must be completed by early November. The initial report from the project evaluator regarding the MDE-hosted December 2011 training attended by the 32 teachers and administrators found significant increases in teachers' pedagogical knowledge and skills relating to integrating EOE into the academic curriculum and in their self-efficacy toward integrating EOE into the academic curriculum. Outcomes of the teacher professional development will also be evaluated at the end of the project.

The project coordinator also successfully led Minnesota's involvement in the national Green Ribbon Schools recognition program. Sixteen Minnesota schools applied for the recognition, and over 200 individuals accessed the on-line application. Many commented that the process helped encourage them to make their facilities, policies and practices more sustainable, and provided them with great ideas and resources to educate students on the environment and outdoors. Garlough Environmental Magnet School in West St. Paul, Kennedy Community School in St. Joseph and North Shore Community School in Duluth were among 78 schools recognized in Washington, D.C. on June 4 with the inaugural National Green Ribbon Schools Award from the U.S. Department of Education.

Seventeen teachers not associated with the pilot schools attended the first summer regional EOE workshop at the Cascade Meadow Wetlands & Environmental Science Center in Rochester on July 11, 2012. All of them felt that the workshop was "effective" or "very effective" in helping them integrate EOE into their classroom, and all but one of them identified specific things they will implement in the next school year. One of the teachers had this to say about the workshop: "I wanted to write and thank you for putting on such an informative, energizing workshop at Cascade Meadow today. I learned a great deal and left the workshop feeling excited about the coming school year!" Several others wrote similar comments on their evaluations.

Result Status as of January 25, 2012:
Advisory Committee members participated in the selection of the regional specialists. Three highly-qualified and experienced specialists have been hired:

- Su Beran – a former state education coordinator for MPCA and teacher, Sue has done masters work in experiential education at Minnesota State University. She has years of experience providing EE technical assistance and training teachers, including the State EE scope and sequence document.
- Kim Kovich – is a science teacher at Champlin Park High school and served on the Outdoor Education Task Force. He has a Master's in Education from the University of Minnesota. He has been a high school teacher since 1982 and has held many leadership positions on several organizations, including many outdoor groups.
- Patty Born Selly – is an environmental and outdoor education consultant and has worked on several education projects for the MDNR and has 15 years of experience training teachers. She has a Master's in Education from Hamline University.

After a request for proposal process to hire an evaluator, an agreement was completed with the University of Minnesota-Duluth (UMD) to conduct the evaluation. Dr. Julie Ernst, who has considerable experience and is nationally-known for her work evaluating environmental education in school settings, will be the project lead at UMD.

The regional specialists, evaluator and Advisory Committee members, under the direction of the Project Coordinator, designed and delivered a successful two-day training on Dec. 8-9 at Camp Courage near Maple Lake, MN. Several other environmental and outdoor education experts were recruited by the Project Coordinator and donated their expertise and resources to the training, including representatives from DNR, Jeffers Foundation, Prior Lake – Savage schools, UM Extension, St. John's University, Three Rivers Park District, Pheasants Forever and several community members that were interested in supporting the pilot schools in their area. Thirty-two teachers and administrators from the pilot schools participated in the training. Working with the evaluator, the Project Coordinator delivered pre and post surveys of the teachers regarding the professional development. Final results have not been tabulated yet by the evaluator, but feedback from the participants was extremely positive. One experienced teacher stated it was the best professional development they had ever attended and another shared:

"I found the training extremely helpful and it really opened my eyes to a much broader incorporation of EOE than I had ever imagined! The activities demonstrated how well the outdoors can facilitate student learning in all disciplines. I appreciated that we were given the opportunity to be students and experience how engaging EOE really is! It was so much better than reading it in a book."

The regional trainers have been assigned to continue supporting the trained teachers over the next several months as they adapt their curriculum and begin to implement EOE lessons. They will also be determining additional professional needs that the project will support over the next several months. Additional surveys of the teachers and their students will be conducted as the project progresses.

Because of the direct linkages to environmental education, the Project Coordinator has also led Minnesota's involvement in the national Green Ribbon Schools recognition program. It has provided an opportunity to encourage and recognize schools that are not only making their

facilities, policies and practices more sustainable, but educating students on the environment and outdoors. Applications for the recognition are being accepted through Feb. 22, 2012, and the Commissioner will forward up to four schools for consideration for the national award. Several schools have expressed interest and are in the process of applying.

The Project Coordinator is also exploring options to provide training to additional teachers beyond the original scope of the project during the remaining months of the project. While little or no funding is available from the project to cover expenses or substitutes for additional teachers to be trained, several organizations have expressed interest in partnering with MDE to support additional workshops and reduce costs to participants.

Result Status as of August 3, 2011:
Research has been done and information gathered on successful EOE programs, including observing and participating in successful EOE workshops and programs in the region that were attended by 238 educators to date.

In addition to notifying the workshop participants in person, program information was also developed, including a webpage at MDE and promotional materials. Information has been distributed through SEEK, education listserves and networks, including a featured article in the Minnesota Science Teachers Association newsletter, and at several meetings and educator gatherings.

A formal invitation for proposals was announced in early summer to manage the evaluation component of the project. After the formal MDE review process, a qualified contractor has been selected for the evaluation. We are in the process of negotiating an agreement and contract and they should be in place by the end of August.

Position descriptions for the regional trainers were developed and notice of the positions were made through SEEK and other electronic EOE listserves and networks. Advisory committee members reviewed the position descriptions and assisted with recruitment. 18 qualified educators have applied for the positions. We plan to bring trainers on board in the next few weeks.

Result Status as of January 2011**:**
Hiring of coordinator position delayed due to hiring freeze. Applications for the coordinator position have been received and screened for eligibility. Interviews are scheduled for early January.

RESULT/ACTIVITY 2: Incentives for innovative environmental and outdoor education models provided through mini-grants.

Description: Middle schools and high schools will be invited to submit proposals for the design and implementation of innovative environmental and outdoor education programs that bolster student achievement in middle school or high school science, physical education, social studies and/or mathematics. Other non-profit providers of environmental and outdoor education may partner with middle schools and high schools to develop the grant proposals and implement the grant activities. Funding priority will be given to programs that target traditionally underachieving or at-risk student populations. A small number of programs (5-10) will receive grants ranging from $3,000 to $10,000 apiece. Funded proposals, collectively, will reach at least

750 students, 200 or more of whom are considered to be underachieving or at risk of underachieving.

Summary Budget Information for Result/Activity 2:

ENRTF Budget:	**$**	78,759
Amount Spent:	**$**	83,560
Balance:	**$**	**-4,801**

Deliverable/Outcome	Completion Date	Budget
1. Design and announce the RFP for innovative environmental and outdoor education programs. This outcome will involve the coordinator, approximately 4 advisory committee members and the evaluator.	August 30, 2011	$ 16,400
2. Select 5-10 proposals to be funded $3,000 – $10,000 per proposal. This outcome will involve the coordinator, evaluator and approximately 4 volunteers, following established guidelines of the MDE grants division.	November 1, 2011	$ 8,218
3. Implement and support the grant programs (November 1, 2011 – May 15, 2013). This outcome will involve the coordinator, evaluator, 3 regional trainers, approximately 6 school grant recipients, and at least 750 students.	May 15, 2013	$ 25,311
4. Monitor and evaluate the grant programs (November 1, 2011 – June 30, 2013). This outcome will involve the coordinator, evaluator and approximately 6 school grant recipients.	June 30, 2013	$ 12,466
5. Write a report of the grant program activities including results and recommendations for activities that should continue beyond the LCCMR grant period. This outcome will involve the coordinator, evaluator and advisory committee.	June 30, 2013	$ 16,364
Total for two years (Result 2)		**$ 78,759**

Result Completion Date: June 30, 2013. Work Program progress reports will be submitted not later than August 2011, January 2012, July 2012 and January 2013.

Final Report Summary:

The six pilot schools successfully completed implementing their mini-grant projects and submitted their final program and financial reports. The six schools each received grants ranging from $4,549.94 to $8,500.00. Total awards to the schools added up to $44,626.51. Because of the teachers' busy schedules, it was difficult to connect with the teachers and find a time that was convenient to visit them. However, regional trainers and the project coordinator visited all the schools at least once and several schools more than once to verify the reports.
The teachers reported that 1,037+ students were engaged by the projects at their schools and a similar amount will be impacted each year going forward. The teachers worked with the project evaluator to assess student outcomes throughout the project. The evaluator looked at many different options to assess the students. It was hoped that comparisons could be made with Minnesota Comprehensive Assessments, but that proved difficult for many reasons. However, the evaluator did find that potentially students in the EOE projects at two schools may be associated with stronger science and reading achievement on the MCAs than in comparable schools. Teachers and students perceived that the project helped students achieve standards in multiple content areas and created a positive influence on engagement, EOE sensitivity, understanding and skills. Surveys of students suggested a significant increase in understanding of ecological systems among participants. The students from two schools that took the national Middle School Environmental Literacy Survey scored significantly higher on MSELS than the national mean.

The mini-grants proved to be a big incentive and valuable tool to enable the schools to accomplish a lot of quality EOE outcomes. Specific results and recommendations from the project, including the full evaluation report, are available in the final project report that is being submitted to LCCMR and will be posted on SEEK.

Result Status as of January 30, 2013:
The six pilot schools reported in their recent interim reports that they have plans or have expended their mini-grants and have implemented the majority of their grant activities. Staff continue to monitor and support the schools and plan to visit each of them at least once more before the end of the project.

Teachers continue to engage their students in the project and work closely with the project evaluator to assess the outcomes of the project. Last September the pilot schools did pre-assessments with at least two classrooms of their current students with questionnaires developed by the project evaluator. The same students will be given post-assessments this spring. The evaluator is working with a couple of the larger projects to assess the feasibility of using Minnesota Statewide Comprehensive Assessments to see if any comparisons can be made with that data also. The national Middle School Environmental Literacy Survey (MSELS) developed by the Center for Instruction, Staff Development & Evaluation will again be administered to two additional classes in the spring.

Result Status as of July 30, 2012:

The six pilot schools are in various stages of implementing their grant projects. They are being monitored and supported by the project coordinator and the three regional specialists, including site visits to all six schools in the last few months. Teachers at the pilot schools were required to identify the number of students impacted during the project, which they estimated to be over 1200 students. In April, the pilot schools were asked to provide at least two classrooms of their current students with an end of year one assessment and complete teacher questionnaires developed by the project evaluator. Two of the schools also volunteered to have a section of their eighth graders participate in the national Middle School Environmental Literacy Survey (MSELS) developed by the Center for Instruction, Staff Development & Evaluation.

Despite only partial implementation of some of the grant projects, the project evaluator found that the 159 students assessed in April reported that participating in their EOE project somewhat increased their academic engagement, environmental sensitivity, and understanding of ecological systems. This is consistent with the seven teacher respondents on the post year one questionnaire, who indicated somewhat of an increase in these areas for students who participated in the EOE projects. Students indicated learning outdoor skills such as survival skills (fire and shelter building), navigation, and snow shoeing. Teachers, interestingly, when asked what outdoor skills students' learned, indicated similar skills, but also listed things such as phenology, gardening, building a rain garden, tree identification, etc.. One open-ended student response to note: "This project encouraged me to teach my niece about the importance of taking care of the environment. Because of this class, I was inspired to go outside and pick up trash in my neighborhood with my niece."

Year two data collection regarding student learning outcomes will include pre- and post-testing for the youngest grade level participants at each school, as well as post-only questionnaires for students have participating in year one. Teachers will also complete a questionnaire at the end of year two regarding their perceptions of student learning. The MSELS has not yet been scored or analyzed, but it will be administered to two additional classes next spring.

Result Status as of January 25, 2012:

A request for proposals was released to Minnesota middle and high schools in mid-August 2011 encouraging them to apply for the mini-grants. Twenty-one applications were received and reviewed with the help of Advisory Committee members. The following six schools were selected and awarded mini-grants in the amount of up to $5,000 in late November 2011:

- Concordia Creative Learning Academy, St. Paul
- Kennedy Community School, St. Cloud Public Schools
- Rockford Middle School Center for Environmental Studies
- River's Edge Academy, St. Paul
- Simley High School, Inver Grove Heights
- Waconia High School

The school projects will impact approximately 1600 or more students in multiple and diverse content areas, including a high percentage of at-risk and underachieving students. Included in the schools are two charters, an alternative learning program and a couple of traditional, public middle schools and high schools.

Over the next several months, the Project Coordinator and regional specialists will be supporting the schools in the implementation of their projects and working with the evaluator to effectively measure the impact of the projects.

Result Status as of August 3, 2011:
This outcome has needed to be adjusted due to the delays in hiring the coordinator, the state government shutdown and timing a request for proposals to match when school personnel would be available and able to respond (i.e. not during the summer). However, advisory committee members have been providing guidance by reviewing priorities and criteria for a mini-grant program, and we have been gathering the necessary plans and paperwork to put out notice of the mini-grant program through a request for proposals to schools as soon as possible. With the granting of the extension and once the amended workplan is approved, we will be ready to release the grant RFP within a couple of weeks.

Result Status as of January 2011:
Applications for the coordinator position have been received and screened for eligibility. Interviews are scheduled for early January.

V. TOTAL ENRTF PROJECT BUDGET:

Personnel: $ 215,000 for fulltime project coordinator

Contracts: $ 60,652 ($10,000 for program evaluation; $50,652 for innovation mini-grants)

Equipment/Tools/Supplies: $ 3,000

Acquisition (Fee Title or Permanent Easements): $ 0

Travel: $ 6,848 in-state travel following state guidelines for travel expense reimbursement. This amount includes mileage, meals and housing for at least 30 teachers, 3 regional trainers, and 12 advisory committee members, as identified in the table of Part IV Result 1, to attend meetings and training workshops.

- Mileage is limited to people who live greater than 50 miles from the event sites.
- Housing is for the regional training events, which will be held at residential environmental learning centers. Training events at environmental centers are estimated at $40 per day for meals and housing.
- Meeting expenses are estimated at $9/day for meal expenses.

Travel expenses will be reimbursed at applicable state employee rates for the Project Coordinator and the Evaluator to attend events and visit grantee schools.

Additional Budget Items: $ 14,500. This amount includes the following—

1. Reimbursements for substitute teachers to enable 30 teachers to attend follow-up workshops. (Substitute reimbursement: $125/day for 2 days)
2. Stipends for up to 3 Regional Trainers to develop and present training and follow-up workshops and to provide support to teachers during the project.

TOTAL ENRTF PROJECT BUDGET: $ 300,000

Explanation of Capital Expenditures Greater Than $3,500: NA

VI. PROJECT STRATEGY:

A. Project Partners: The Department of Natural Resources (DNR) is partnering with the Minnesota Department of Education (MDE) on this project. MDE's contact at DNR will be C.B. Bylander, DNR Outreach Section Chief. Both agencies co-chaired the legislatively mandated Outdoor Education Advisory Committee which published the *Outdoor Education Legislative Report – 2009*. Other partners will include the following--

- *Project Coordinator:* Fulltime staff person to be hired at the Minnesota Department of Education with expertise in implementing environmental education and/or outdoor education within a standards-based curriculum at the secondary level (grades 7-12).
- *Evaluator:* Consultant to be contracted by the Minnesota Department of Education who will plan and implement the evaluation activities throughout the duration of the project. Contractor will be selected using criteria developed by the Minnesota Department of Education.
- *Advisory Committee:* Leaders in environmental education and outdoor education from state agencies, environmental learning centers, school curriculum coordinators, and postsecondary education and others with expertise in environmental or outdoor education or school curriculum.
- *Regional Trainers:* Educators with secondary classroom knowledge and experience, especially in the areas of environmental and outdoor educatioon.

B. Project Impact and Long-term Strategy:

This project is a direct response to state and national trends that show declining participation in outdoor recreation, a decreased understanding of the natural world, and a shift to a more sedentary lifestyle. These trends are linked, in part, to issues identified by the Outdoor Education Advisory Committee in its *Outdoor Education Legislative Report – 2009;* and in the document, *A GreenPrint for Minnesota: State Plan for Environmental Education, third edition.* This project addresses four strategic themes identified in the reports: 1) increasing understanding of outdoor education and its benefits, 2) improving understanding of ecological systems, 3) garnering resources to support implementation of outdoor education, and 4) making environmental and outdoor education "academically relevant" through connections to state standards.

Specifically, this project will improve the achievement of students in grades 7-12 by using the environment and the outdoors as a context for academic learning. In addition to mastering selected academic standards, students will develop their outdoor skills and increase their understanding of the natural environment. These goals will be achieved by providing professional development to teachers, and funding innovative programs—two strategies identified in the *Outdoor Education Legislative Report – 2009.* An evaluation plan will be designed during the initial stages of the project to ensure that the professional development and innovation grant activities are appropriately monitored and reported, and that subsequent conclusions about the project results are well-informed. Also, the ongoing evaluation will permit adjustments in program activities to achieve the desired results.

A description of the project and its impact or results will be reported in a written evaluation following the conclusion of the project. The report will identify project activities that demonstrate the greatest potential for improving the academic achievement of secondary students by using the environment and outdoors as a context for learning. These "promising" activities can be the basis for future grant proposals, curriculum improvement efforts, and professional development intended to reach a wider audience of teachers and students. For example, exemplary lesson plans developed by teachers will provide concrete illustrations of how to integrate environmental concepts and outdoor skills with Minnesota's academic standards. These model lesson plans will be reported on the SEEK (Sharing Environmental Knowledge) website and incorporated into the professional development carried out by the regional Math and Science Teacher Academies. Resources to assist teachers in their planning of standards-based environmental and outdoor education activities will be posted on the SEEK site, as well. Insights and "lessons learned" through this project will benefit educators in environmental learning centers and state agencies (e.g., DNR, PCA, MDE) and other providers of environmental and outdoor education.

C. Other Funds Proposed to be Spent during the Project Period:

The Minnesota Department of Education will provide in-kind support including a workspace at its Roseville site, office technology (computer, telephone, audio-visual equipment, etc.), transportation support, workshop and meeting space, and professional collaboration with state instructional specialists in the content areas. It is anticipated that the Department of Natural Resources, other state agencies and educational entities are likely to contribute staff time toward one or more parts of the project.

D. Spending History: None

VII. DISSEMINATION: Information about the project results will be shared in the following ways:

- A final report, including findings of a project evaluation, will be created.
- Professional development plans (i.e., training modules) and selected model lesson plans will be compiled for access by educators and the public on the Minnesota Department of Education and/or SEEK (Sharing Environmental Knowledge) websites.

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than January 2011, August 2011, January 2012, July 2012 and January 2013**. A final work program report and associated products will be submitted between June 15 and August 1, 2013 as requested by the LCCMR.**

IX. RESEARCH PROJECTS: NA

Attachment A: Budget Detail for 2010 Projects - Summary and a Budget page for each partner (if applicable)

Project Title: Innovative Model for Environmental and Outdoor Education in Grades 7-12

Project Manager Name: Jeff Ledermann, Minnesota Department of Education

Trust Fund Appropriation: $ 300,000

1) See list of non-eligible expenses, do not include any of these items in your budget sheet

2) Remove any budget item lines not applicable

2010 Trust Fund Budget	**Result 1 Budget:**	**Amount Spent** *(6/28/13)*	**Balance** *(6/28/13)*	**Result 2 Budget:**	**Amount Spent** *(6/28/13)*	**Balance** *(6/28/13)*	**TOTAL BUDGET**	**TOTAL BALANCE**
	Professional development	Professional development	Professional development	Innovation mini-grants	Innovation mini-grants	Innovation mini-grants		
BUDGET ITEM								
PERSONNEL: wages and benefits: Project Coordinator*	172,000	179,563	-7,563	43,000	44,891	-1,891	215,000	-9,453
Contracts								
Professional/technical: Evaluator contracted via MDE evaluation criteria	5,000	5,000	0	5,000	5,000	0	10,000	0
Other contracts Grants to schools via RFP developed by advisory committee members		0		29,687	32,336	-2,649	29,687	-2,649
Other contracts Round 2 teacher development and/or curriculum updating	20,965	12,290	8,675		0	0	20,965	8,675
Supplies Instructional materials	3,000	1,222	1,778				3,000	1,778
Travel expenses in Minnesota meals, lodging and mileage for planning, training, support and evaluation	5,776	5,330	446	1,072	1,333	-261	6,848	185
Substitutes for teacher participants	7,000	6,388	612		0	0	7,000	612
Stipends for regional specialists	7,500	7,500	0		0	0	7,500	0
COLUMN TOTAL	**$221,241**	**$217,293**	**$3,948**	**$78,759**	**$83,560**	**-$4,801**	**300,000**	**-853**
*In FY12, tracking time indicates the project coordinator is spending about 20% of total time and travel on activities that support result 2. Activities that support the over-arching goals of the project and/or simultaneously support outcomes associated with both results are reported in the Result 1 wages.								*$853 over budget to be covered by MDE.

Environmental and Outdoor Education in Minnesota

Goal of Environmental Literacy
Since 1990, state goals for environmental education have been in place with the objective of an environmentally literate citizenry (see sidebar). However, according to the *Third Minnesota Report Card on Environmental Literacy*, almost 38 percent of Minnesota adults have a below-average level of knowledge about the environment. Only eight percent received an A grade.

Minnesota Department of Education (MDE) Coordinates Project to Support Environmental and Outdoor Education
With funding from the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources, beginning in 2011, MDE will be coordinating a project to integrate environmental education and outdoor education into the instruction of academic standards for students in grades 7-12. Professional development and program incentive grants will be provided to help teachers use the environment and outdoors as a context for student learning.

Outdoor Experiences Critical to Attitudes and Behaviors that Protect the Environment
People that participate in nature-based outdoor activities as children are more likely to have attitudes favorable toward the environment and engage in behaviors that are protective of the environment (Wells and Lekies, 2006). Additionally, experience out-of-doors builds creativity, physical competence, social skills, environmental knowledge, confidence and problem-solving (Chawla, 2006).

Environment-based Learning Boosts Achievement
Students demonstrate improved achievement when receiving school instruction that uses the environment as an integrating context for learning. Studies have shown that students scored as well or better on standardized measures in reading, math and language. This approach also has been shown to foster cooperative learning and civic responsibility (SEER, 2005).

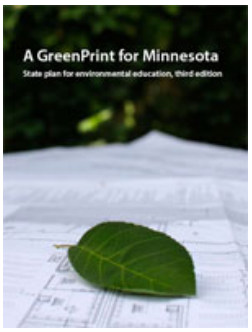
For more information, contact:
Jeff Ledermann
Environmental and Outdoor Education Coordinator
Minnesota Department of Education
1500 Highway 36 West, Roseville, MN 55113-4266
651-582-8602
jeff.ledermann@state.mn.us

Minnesota Statute § 115A.073
ENVIRONMENTAL EDUCATION GOALS
(a) Pupils and citizens should be able to apply informed decision-making processes to maintain a sustainable lifestyle. In order to do so, citizens should:
(1) understand ecological systems;
(2) understand the cause and effect relationship between human attitudes and behavior and the environment;
(3) be able to evaluate alternative responses to environmental issues before deciding on alternative courses of action; and
(4) understand the effects of multiple uses of the environment.
(b) Pupils and citizens shall have access to information and experiences needed to make informed decisions about actions to take on environmental issues

Environmental and Outdoor Education Resources

SEEK Minnesota's home of environmental education resources

SEEK (Sharing Environmental Education Knowledge), is the home of Minnesota's environmental education (EE) resources. SEEK is a dynamic website that is constantly evolving. It includes a comprehensive directory of over 1200 resources, press releases, employment opportunities, research abstracts, web links, a calendar of events, and much more.



A GreenPrint for Minnesota: State plan for environmental education, third edition is the state plan for environmental education for 2008-2018. It was developed by the Environmental Education Advisory Board, which sunset as of June 30, 2008, and supporting staff with input from the environmental education community. *GreenPrint, third edition* is designed to serve those who educate, provide funds, develop programs, support efforts, and set policies that affect environmental education in Minnesota.

The **Environmental Literacy Scope and Sequence** (March 2002) is designed to help create opportunities for mainstreaming environmental education (EE) in a way that has not been possible before. It provides a systems approach to environmental education that can focus the efforts of teachers and deliverers of EE to unify their many independent efforts to achieve the goal of environmental literacy. Because the Scope and Sequence is based on both state and national standards, it enables environmental education deliverers to build, adapt or integrate curriculum and assessments that are most appropriate for their particular grade level or audience.

The Children & Nature Network (C&NN) was created to encourage and support the people and organizations working nationally and internationally to reconnect children with nature. The network provides a critical link between researchers and individuals, educators and organizations dedicated to children's health and well-being.

Minnesota Association for Environmental Education: http://www.minnesotaee.org/
Minnesota Naturalists Association: http://www.mnnaturalists.org/
Minnesota Department of Natural Resources: http://www.dnr.state.mn.us/index.html
Minnesota Project Get Outdoors : http://mnprojectgetoutdoors.org/

Research Cited:

Chawla, Louise. (2006). "Learning to Love the Natural World Enough to Protect it," *in Barn nr. 2* 2006:57-58.

SEER. (2005). "California Student Assessment Project Phase Two: The Effects of Environment-Based Education on Student Achievement." SEER: Poway, CA. Available on website of the State Education and Environment Roundtable (SEER) at www.seer.org.

Wells, Nancy M. and Kristi S. Lekies. (2006). "Nature and the Life Course: Pathways from Childhood Nature Experiences to Adult Environmentalism." *Children, Youth and Environments 16*(1): 1-24.

MDE Environmental and Outdoor Education Project Outreach Activities

Date	Event/Meeting	Location	# of Educators	# of Students
4/8/11	Midwest EE Conference	Rochester	50	
4/12/11	DNR Education Committee	St. Paul	10	
4/13/11	DNR Outdoor Mentor Program	St. Paul	1	
4/15/11	Nature Connection Workshop	White Bear Lake	30	
4/20/11	Renewable Energy Guide for Schools	St. Paul	5	
4/27/11	EE/OE Advisory Committee	Roseville	25	
4/30/11	MN Science Teachers Board	St. Paul	20	
5/5/11	Jeffers Pond Env. Festival	Prior Lake	5	25
5/12/11	Green Schools Workshop	St. Paul	10	
5/13/11	OHA Nature Day	Mahtomedi	10	80
5/17/11	3 Rivers Park Workshop	Plymouth	12	
6/27-29/11	Rivers Institute, Hamline University	St. Croix River State Parks	60	
8/12/11	Will Steger Foundation Teacher Workshop	Apple Valley	100	
8/17/11	Green Schools Coalition	St. Paul	20	
8/18/11	Health Science Educators Workshop	Roseville	20	
8/23/11	Math and Science Frameworks Workshop	Roseville	100	
8/30/11	Math and Science Partnership	Roseville - phone	22	
9/1/11	Wilderness Inquiry	Minneapolis	4	
9/1/11	CERTs Grantees	Minneapolis	15	
9/13/11	PCA managers	St. Paul	2	
9/13/11	DNR Education Committee	St. Paul	8	
9/14/11	Math and Science Frameworks Workshop	Roseville	50	
9/15/111	PCA School Sector Staff	St. Paul	8	
9/22/11	MAEE Board Meeting	Sandstone	10	
10/13/11	GreenCorps Members	St. Paul	24	
10/14/11	Metro State Education Students	Afton	10	
10/19/11	Energy Education Working Group	St. Paul	8	
10/20/11	Education MN exhibits	St. Paul	40	
11/17/11	Interagency Pollution Prevention Advisory Team	Roseville	20	
12/8/11-12/9/11	EOE Teacher Training	Maple Plain	50	
12/14/11	Green Ribbon Schools Advisory Group	Roseville	17	

1/23/12	Student EOE Presentation	Roseville	16	6
1/25/12	Will Steger Foundation	Roseville	3	
1/30/12	Rockford School Board	Rockford	12	
2/28/12	National Green Schools Conference	Denver	80	
3/5/12	School Recycling Focus Group	St. Paul	15	
3/8/12	Children and Nature Connection	Roseville	6	
3/14/12	Conserve School	Land O'Lakes	5	60
3/21/12	Environmental Initiative Awards	Fridley	25	
3/22/12	Concordia Creative Learning Academy	St. Paul	5	
3/28/12	Rivers Edge Academy	St. Paul	8	
4/5/12	PCA School Planning	St. Paul	4	
4/10/12	DNR Education Committee	St. Paul	8	
4/12/12	MN Green Schools Coalition	St. Paul	40	
4/24/12	MN Ag Teachers Conference	St. Paul	140	
4/25/12	3 Rivers Parks EE Panel	Plymouth	6	
4/30/12	Children and Nature Connection	White Bear Lake	11	
5/3/12	EOE Advisory Committee	Prior Lake	6	
5/4/12	Rivers Institute Planning	St. Paul	6	
5/14/12	Rockford Middle School	Rockford	6	
5/14/12	Waconia Public Schools	Waconia	3	
5/17/12	Children and Nature Connection	St. Paul	6	
5/18/12	Special Education Directors Conference	Roseville	25	
6/4/12	National Green Ribbon Schools Workshop Panel	Washington, DC	50	
6/13/12	Kennedy Community Schools	St. Joseph	20	
6/21/12	MAEE State Conference Presentation	Itasca	22	
6/25-26/12	Rivers Institute, Hamline University	Interstate and Afton State Parks	54	
7/7/12	Digital Bridge to Nature Workshop	Vadnais Heights	14	
7/11/12	EOE Regional Workshop	Rochester	25	
7/23-25/12	Rivers Institute, Hamline University	Fort Snelling State Park	60	
7/31/12	EOE Regional Workshop	St. John's U	18	
8/6/12	Meet with Will Steger Staff	Minneapolis	8	
8/7/12	Will Steger Teacher Institute	Apple Valley	80	
8/8/12	Cretin-Derham Hall Teachers	St. Paul	3	
8/9/12	St. Paul Teachers EE	St. Paul	20	

	Workshop			
8/10/12	Children Nature Connection	St. Paul	9	
8/13/12	EOE Regional Workshop	St. Paul	33	
8/23/12	IPPAT	St. Paul	16	
9/20/12	State Agency Health Group	St. Paul	12	
9/25/12	Growing School Partnerships	St. Louis Park	20	
9/25/12	EOE Regional Workshop	Sandstone	14	
10/2/12	EOE Advisory Committee	West St. Paul	8	
10/9/12	Green Schools Coalition	St. Paul	36	
10/11/12	Upper Mississippi Academy	Roseville	1	
10/29/12	Green Schools Workshop	St. Joseph	12	
10/30/12	Children Nature Connection	St. Paul	8	
11/5/12	Green Schools Workshop	West St. Paul	40	
11/14/12	Dragonfly Workshop Planning	Roseville	2	
11/15/12	MAEE Meeting	St. Paul	10	
11/28/12	Green Schools Workshop	Duluth	50	
11/30/12	Science Standards Workshop	Roseville	50	
12/4/12	Healthy Schools Conference	St. Paul	15	
12/18/12	MDH School Env Quality Working Group	St. Paul	12	
1/9/13	Designing Natural Play Areas Presentation	Roseville	70	
1/18/13	MN School Board Presentation – Green Schools	Minneapolis	12	
1/23/13	EOE Regional Workshop	North Mankato	16	2
1/25/13	Hennepin County School Organics Group	Golden Valley	18	
2/21/13	MN Clean Energy Conference	St. Cloud	35	
2/22/13	MN School Gardening Conference	Chanhassen	14	
2/26/13	Green Schools Conference Planning Team	St. Paul	5	
2/26/13	Sustainability Workshop at Science Museum	St. Paul	10	
2/28/13	Project Get Outside Meeting	St. Paul	6	
3/6/13	OH Anderson Elementary horse logging	Mahtomedi	3	75
3/19/13	MN Junior Duck Stamp Competition	Bloomington	10	
3/21/13	MN Green Schools Coalition Strategic Planning Meeting	St. Paul	15	
3/27/13	Renewable Energy Concept Center Planning Meeting	St. Paul	6	
3/28/13	Fox 9 Think Green Award Judging	St. Louis Park	6	
4/10/13	Watershed Partners Meeting	Minneapolis	20	

4/12/13	MN Children and Nature Connection	Bloomington	10	
4/17/13	Metro CERTs Event	St. Paul	20	
4/18/13	GreenStep Schools Meeting	St. Paul	6	
4/23/13	Jeffers Foundation Meeting	Plymouth	13	
4/25/13	Sustainability Semester School	St. Paul	3	
5/1/13	Indian Education Grant Review	St. Paul	4	
5/8/13	Global Learning Experts	St. Paul	6	
5/21/13	MDH School Meeting	St. Paul	12	
5/22/13	EOE Advisory Committee	Rockford	10	
6/11/13	DNR Education Committee	St. Paul	8	
6/12/13	MN Gifted and Talented Education Conference	Austin	22	
6/15/13	Natural Play Area Field Trip	West St. Paul	18	
TOTALS			**2302**	**248**
4/1/13	Mom Enough Interview	Minneapolis	1000+	

Minnesota Department of Education

“Integrating Environmental and Outdoor Education in Grades 7-12”

Final Report

By Jeff Ledermann

June 28, 2013

Project Coordinator: Jeff Ledermann, Environmental and Outdoor Education Coordinator

Project Director: Beth Aune, Director, Academic Standards and Instructional Effectiveness

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1500 Highway 36 West
Roseville, MN 55113-4266
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http://education.state.mn.us

Funding Source: Environment and Natural Resources Trust Fund

Legal Citation: M.L. 2010, Chap. 362, Sec. 2, Subd. 8g;
M.L. 2011, 1st Special Session, Chapter 2, Article 3, Subd. 18. Carryforward (b)

Funding for this project was provided by the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR).

The Trust Fund is a permanent fund constitutionally established by the citizens of Minnesota to assist in the *protection, conservation, preservation, and enhancement of the state's air, water, land, fish, wildlife, and other natural resources.*

Currently 40% of net Minnesota State Lottery proceeds are dedicated to building the Trust Fund and ensuring future benefits for Minnesota's environment and natural resources.

About the author: Jeff Ledermann is a former high school science teacher and has worked for the State of Minnesota for over 20 years on a variety of award-winning environmental education and outreach programs, including author of *A GreenPrint for Minnesota, Second Edition: State Plan for Minnesota* and founder of the Eco Experience at the Minnesota State Fair. He did his undergraduate work at the University of Minnesota-Morris and has a Master of Arts in Liberal Studies degree from Hamline University with an emphasis in environmental studies and education.

Cover photos: Rockford Middle School students discover the academic benefits and joy of environmental and outdoor education. Photo credit – Beth Russell, Rockford Middle School

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Introduction

Recent and emerging research indicates that students are increasingly disconnected from nature. Citing the challenges associated with a student population rarely exposed to the outdoors, the 2010 Minnesota Legislature appropriated $300,000 from the Minnesota Environment and Natural Resources Trust Fund (ENRTF) as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR) to the Minnesota Department of Education (MDE). In cooperation with the Minnesota Department of Natural Resources, MDE hired a full-time coordinator to lead a project to train and support grade 7-12 teachers to integrate environmental and outdoor education (EOE) into the instruction of academic standards. Professional development and grants of up to $8,500 were provided to six pilot schools to support 50 teachers and administrators in their use of the environment and outdoors as a context for student learning, which resulted in engaging over 1,000 additional students in EOE on a regular basis during the 2011-13 school years.

Beyond the original goals of the project, the project coordinator developed partnerships with several EOE providers to coordinate and offer five, additional, day-long regional workshops at minimal cost that were attended by 108 additional educators not from the pilot schools.

The project coordinator also developed and implemented Minnesota's participation in the first two years of the U.S. Department of Education's Green Ribbon Schools Program that recognizes schools for efforts to reduce their environmental impact and implement EOE throughout their curriculum. Minnesota led the nation with the most applicants in 2013 and seven Minnesota schools and districts were among 156 schools that have received the national award to date. Workshops led by the coordinator at the sites of Minnesota's three 2012 national honorees were attended by over 100 people.

Several promising activities were identified during the project, many of which were tested and evaluated. They included teacher training, mini-grants to schools, community partnerships, children and nature connections, green school programs, connections with MDE staff, school administrative support, and the need for a national EE program model. These activities, challenges and the project evaluation are described in detail in the report.

Training

Recognizing that teachers and administrators would be the key to implementation and sustaining the efforts to integrate EOE into Minnesota schools, training of educators was established early on as a priority of the project. With the support of an Environmental and Outdoor Education Advisory Committee (EOEAC, members listed in Appendix C) and three regional trainers, shortly after his hiring in March of 2011 the project coordinator began the task of establishing the criteria to select six pilot schools and establish the framework for the training. It was determined that offering high level training taught by some of Minnesota's EOE experts would be an extra incentive for schools to apply for the project's mini-grants. In addition, the two-day intensive training would provide them with the necessary background and skills to maximize the impact of the mini-grant funds.

Grantees

A sub-committee of the EOEAC met with the coordinator and regional trainers and quickly established targeted outcomes for the training of the teachers from the pilot schools. The project evaluator also helped survey the initial 32 educators from the project pilot schools to determine their needs for the training. With the input from the educators, the project coordinator set out to determine a location for the pilot training and solicit state EOE experts to participate. Drawing upon years of relationships and experience in the EOE field, he was able to find several partners willing to donate their time and resources to participate in the project, including staff from DNR, Master Naturalist Program, Jeffers Foundation, SEEK, Three Rivers Park District, Pheasants Forever, MDE Academic Standards Team and several local community partners.

Centrally located for most of the grantees to save travel expenses and transportation emissions, Camp Courage, a residential camp and environmental center in Maple Lake with diverse outdoor learning areas, was chosen as the location for the initial pilot training in December of 2011. Thirty-two teachers and administrators from the six pilot schools were able to attend. Eighteen more teachers from the pilot schools participated in later trainings. The initial training agenda (Appendix D) focused on building skills for EOE, state and local resources, examples of good EOE curriculum, alignment with the state academic standards and time to meet in teams to begin planning the process of integrating their projects over the next one and one-half years.

Figure 1. Exploring Camp Courage natural areas during a school forest lesson led by DNR staff at the pilot training.

Figure 2. Teachers measure tree circumference at Camp Courage. Mathematics is just one example of the many ways academic standards can be achieved within an environmental context.

Regional Workshops

Beyond the original goals of the project, the project coordinator also developed partnerships with several EOE providers to coordinate and offer five, additional, day-long regional workshops

(see Appendix E for workshop flyer) at minimal cost that were attended by 108 additional educators not from the pilot schools. The workshops were held at environmental learning centers that donated space. These centers were Cascade Meadow Wetlands & Environmental Science Center, Rochester; St. John's University Arboretum, Collegeville; Como Park Streetcar Station, St. Paul; Audubon Center of the Northwoods, Sandstone; and South Central Service Cooperative, North Mankato.

The introductory EOE regional workshops developed with the DNR, Jeffers Foundation and other local partners have led to additional opportunities for coordinated workshops. In particular, the Jeffers Foundation has expressed interest in continuing to work with MDE on future workshops patterned after those developed during the project.

Figure 3. Teachers investigate natural landscapes at the Cascade Meadow Wetlands and Environmental Science Center in Rochester.

Various other presentations, meetings and outreach

In addition to the several EOE workshops and trainings, the coordinator has directly reached over 2,300 other educators through technical assistance and teaching, including participating in several workshops, programs and events. The coordinator also made regular efforts to promote activities related to the project and the benefits of environmental and outdoor education whenever possible throughout the duration of the project. EOE information, resources and achievements, such as the Green Ribbon Schools honorees, were regularly shared through MDE's Superintendent mailings and department listserves and newsletters and listserves by SEEK, Minnesota Association for Environmental Education, Minnesota Science Teachers Association, Green Schools Coalition, Children and Nature Connection, Minnesota Sustainable Communities Network and many others.

The coordinator had occasional opportunities to do some media activities, including a 20 minute interview about the value of EOE on the April 1, 2013 show of the podcast, Mom Enough, which has a national following of several thousand listeners. The interview can be found at http://momenough.com/2013/04/lets-get-outside-tips-for-parents-and-teachers-from-an-environmental-educator-and-creative-dad. Local media from the communities of the pilot schools and Green Ribbon School honorees also developed several news stories covering the value of EOE activities.

Information about the project, including the final report and model lessons, will be posted on the SEEK (Sharing Environmental Education Knowledge) website at www.seek.state.mn.us, hosted by the Minnesota Pollution Control Agency.

Figure 4. EOE display at a healthy schools conference.

Pilot Schools

Selection of the six EOE project schools was done through an open invitation for proposals by MDE early in the 2011-2012 school year. The invitation was shared widely across the state, including SEEK, MDE's Superintendent mailing and several department and other organizational newsletters and electronic maillists. As required by the appropriation from the ENRTF, only programs targeting public school students in grades 7-12 were eligible to apply. Dozens of schools inquired about the project and MDE received 20 applications.

The applications were reviewed and scored by a team of internal and external education experts. Original awards of up to $5,000 were awarded to Concordia Creative Learning Academy, Kennedy Community School, River's Edge Academy, Rockford Middle School, Simley High School and Waconia Public Schools. Attempts were made to solicit and choose a diverse group of schools. The pilot schools included two charters, an alternative learning center, community schools, large public schools, schools from urban, suburban and rural communities, new and old buildings and schools with a high percentage of youth from disadvantaged backgrounds.

After the initial training at Camp Courage, it became clear that due to the diverse training needs and interests of the pilot schools and the high cost and logistics, it wasn't feasible to bring the group together again for a large, combined training. Instead, with approval from LCCMR, MDE amended the original grant awards and offered each school up to an additional $3,500 for professional development training and to adopt or revise their curriculum. Individual schools received up to a total of $8,500 and total awards to all schools amounted to $44,626.51. Projects ranged from gardening to water quality testing to additional teacher training to support curriculum revision and are highlighted over the next several pages. The pilot teachers reported that as a result of the mini-grants they engaged 1,037 students in studying the environment and going outside on a regular basis and will continue to reach a similar number of students each year.

Concordia Creative Learning Academy

Address:

930 E Geranium Ave
St Paul, MN 55106
(651) 793-6624

Contact:

Jesse Maloney, Science Teacher
jesse@cclaonline.org

Concordia Creative Learning Academy is a charter school in the St. Paul School District. Four teachers were trained as part of the EOE project. Unfortunately, after the first year of the project, three of the four teachers left the school for other positions. However, the lead teacher has provided approximately 55 students with numerous new and innovative environmental and outdoor education experiences. The mini-grant funds were used for educational equipment and supplies, including microscopes and snowshoes. Water quality and watershed investigation was a primary focus of the project.

- Several science lessons were adapted to integrate outdoor, real-world components and other subjects, such as math and geography.
- In addition to water quality testing, they have built a gazebo, snowshoed several times, collected and made maple syrup and collected samples to study air quality.
- They plan to continue to take one outdoor trip per month in the foreseeable future.

The lead teacher reported the following:

> "Students have really enjoyed their time participating in this project. Students were happy to combine water fun with work. They loved launching their rafts to test their occupant capacity and buoyancy. Students have used the microscopes for a number of activities since their arrival. They have grown their own mold and studied their spores. They have looked at the dust germs at the middle of snowflakes. Another benefit of the project is that students were required to create a large report based on data collected over a number of weeks. It was a difficult yet rewarding process. Students are more aware of the effects of runoff and littering. When we assessed whether they believe this project has influenced them to want to be better stewards of the environment with their new knowledge, 78% of students responded, "yes.'"

He added that involvement in the EOE project appealed to all students at CCLA, who come from a wide diversity of cultures and backgrounds.

Figure 5. CCLA student making Secchi disks for their water quality investigation.

Figure 6. CCLA students preparing to launch the rafts they made for water quality studies.

Figure 7. Heading out on a snowshoe hike.

Figure 8. A CCLA student with a nature discovery.

Kennedy Community School

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St. Joseph, MN 56374
(320) 363-7791
http://isd742.org/kennedy/
http://kennedyee.weebly.com

Contact:

Rick Wilson, Science Teacher
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Fifteen teachers working with 400 middle school students were engaged by the EOE project at Kennedy Community School, which is K-8 school in a rural area on the western edge of the St. Cloud School District. They primarily used their funding for trail construction in their on-site prairie and additional teacher training and curriculum revision.

- Students at Kennedy are now outside and using the prairie on a regular basis doing science, reading in the garden, taking measurements for Math, writing poetry, creating drawings, collecting samples, taking pictures for further research, and learning stewardship.
- Groups of teachers are working to take adapted lessons and match them to standards that correspond to grade level.
- They created a Weebly website for teachers and students that allows teachers to find ideas, resources, and pre-made plans to help them take their students outside.

Kennedy's lead teacher reported the following:

> "This project has been incredibly beneficial to our staff and students. During our staff development sessions many of our staff came and learned about how to get students outside. Since then, many students in many grades have spent time outside learning about the flora and fauna. It has really opened our eyes to the opportunities to teach outside. Many of those participating do not think of spending time outside as "something extra" any longer. It is simply a part of what we do.
>
> For our project, we really were searching for a means to get students outside to our prairie. Many just needed a starting point to welcome them out to this space. That is what our nature trail did for us. Many teachers are taking their students out quite regularly. In the past we would see a class outside and the students would want to know what they are doing. Now, when we see people in the prairie it is just a normal occurrence. In conjunction with the physical education teacher, she has revived an old program where the students count the miles they have walked on the trail. So, now students are able to enjoy nature while they exercise. Students have currently logged 1,160 miles!"

Figure 9. A frog found during science class at Kennedy.

Figure 10. Collecting water samples and taking notes at the pond near Kennedy.

Figure 11. Kennedy students note changes on the prairie in early spring.

River's Edge Academy

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Phone: 651-234-0150
http://riversedgeacademy.org/

Contact:

Meghan Cavalier, Executive Director
mcavalier@reamn.org

River's Edge Academy is a small, charter school with a diverse student body just across the Mississippi River from downtown St. Paul. Five teachers and 65 students participated in the EOE project. Funding was used for equipment and supplies for their new outdoor learning space, which has a gardening focus, and to support teachers making revisions to their curriculum.

- Several lessons were adapted to encourage use of the outdoor classroom. Lessons will continue to be created or modified to include environmental concepts or approaches.
- The students at REA installed and maintained seven raised bed gardens.
- Every class at REA has utilized the outdoor classroom.

River's Edge Academy's Director reports that:

> "The EOE project was a spring board for River's Edge Academy to create a flexible and functional outdoor classroom. This space has allowed for safe and high quality learning! The school's gardens and chickens have been embedded into both the curriculum and school culture. Science classes, a gardening elective, and student interns supported this process. The school's collaborative relationship with the Youth Farm and Market Project was strengthened. Students had several opportunities to volunteer in the green house and participate in workshops. Over 20 parents and community volunteers helped to build and install the raised beds. This project has encouraged teachers to not only utilize the space, but also embed environmental themes into curriculum."

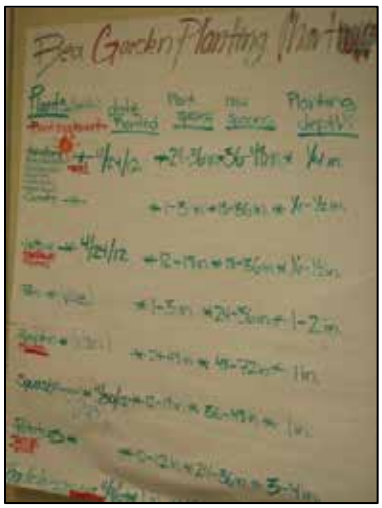

Figure 12. REA's plan for a garden in their new outdoor learning area.

Figure 13. Thanks to the students' efforts, REA gardens flourished in the hot dry summer of 2012.

Figure 14. REA's outdoor space also includes feathered subjects.

Rockford Middle School – Center for Environmental Studies

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Rockford Middle School is in a rural community just west of the quickly growing Minneapolis suburbs. After losing enrollment to neighboring schools, the district made the commitment to become a STEM (science, technology, engineering and mathematics) magnet with an environmental focus starting in the fall of 2011. The EOE project coincided exactly with their conversion and was extremely valuable to supporting and training their teachers through the transition. Twenty teachers and 360 students have been impacted by the EOE grant. Project funds were used for teacher training and curriculum revisions, and environmental themes were integrated into all grade levels and most classes. With a high level of support from the administration, a school-wide commitment and involvement of many community partners, the staff achieved a number of outcomes.

- The EOE project helped them connect with many community partners. They plan to continue to expand programming and partnerships with other EE providers.
- The school started a green team, organic recycling, put in two rain gardens and removed invasive species from their newly developed outdoor learning area. Student learning has extended to others as students have cut and treated buckthorn on the elementary school property, educated their families and neighbors to remove invasive species, and some families have installed rain gardens on their properties.
- RMS-CES is now a school focused around central themes at each grade level. All teachers collaborate on common ideas for each unit. Examples of theme units are force and motion, astronomy, ecology, raptors, and energy. Each of these TIE units connect standards from science to different core curriculum areas, as well as connect to environmental themes.
- RMS-CES enrollment has increased dramatically over the last couple of years.

Rockford's lead teachers report:

> "Our school has moved farther in the direction of stewardship, with a focus on environmental issues. We have worked hard with our partners, our green team, and our buildings and grounds manager to reduce waste by 40% this year, use energy effectively, and to manage our grounds in responsible ways.

The most valuable piece for our school has been the opportunity to have time to work together with our staff to set goals, find curriculum, integrate themes, and make connections. Staff development funds have become increasingly scarce over the past few years, so having the time and ability to get away from the classrooms, connect with other teachers and professionals, and plan for future years was invaluable."

Figure 15. Rockford's physical education curriculum includes lessons on orientation.

Figure 16. Rockford students experience nature using all of their senses.

Simley High School ALP

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Contact:

Kay Martin, Teacher, Alternative Learning Program
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Simley High School is a public school located within St. Paul's southern suburbs. Two teachers and 27 students from Simley's Alternative Learning Program participated in the EOE project. Funding provided educational equipment, supported curriculum revision and transportation to an offsite wilderness area a short drive from the school campus. It provided an opportunity for students to explore, experience and engage with nature in an undisturbed wilderness area, while mastering standards in a variety of content areas.

- Environmental themes were integrated into a variety of classes. Specific activities included observation skills, water and soil testing, tree identification, carbon footprinting and building teamwork.
- Students were challenged to investigate and think critically about a variety of environmental issues that impact their local community. Students listed challenges, identified environmental organizations, debated environmental issues and created solutions. They learned how to take, analyze and categorize samples. They built on observational skills and learned how to be a team member and leader.

The project leader reported that:

> "The EOE project has provided many opportunities for students in our program that were not previously available. Our students have benefited from the classroom component of the project and the outdoor experience in a variety of ways. The integration of environmental themes into a variety of classes has provided an opportunity to enhance student engagement and support outdoor classroom activities.
>
> The EOE project created multiple opportunities for students to focus on real world problems and investigate different solutions. The project has allowed our program to create a foundation for future activities across disciplines. We are fortunate to have access to water, forest and prairie areas near our school. These areas will allow us to continue to study natural areas. We will continue to integrate environmental themes into the content areas and use the equipment to engage students with the content and continue to foster these skills with students."

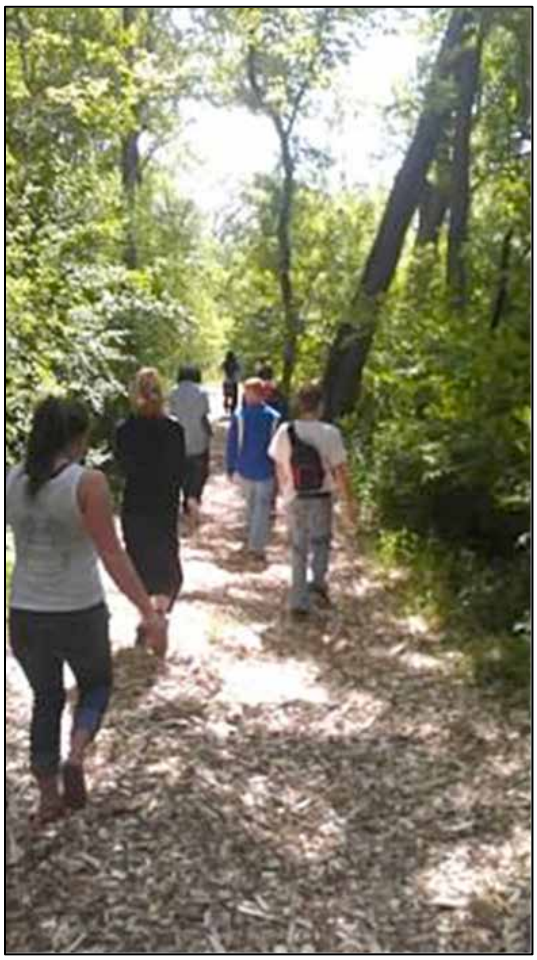

Figure 17. Simley students explore the amazing diversity at Darvan Acres Nature Center near their campus.

Figure 18. A community expert provides Simley students with a nature lesson.

Waconia Public Schools

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Multiple teachers at both Clearwater Middle School and Waconia High school participated in teacher training during the EOE project. Mini-grant funding was primarily used by two teachers and 130 students at the high school for equipment to develop water quality studies in their environmental science classes. Participation in the project led to many outcomes:

- Environmental themes were integrated into a variety of classes at both schools and have influenced learning and programming throughout the district. At the high school fifteen lessons were adapted to involve environmental journaling, math and an emphasis on local water quality. Middle school teachers were also trained and integrated more EOE lessons that are reaching hundreds of other students. Elementary school staff have been inspired to do the same, and the district is striving to become a Green Ribbon Schools designee.
- It is estimated that 400 pounds of phosphorus were removed from the local watershed since 2011 through leaf clean-up efforts as part of the EOE project efforts.
- Approximately 30 acres of habitat (Bayview Woods and Waconia High School Ponds) were restored and improved for environmentally responsible use.
- Students were equipped to conduct quality water testing that can be used for the Volunteer Stream Monitoring Partnership Program. For many students, it was their first time in waders or in a canoe.

The high school teachers report that:

> "The EOE grant has benefited not only the classes directly taught by teachers involved in the EOE grant, but also has had a broader impact on our entire district. In regards to individual classroom, the EOE grant has provided funding for water quality testing supplies that have provided a qualitative and quantitative aspect to our environmental courses. Integrating lesson plans around water and local water quality has given our students a chance to be out in the community making observations, collecting data, analyzing data, understanding critical links and associations between human behavior and environmental consequences and learning to take responsible social action to improve the environment."

Figure 19 – Local daycare kids see how fun science can be at Waconia High School

Figure 20. Waconia students take measurements from a creek near the high school as part of science class.

Green Ribbon Schools

The project coordinator also developed and implemented Minnesota's participation in the first two years of the U.S. Department of Education's Green Ribbon Schools Program. The program recognizes schools across the country for their exemplary efforts to reduce environmental impact and costs, promote better health, and ensure effective environmental education. Minnesota led the nation with the most applicants in 2013 and seven Minnesota schools and districts were among 156 schools that have received the national award to date:

- Garlough Environmental Magnet School and Heritage Middle School, West St. Paul
- Jeffers Pond Elementary and Prior Lake – Savage School District, Prior Lake
- Kennedy Community School, St. Joseph
- North Shore Community School, Duluth
- School of Environmental Studies, Apple Valley

Over the two years of the program, Minnesota received 29 applications. Support for the program came from an advisory group of green school experts made up of representatives from several different state agencies and organizations with an interest in green schools. The advisory group refined the application template to make it relevant to Minnesota laws and resources, helped develop the evaluation criteria, reviewed and scored applications and helped with promoting the program to schools.

Minnesota's success in maintaining a high number of applications in year two was supported by workshops (Appendix F) led by the coordinator at the sites of Minnesota's three 2012 national honorees. Workshops in Duluth, St. Joseph and West St. Paul were attended by over 100 people in total. In addition to recognizing the host school for their efforts, the participants got the chance to see real-life programs at a designated Green Ribbon School, meet with several green school resource professionals and gather in small groups to discuss ideas and strategies in the award pillars (green building, health and safety, and environmental education) of their choice. Based on Minnesota's success with the Green Ribbon Schools program, Minnesota was often held up nationally for our efforts and the project coordinator was invited to speak at the 2012 National Green Schools Conference in Denver, CO and the workshop for national Green Ribbon Schools awardees at the inaugural celebration in Washington, D.C. in June of 2012.

In Minnesota and nationally, several of the designees were schools that fit the category of having a highly disadvantaged student body (defined as 40% or more of students on free and reduced lunch). These schools have recognized that establishing the priority of being a green school better engages their students and staff and can actually save their school money. Typically lacking funding, they make it a priority to tap into the capital in their community by forming partnerships. Those community partnerships often are with organizations and agencies interested in protecting the environment and result in many hands-on, real-world, civic-based, sustainable education programs.

Figure 21. Rose Chu, MDE Assistant Commissioner, welcomes participants to the Green Schools workshop at North Shore Community School in November 2012.

2012 National Green Ribbon Schools Honorees

Garlough Environmental Magnet School

1740 Charlton Street
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651-403-8100
http://www.rschooltoday.com/se3bin/clientschool.cgi?schoolname=school174

Contact:

Susan Powell, Principal
susan.powell@isd197.org

Garlough Environmental Magnet School (GEMS) is a leader in the green/environmental school movement, winning numerous awards at the local, state, national and international level, especially in the area of environmental education. Educators and policy makers have visited Garlough from all over the Midwest, Washington D.C, New Mexico, Norway and Japan. Garlough has received many grants ranging from $500 -$100,000 from numerous organizations to further their green initiatives for children's education in environmental and sustainability literacy.

- Garlough has reduced greenhouse gas emissions by 40% and energy use by 22% from 2007-2011, garnering several Energy Star and other energy program awards. Besides behavioral changes, they utilize indoor temperature standards, and building automation system for heating, cooling and lighting for occupied and unoccupied building schedules.
- Water consumption has decreased by 26% for both irrigation and domestic use. During 2005 renovation they installed lead free fixtures, motion sensors to control water usage on toilets, urinals and sinks.
- More than 64% of solid waste is diverted from landfills. They have been composting lunch waste for six years. They have partnered with Dakota County and have recycle bins in every classroom, office and hallway. Classrooms have organic worm bins as teaching tools. Clear labeling is on all containers. Students collect shoes for GreenSneakers. E-waste is recycled by a certified recycler.
- Garlough has a no-idling policy that applies to all vehicles, promotes carpooling, participates in "Safe Routes to School" and partnered with Project Green Fleet, an initiative to reduce diesel emissions.
- The entire school "walks from school" to the school buses on a path through the woods every other Friday. Students participate in various "energizers" every 20-30 minutes during the day to elevate heart rate for optimal learning. Six classrooms are equipped with treadmills and 80 under-desk peddlers are distributed throughout our classrooms to provide a mode of movement for children who need it.
- School wide LIVEGREEN club promotes energy conservation and recycling through behavior changes with guidance of a dedicated teacher.
- Organic gardens, a fresh salad bar, commitment to healthy snacks, thirty minutes of daily recess on top of several weekly academic outdoor lessons immerse the students and staff in quality nutrition, activity and authentic environmental lessons.

- Environmental and sustainability education holds all the pieces of what is done at GEMS together. An integrated curriculum across all subjects using nature and environmental science as the integrating force, provides opportunities for expansive use of ipods, ipads, laptops, probes, scopes, and expertly developed observation skills to practice and master math, science, engineering and technology skills. They visit Dodge Nature Center daily to supplement lessons with hands-on experiences at their working farm, wind turbine, orchard, apiary, pond and more. Our 20 Outdoor Wonder Learning Stations (OWLS) are aligned to MN State Academic Standards and each grade level has interdisciplinary lessons at these stations throughout their five years here focused on systems relationships.
- Each year, a major environmental theme is woven through curriculum on a rotating five-year cycle: Energy, Change, Cycles, Patterns, Systems; so that students will experience all in their K-4 tenure here. Garlough also has monthly school-wide environmental themes which are taken from the Minnesota Environmental Literacy Scope and Sequence.
- GEMS students are civically involved locally and internationally, having partnered with a school in Guatemala to support fresh water wells. They also have worked together collecting coats, shoes and pajamas to be donated for others in our community to re-use.

Figure 22. Garlough's new highly efficient heating system in the foreground has made the old boiler obsolete.

Kennedy Community School

1300 Jade Road
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Contact:

Diane Moeller, Principal
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In 2006, the community of St. Joseph was outgrowing their little school, and knew they needed to go to voters to approve a building referendum. The community came out strongly stating that if it were built green, they would support it. After passage, work began immediately to design and build a green school, and in 2008 they opened the doors to a beautiful school certified at the Gold Level for LEED (Leadership in Energy Efficient Design).

Since that time, Kennedy Community School has been a leader in promoting other schools to go green. They believe it is part of their mission to help not only their school, but the larger community, to understand the possibilities and benefits of going green. Students and staff have given over 300 tours to groups. They are the subject of a US Green Building Council video production that is used to show other school districts how going green has paid off and were featured on the front page of the Education MN newspaper showing how energy savings can translate into resources and teachers.

- The school has a large geothermal system and has not fired their boiler in their first four winters and do not need compressors for air conditioning.
- The school design is heavy on utilizing day-lighting with very large windows throughout the building to access sunlight, and roughly twenty other components of green school building design that teach students and community and save resources.
- Many partnerships have been created through their process of going green. For example, a partnership with the US Fish and Wildlife Service has resulted in over 20 acres of prairie grasses that are the centerpiece of outdoor education programming. Many organizations partnered with them to create a reading garden that was the idea of our first class of eighth graders.
- An energy tracker website allows students and community members to go online to see what the best form of energy is on any given day. They can compare if their wind turbine or solar panels are producing more energy. These components were installed not to provide energy for the school, but to teach students about alternative energy sources. Community members have commented on how much they have learned from the energy website.
- Students have become the best ambassadors for being a green school. They are well versed in the importance of going green, the components of being green, and the good we are doing for our earth. Students have created websites in their science classes that compare various energy forms. They also conduct tours for the community on Earth Day. People cannot believe such young learners are so knowledgeable about green concepts.

- Students were also instrumental in the Green Ribbon Schools application process and provided ideas for each of the pillars. Kennedy reports that becoming a Green Ribbon School reinforced their commitment to doing what is right and helps them to continue to be an example for others.

Figure 23. Green Ribbon Schools award flag hangs in Kennedy's cafeteria.

North Shore Community School

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www.northshorecommunityschool.org

Contact:

Susan Rose, Director
srose@northshorecommunityschool.org

North Shore Community School, a rural charter school just a few miles from the beaches of Lake Superior, is situated on a 40 acre parcel of land and is home to 658 K-6 grade students. The operations, physical environment and instruction at the school are driven by a core purpose, the desire to excel in connecting students' learning with their natural and social environments. Despite the fact that the building is over 50 years old, significant accomplishments have been achieved as North Shore strives to make progress toward a "net zero" environmental impact.

- 95% of the school's grounds are devoted to ecologically beneficial, instructional use including rain, butterfly and vegetable gardens, as well as a Minnesota DNR supported school forest.
- 90% of campus-generated food waste is composted via a site-based vermiculture system.
- 100% of cafeteria trays and flatware are washable and reusable. 100% of used colored paper is recycled into student-made paper.
- The school participates in a Farm-to-School program and their school greenhouse supplies up to 20 pounds of mixed greens each year to the cafeteria. Each spring students tap maple trees on campus, gather sap and enjoy a pancake breakfast, served with maple syrup produced by their efforts.
- Students participate in a minimum of 170 minutes of physical activity and/or outdoor learning each week including 90 minutes of Physical Education.
- In an effort to increase civic engagement and environmental literacy, interdisciplinary learning is facilitated at each grade-level through year-long environmentally themed questions that consider both the social and natural environment. Teachers develop two to three Environment as Integrating Context (EIC) lessons each month.
- Place-based learning and curricular integration ideas are generated and enhanced during monthly grade-level meetings with the school's Environmental Educator.
- Environmental Education is offered to all students 60 minutes each week as a special subject, similar to PE.
- Environmental learning extends beyond standard programming; older students participate in elective classes that include Winter Outdoor Skills and Phenology Animation.
- Environmental themes are required components of school field trips; kindergartners travel to Tom's Logging Camp to study historical logging methods and fourth graders visit the Lake Superior Marine Museum to explore the maritime heritage of Lake Superior.

- 90% of faculty participates in site-based professional development focused on environmental concepts and instructional practices. 100% of faculty are invited to attend in off-site trainings including Project Learning Tree, the National Green Schools Conference and the annual Minnesota Environmental Education Conference.

Figure 24. A typical scene at North Shore Community School, where students study outside many times a week.

Figure 25. North Shore has found creative ways for all students to access their outdoor learning environment in all kinds of weather.

2013 National Green Ribbon Schools Honorees

Heritage Middle School

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Contact:

Lisa Johnson, Sustainability Manager
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Located in an inner-ring suburb of St. Paul, Heritage Middle School has a highly disadvantaged student body with 51% of students qualifying for free and reduced lunch and 15% with limited English proficiency. They have done exceptional work in greening up their buildings, despite having a building constructed in 1951. They also have a very strong E-STEM middle school.

- They have received several recognition and awards in multiple years for energy reduction and efficiency, including Energy Star.
- Implemented significant water usage reduction the last few years, including 69% reduction in domestic waster use and 3% reduction in irrigation use.
- Great efforts in waste reduction and recycling, including 62% recycling and organic composting. School's LIVEGREEN team held fundraisers to purchase a filtration station to promote reusable water bottles
- 20-25% of students walk, carpool, bike depending upon weather.
- School-wide vegetable gardens that are used by students to make fresh salads.
- School is an Environmental STEM Magnet School and follows environmental literacy standards that are designed into multiple elements of all teaching; multiple partnerships utilized for classroom lesson designs and Environmental Education professional development has been provided for entire staff; assessment is part of design to ensure environmental literacy is measured and supported.
- Conversations and lessons about environmental careers have been built into science curriculums in grades 5-8. Even the Language Arts teachers include green careers as part of their career exploration unit. The 5th and 7th grade students have weekly instruction from a trained naturalist who shares many green career pathways throughout the year.
- All grades have specific programs for civic and community involvement around environmental and sustainability issues. Major partners include Dodge Nature Center, Dakota County, and surrounding cities. Unique programs include water testing done in conjunction with local units of government, courtyard area designed to showcase elements of prairie restoration and a butterfly garden with native regional plants. The student club, Livegreen, makes sure that

sustainability is incorporated into all school policies and actions. The school's Community Education Dept. offers E-STEM classes throughout the school year to promote the magnet theme.

Figure 26. One of Heritage Middle School's many raised-bed gardens.

Jeffers Pond Elementary

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Contact:

Karoline Warner, Principal
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Jeffers Pond Elementary is a relatively new public school located in the outer suburbs southwest of Minneapolis. It was founded with a commitment to getting kids outside in the vast acreage and wonderful natural amenities around the school. Through a partnership with the Jeffers Foundation that donated the land for the school and provided environmental educational staff and resources for many years, they have established one of the finest examples in the country of integrating environmental and outdoor education throughout the curriculum of a traditional public school setting. They also are doing solid work in Pillars 1 and 2. Here are some highlights from their green school efforts:

- Sustainability and the environment are a context for learning at Jeffers Pond. Environmental issues are thoroughly woven into teaching and learning at the school – both for the students and the teachers. Strong leadership by the administration has been key to supporting an environmental education approach.
- The school has long-term commitment to energy efficiency and reduction. They participate in Schools for Energy Efficiency and Energy Star programs achieving a rating of 98, and undergo annual third party energy audit. They reduced greenhouse gases by 18% in 2012 and reduced energy use by 41% from 2007 to 2012.
- The school has achieved a 36% reduction in water use and the site contains a rain garden and butterfly garden planted in prairie grasses that serve as outdoor learning areas.
- Through a partnership with the Shakopee Mdewakanton Sioux Tribe, the school has implemented an organics recycling program that has helped them achieve a 79% waste diversion rate.
- They have worked with the City of Prior Lake to expand the sidewalk system and have consolidated bus routes.
- The school has hosted numerous environment and sustainability professional organization events, including MN Environmental Educators Conference. Teachers are involved in numerous environmental education professional activities, including writing Minnesota Weatherguide calendar lessons and Eco-time Morning Meeting cards.
- The school has a Green Team which meets monthly, with representative teachers from each grade level. The committee plans school initiatives focusing on Environmental Education and twice a year Green Teams from across the

district meet to discuss their buildings goals and ideas. Also, at each staff meeting, time is set aside for a “Green Moment” where a teacher shares an Environmental Education idea, task, or initiative.

- School has offered a Junior Naturalist program for seven years to third, fourth, and fifth grade students through a partnership with Community Education, which includes regular meetings and exercises related to environment and sustainability issues.

- School holds annual school-wide Environmental Education Festival, in which each grade level has a theme, such as insects, water, trees, and geology and the whole day is dedicated to environmental and outdoor learning. Community partners, such as the local watershed district and county park staff participate in teaching.

- School has a partnership with the St. Catherine University EcoStar program that involves elementary classroom teachers hosting a pre-service teacher for seven weeks each school year with an environmental education focus. The school also works on environment and sustainability projects with many other local partners, including the Jeffers Foundation, the Spring Lake Watershed District, McColl Pond Environmental Learning Center, University of Minnesota Master Gardeners, City of Prior Lake, local sportsman’s clubs and the DNR.

- The school runs Eco Camp, an environmental education focused camp during the summer for kids. Teachers and after-school childcare staff participate in summer professional development so they are educated on the use of our EE equipment.

Figure 27. Jeffers Pond students test water quality in their campus creek.

Prior Lake – Savage Area Schools

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The Prior Lake – Savage Area Schools (PLSAS) district is one of only 14 school districts in the nation to date to be awarded as an honoree in the Green Ribbon Schools program. PLSAS is a large, public school district with 11 buildings and 7300 students and is located in a fast-growing suburban area southwest of Minneapolis. Environmental stewardship is a major part of their official mission. Through a supportive administration and partnerships with the Jeffers Foundation, Shakopee Mdewakanton Sioux Community and many other local and regional organizations, PLSAS has made it a system-wide priority to reduce environmental impact, improve health and wellness, and interweave environmental education and sustainability practices as a context for learning in grades K-12. Green school highlights at PLSAS include:

- Prioritization and leadership of environmental education at the highest levels of the district has led to integration of environmental education throughout the curriculum. Jeffers Pond Elementary epitomizes these efforts that have now been integrated through every PLSAS school and has made them a national leader in the field of environmental instruction.
- They are very involved in Energy Star and have achieved 49% reduction in energy use district-wide since 2007. They have also achieved 21% reduction in domestic water use and an excellent 76% recycling/waste diversion rate by implementing recycling of organic materials.
- 18.3% of eligible graduates have completed an AP Environmental Science course.
- They have received green building certification for recent construction and renovation at two district buildings.

Figure 28. PLSAS students spend lots of time outside during their school years.

School of Environmental Studies

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952-431-8750
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Contact:

Dan Bodette, Principal
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The School of Environmental Studies is is an educational option of choice for 400 juniors and seniors in Independent School District 196, which is located in a suburb just south of the Twin Cities. They were a Minnesota finalist in the first year of GRS. They made improvements and became the top scoring school in 2013 with solid scores across all three pillars. Their EOE work in Pillar 3, which has been stellar since they opened the school in 1995, has no equal among Minnesota high schools. Here are highlights about their green school efforts:

- The school provides an exceptional amount of outdoor classroom activities, both local and globally. Community partnerships are key to supporting their hand's on work in the community on environmental programs. They have an extremely strong focus on interdisciplinary environmental education learning, which is incorporated into curriculum and assessments.

- They have achieved a 31% GHG reduction in electricity, including a 16% energy reduction in just the last year. The school has on-site demonstration wind, and solar. Students monitor energy that feeds into the grid from the demonstration 20kw wind turbine and 2kw solar panels. The school is heated with waste heat from the neighboring Minnesota Zoo.

- They have reduced domestic water use by 50% and no municipal water is used for irrigation.

- A school pond was restored with native aquatic plants as a buffer around the perimeter and native prairie forbs and grasses have been planted in unmowed areas along parking lots and at the building entrance. Large areas of school landscape are unmowed and remain in their natural state.

- They have an organic community garden, orchard and apiary in partnership with Apple Valley citizens.

- They have a very high rate of waste diversion, which is at 76.49%. The increased use of web-based systems like Moodle is bringing them close to a goal of being a "paperless" school.

- 70% non-single passenger vehicle transportation to and from school by students. The school van runs on E-85 and they use mass transit for some remote site classes.

- The 12-acre school site contains a student-maintained trail system, heavily used for fieldwork. Students have class outside on average 5 hours a week.

Sometimes they are outside for 3 hours daily for several weeks for pond, forest, biodiversity, and winter study units. They have an outdoor classroom that is used daily in the fall and spring and a small outdoor amphitheater. The school owns several canoes and a boat. Twice a year they have “field days” where the entire school is out canoeing, hiking and biking. Students work on many outside projects like gardening and buckthorn removal.

- All students take two full years of Environmental Studies, an interdisciplinary course integrating English, social studies, and environmental science, for three hours each day. Through reading a wide variety of environmental texts, writing many papers, engaging in student-centered discussions, and completing many field and research-based projects, over the course of two years students develop solid problem solving and critical thinking skills that will equip them to be environmentally literate citizens. All seniors are required to complete a three-part Capstone: a personal statement of environmental ethic, an environmental service project, and a public presentation about a significant environmental issue.

Figure 29. Demonstration wind turbine, solar panels and sustainable building with green roof, produced in partnership with the local electrical utility.

Evaluation

The evaluation of the project was conducted by a contract with the University of Minnesota – Duluth and was led by Dr. Julie Ernst. The goals of the evaluation were to determine the effectiveness of the project's professional development activities and the outcomes associated with the environmental and outdoor programs implemented through the project. Twenty-eight teachers and 354 students at the pilot schools participated in the collection of data for the evaluation. Teachers were asked to participate in surveys and also implement a significant amount of the evaluation with their students. Their participation was critical and much appreciated by the researcher and project coordinator.

The project was fortunate to have Dr. Ernst involved as she is nationally-recognized for her environmental education research. She is hoping to publish a research paper summarizing the evaluation of the project, which will hopefully help inform and guide future research in the environmental education field. Below is a summary of the highlights by Dr. Ernst. The full evaluation report can be found in Appendix A.

Teacher Training

Results suggest a multi-day workshop can be an effective way for increasing teachers' pedagogical knowledge and skills, as well as their self-efficacy beliefs, relating to integrating environmental and outdoor education (EOE) into the academic curriculum. This is consistent with teachers' suggestions relating to desired professional development outcomes, as their suggestions focused on pedagogical knowledge and skills, specifically integrating EOE into subject areas beyond science, aligning EOE with core subject area standards, managing students outdoors, navigating barriers associated with integrating EOE, teaching through an inquiry-based approach, and working as a team of teachers to implement a project across disciplines rather than as individual teachers implementing more isolated and short-term EOE activities. Their suggestions also seem to indicate a range of needs, reflective of varying levels perhaps, with some suggesting knowledge and skills oriented toward more "entry-level" needs such as help with aligning lessons or activities with standards or managing students outdoors, whereas others indicated a desire to learn how use team teaching to implement longer-term projects across multiple subject areas. These represent different forms of EOE, with somewhat differing associated procedural knowledge and skills. Thus, clarifying needs of teachers and intentions regarding the type of EOE integration to be achieved may be helpful in selecting or grouping teachers/school participants and designing professional development opportunities accordingly. The specific suggestions provided by teachers relating to desired outcomes, format, and resources also can be used to guide future professional development efforts.

Student Outcomes

Regarding student outcomes, Minnesota Comprehensive Assessment data suggests students were meeting academic standards in core subject areas, and potentially students in the EOE projects at two schools may be associated with stronger science and reading achievement than in comparable schools (with the effect on reading achievement moderated by gender at one school). Due to limitations associated with the data available and analysis approach used, further research is needed to measure impact of EOE participation on academic learning in the core subject areas and on MCA performance. Teachers and students were consistent in their perception that participating in the EOE projects had a positive influence on their learning in science; participation may also have influenced learning in math, language arts, social studies, and physical education, but perceptions as to the degree of influence were not as strong as they were for science learning. In addition, teachers and students consistently perceived participation to have had a positive influence on academic engagement. Teachers attributed this influence on academic engagement and achievement to the outdoor/out-of-classroom learning experiences, active learning, novel topics and settings, real world projects and problem solving, student ownership in the projects, and connecting lessons and content together through team teaching across subject areas.

Other student learning outcomes included environmental sensitivity and an understanding of ecological systems. Teachers and students consistently perceived these outcomes to have been achieved through project implementation, and results further suggest a significant increase in understanding of ecological systems among participants. Perhaps strongest evidence of student learning outcomes stems from results from the Middle School Environmental Literacy Survey (MSELS). Data from the MSELS indicate 8th grade students from the two schools taking this assessment at the end of each school year of project implementation scored significantly higher than the national mean in the following areas measured on the MSELS: ecological knowledge; environmental sensitivity; general environmental feelings; issue analysis; intention to act; and pro-environmental behavior. Teachers provided suggestions that can be used to guide future integration of EOE into the academic curriculum.

Promising Activities

The original workplan for the EOE project required the identification of activities conducted during the EOE project that had the most potential or promise for sustaining EOE in Minnesota schools. The following potential strategies have been identified through either the formal evaluation by Dr. Ernst, input from the project coordinator, and/or input from the advisory committee.

Teacher training

While more educators would have been welcome at the trainings conducted during the project, the evaluation demonstrated they were highly effective. Research has long shown that educators are at the core of quality instruction, which is critical to student achievement. It may be even more important in the field of EOE, since very few current undergraduate teacher preparation programs integrate EOE into their curriculum. Consequently there is a backlog of current and incoming teachers that need to learn EOE skills and improve their environmental knowledge. In addition, teachers in the pilot identified the project approach to providing them with time to work as teams and individually to revise and adapt lessons was critical to helping them make the time to integrate EOE into their schools' curriculum.

Throughout the project, the coordinator stressed that all subjects and most academic standards could be taught with an environmental or outdoor context. By starting with the standards of their given content area, the project provided the training, resources and time for them to identify the opportunities to integrate EOE. Some teachers asked for model lessons they could easily plug into their curriculum. While they can help spur the thought process and potentially trigger ideas for teachers just beginning the EOE integration process, the coordinator believes in the end teachers need to revise and adapt lessons based on the standards to fit their own unique circumstances, including available outdoor and natural spaces in close proximity to the school; type, age and number of students; and resources available to support their EOE efforts. Training that provides the guidance and time to revise and adapt their plans will be critical for future teachers' ability to sustainably integrate EOE.

Figure 30. Teachers discuss integration ideas in teams with resource experts at training in Rochester

Mini - Grants

Not surprisingly, teachers and environmental educators have long requested additional funding to help support the integration of environmental and outdoor education. In the late 1990s, "designated funding for EE at the local level" was identified as a major statewide strategy in the Second Edition of A GreenPrint for Minnesota (August 2000). Over the last decade, however, available funding for educational programming outside of the core subject areas of reading, writing and mathematics has decreased significantly. Certainly, more money doesn't solve issues in of itself, but participants in this project frequently identified lack of resources as a detriment to their ability to deliver EOE programming.

While a relatively small amount of funds (maximum of $8,500 per school), educators appreciated the mini-grants that were available to them as part of this project to purchase equipment and supplies, spend time intentionally improving their lesson plans and support activities to get their kids outside. It is reasonable to believe that a statewide program with designated funding for environmental and outdoor education would go a long ways to supporting and increasing educators' efforts to expand EOE programming.

Because of the inter-disciplinary nature of EOE, one of the historical challenges of funding EOE at the state level is the environmental community thinks the education community should fund it and vice versa. In fact, since environmental and outdoor education is best taught integrated through all subjects and programs, EOE programming could easily be integrated into many funding streams from either community. On the education side, there are many federal and state funding streams that could have potential, including Healthy Kids Act, Perkins funding for career tech education, STEM, early childhood, and allowing districts to levy for EOE akin to the current enabling legislation for community education and gifted and talented education. Similar opportunities exist with the state's many designated environmental funds. With a history and connection with both the environment and education communities, perhaps the system that makes the most sense as a source for designated funding of EOE would be to dedicate a small portion of School Trust Land Permanent School Funds to EOE.

Action to fund EOE at the federal level has also received increasing attention the last few years, including introduction in Congress of the "No Child Left Inside Act," potential executive action on a National Environmental Education Act, funding for NOAA Environmental Literacy Grants, work on a Healthy Kids Outdoors Act and others.

Community Partners at the State and Local Level

Involvement and connections with community experts and partners was critical to the success of this project. At the state coordinating level, the participation of many stakeholders and experts on the Environmental and Outdoor Education Advisory Committee was crucial to the development and implementation of the project. The project coordinator regularly drew upon the expertise of the members and relied on them to support many aspects of the project. Organizations, such as the DNR, Jeffers Foundation and Will Steger Foundation, were especially valuable in providing resources, staff and support to training the educators in the project. By adding lots of value to the project, they helped the project be more effective and

reach a wider audience. A state level advisory group to advise and support EOE programming is critical to getting involvement and support from Minnesota's diverse environmental and outdoor education community.

At the school and district level, involvement of community groups, resource experts and individuals has proven to be a key factor in the success of some of the best EOE programs in the state. Knowing this to be the case, the project trainings were deliberately set up to feature community resources and help the participating educators make connections with local organizations and individuals. These partnerships appear prominently in the schools featured in this report and include staff and individuals from parks, private nature centers, natural resource agencies (federal, state, regional and municipal), outdoor clubs, environmental organizations, businesses, and parents, retirees and community members that live down the street and want to help get kids connected to nature. These partnerships demonstrate that it "takes a village" to successfully and effectively integrate EOE into schools and should be highly encouraged in future programs.

Making Children and Nature Connections

Ever since its publication in 2005 Richard Louv's book, Last Child in the Woods, has touched a nerve and garnered tremendous attention on the issue of kids becoming increasingly disconnected with nature. Over the last few years, Louv has gathered much of the new and emerging research on this issue and made it and numerous other resources available through the Children and Nature Network (www.childrenandnature.org). Interest in the need to connect kids and even adults with nature is being discussed at many levels among educators, politicians and parents, presenting an excellent opportunity for schools to generate support for EOE initiatives.

One particular opportunity for schools that has appeared to really be gaining momentum in the last couple of years is the concept of natural play. When away from school, kids may not have access or take the time to go outside. However, schools can build child connections to nature by being more intentional about designing spaces for recess, play and learning that are filled with natural elements, such as rocks, sticks, sand, trees, and other plant materials. Climbing, sliding and activities that develop balance can also be accomplished through elevation changes and other interesting topographic features.

Several nature centers, parks and other play spaces in Minnesota and across the country have made it a point to get kids playing in spaces that are partially or completely natural, significantly changing the paradigm of how playgrounds are defined. Several designers and providers of natural play spaces have begun to respond to the interest. Excitement over natural play has arrived in Minnesota as evidenced by a workshop focused on natural play space design, hosted by the Minnesota Association for Environmental Education and the Minnesota Children and Nature Connection in early January 2013 at MDE. The workshop was attended by over 70 people, including many architects, park directors, early childhood providers and school staff, despite limited promotion of the event. Moving the standard definition of school playgrounds away from pre-fabricated, built structures to natural play spaces has the power to calm, inspire and enhance creativity in Minnesota students while still providing exciting physical challenges.

Figure 31. Students cherish play time in O.H. Anderson Elementary's (Mahtomedi, MN) natural play space, "The Outback".

Green School Activities

With programs such as Hallberg Engineering's Schools for Energy Efficiency (SEE) program that has been active in local schools for several years, Minnesota has been a leader in the Green Schools movement. SEE and programs like it have saved some school district as much as $100,000 per year in energy costs through efficiency upgrades and changing the behavior of staff and students to reduce energy use. With the endorsement of the Secretary of Education and development by the U.S. Department of Education of the Green Ribbon Schools program in 2011, Minnesota schools now also have the opportunity to be recognized locally and nationally for their great efforts to reduce the environmental impact of their buildings and grounds, promote policies and practices that protect the health and safety of their student and staff, and the delivery of educational programs that teach their students to be better stewards.

In addition to potentially saving schools thousands of dollars through waste reduction and conservation of energy and water, the implementation of green school activities provides real-world opportunities for students to learn about practices in their school building and campus grounds that are hands-on and can be integrated into multiple content areas. Many schools throughout Minnesota have engaged students in great educational and real-life lessons that include designing and planting raingardens, investigating and fundraising for renewable energy installations, developing and delivering nature lessons to younger students and leading efforts to educate staff and students to help the school reduce energy use by changing behaviors. Green school activities have great promise to educate students about the environment and provide hands-on experiences that will help them become better stewards in the future. Future resources should be provided to support school efforts to implement green school programs.

Connecting with MDE Programs and Staff

A position at MDE to integrate EOE has provided credibility and prioritization of EOE at Minnesota schools and within the department. It has resulted in better coordination among Minnesota's many EOE providers and plans exist for future coordination with MDE academic standards, multi-cultural and health program staff. MDE staff have identified many ways having

an EOE coordinator position at MDE has impacted their work. For example, after connecting with EOE resources and training provided by the project coordinator, MDE content specialists are now providing English as a Second Language teachers with ideas that provide their students a real life context and reason to learn math, science and social studies.

Kari Ross, Reading Specialist at MDE, says, “An EOE position at MDE has had a positive effect on our division and our agency. The project coordinator has provided statewide leadership in his collaborative efforts to support the work of Academic Standards and EOE through fostering partnerships and opportunities for learning in many ways. He has collaborated in statewide professional development opportunities, facilitated workshops, advocated for a greener work environment, and overall, raised our awareness of EOE. Because of his influence and expertise, I am more aware of how EOE enhances academic education and the value of integrating EOE in any educational setting.”

MDE’s World Language Content Specialist reports that teachers at all levels often use a unit on the environment to provide a context and an insight into the culture and that having someone at MDE doing environmental and outdoor education validates their teaching. She adds the connections among content areas provided by an EOE position are invaluable and have inspired future work.

With an extensive background in green school activities, the EOE project coordinator has been instrumental in leading MDE staff in the implementation of Governor’s Executive Order 11-13, which requires state agencies to reduce their environmental impact through a number of sustainability activities. The coordinator established a Green Team at MDE, represented the department at the Interagency Pollution Prevention Advisory Team and has helped lead several activities, including efforts to reduce the department’s energy use and increase recycling.

Administrative Support Critical

There is little doubt to the project coordinator, who has over 25 years of teaching and working with schools and teachers as an EOE provider, that administrative support is probably the most important factor in whether schools comprehensively adopt and integrate EOE and green school activities sustainably. This factor was very evident in the schools that were the most successful in this project and was mentioned by many participants as a key component. Not only does administrative support provide encouragement to those educators working on the front lines and leading the project, but it sends a clear message to all the staff that EOE is a priority. It makes it much easier for educators to get the resources and cooperation needed to create and sustain a successful environmental and outdoor education program. Several of the administrators of pilot or Green Ribbon Schools shared stories of the benefits of these approaches, including increased enrollment, significant recognition in their communities and most importantly, increased achievement by their students. For EOE to successfully expand to other schools, administrators and school leaders throughout Minnesota need to be trained in the values and benefits of environmental and outdoor education and green school activities.

Need for a National EE Program Model

In Minnesota and across the county, there is a diverse and large network of EOE providers that work at all levels of government, non-profits and businesses. There are many advantages to such a large group of organizations and individuals involved in EOE, but it also makes it more challenging to create a coordinated program endorsed by the vast majority of providers. While

at MDE, the project coordinator has witnessed other education programs and interests that have successfully developed national models that have garnered wide spread support and implementation among schools. Once again, funding is a critical component of the sustainability of these other initiatives, but having an identifiable, research-based, comprehensive, packaged plan that is fully supported at all levels is critical to their success. The project coordinator believes that if the national environmental and outdoor education communities develop a widely-endorsed and coordinated EOE program model, it would speed up the adoption of EOE in Minnesota schools.

Challenges

Like most large endeavors, this project had some challenges. For the most part, they revolved around the difficulty of connecting with schools and teachers. Even within the pilot schools, the staff involved had so many priorities for their time they had a hard time finding time to maximize the potential of participating and completing the necessary components of the project. MDE's project coordinator and regional specialists were often frustrated that educators didn't more frequently take advantage of the opportunity to tap into their resources and connections to guide and support the pilot projects. Regional specialists have the potential to provide important support to teachers, but the short duration of this project and difficulty to connect with the pilot schools hampered their effectiveness. Schools around the state that have been able to establish long term relationships with EOE mentors over many years have proven to be very successful.

The lack of time, which could also be rephrased to say the lack of prioritization of EOE in the face of all the other requirements on teachers' time, was also evident in the challenges the schools and teachers faced in completing the reporting required for the project. Pilot participants eventually fulfilled the minimum reporting requirements, but often needed many reminders and a lot of revisions to get them to the point of report completion.

The hope at the beginning of the project was that all trained participants would complete one or more model EOE lessons to share with other educators. As readers will note, however, the number of model lessons attached (Appendix B) is small. Getting these from the teachers was extremely difficult. Teacher time was also certainly a factor in the low number of model lessons shared and perhaps more could have been done to provide clearer instructions, examples or incentives. However, an important factor influencing this process seems to be related to how many teachers approach curriculum development and lesson planning.

During planning for the trainings, project organizers decided that EOE integration would need to start with Minnesota's Academic Standards and teachers should identify how to use the environment or outdoors as a context to achieve the standards in their content area. It should not start with model lessons and then figure out what standards they achieve. Again, given time constraints, it seems many teachers often approach their EOE lesson planning by plugging in existing lessons from various sources, such as the DNR Projects (WET, Wild, PLT, etc.) or other sources. EOE providers frequently hear requests from teachers for model lessons. On the surface, that approach would seem an efficient way to integrate EOE and these model lessons can inspire many ideas of how to teach EOE. In the end, however, there is no replacement for teachers intentionally reviewing the standards associated with their content area, integrating the needs of their students and creating a plan that takes advantage of the outdoor spaces and environmental resources readily available on campus or in the community. To make EOE programs sustainable in schools, teachers will need training, guidance, resources and time to go through that process.

Acknowledgements

The Integrating Environmental and Outdoor Education project wouldn't have been successful without the input and support of many people. In particular, thanks go out to the following organizations and individuals:

- All of the pilot school teachers and administrators, who enthusiastically took on these projects without knowing how much work and reporting it would require for so little money. Despite being overworked and overwhelmed with their normal daily teaching routines, they completed all the necessary evaluations and provided all the necessary reports needed to complete the project without registering a single complaint. It was an honor to work with all these highly professional educators. Your communities and students are lucky to have you, and we all appreciate your willingness to teach them about the environment and get them outside!

- The EOE Advisory Committee and the many other partners that have supported project efforts the last couple of years, especially Paul Oberg and Sil Pembleton, Jeffers Foundation.

- Dr. Julie Ernst, University of Minnesota - Duluth – we were fortunate to have someone with such expertise play a major role in the project by directing the evaluation, which added greatly to the credibility and effectiveness of the project.

- Regional Specialists – Su Beran, Kim Kovich, Patty Born Selly. An extremely talented group of educators with years of experience delivering EOE, who provided time and effort to make sure the teachers in this project had all the necessary training and resources to effectively implement their projects.

- MDE Content Specialists and other staff that supported the project – Their knowledge, patience and support helped ramp up my system understanding and ability to make the project as effective as possible.

- MDE Green Team – For all your efforts to make MDE sustainable – Keep it up!

- DNR Education Staff, especially Dawn Flinn, Amy Kay Kerber, Laura Duffey, April Rust, Roland Sigurdson, Deb Groebner, Nadine Meyer for your support and participation in the project.

- Administration, Staff and Students (especially my own two children) at Mahtomedi Public Schools – Thanks for being my inspiration and providing the opportunity for me to try and put into practice all kinds of EOE and green school efforts. Lessons learned with you have been a great guide for me and have benefitted numerous other schools and students.

- Last, but not least, to my wife, Pam, who is one of the best and most dedicated teachers I have ever known and always puts what is best for her students first. Thank you for being my sounding board and always supporting all my "green" efforts, despite all the long meetings, never-ending community events and numerous dandelions in our yard.

Integrating Environmental and Outdoor Education in Grades 7-12

Evaluation Report

Julie A Ernst, University of MN Duluth
6/10/2013

Executive Summary

An evaluation of the Integrating Environmental and Outdoor Education in Grades 7-12 project was conducted to determine the effectiveness of the project's professional development activities and the outcomes associated with the environmental/outdoor programs implemented through this project. Using multiple instruments, data was collected from 28 teachers and 354 students.

Results suggest a multi-day workshop can be an effective way for increasing teachers' pedagogical knowledge and skills, as well as their self-efficacy beliefs, relating to integrating environmental and outdoor education (EE/OE) into the academic curriculum. This is consistent with teachers' suggestions relating to desired professional development outcomes, as their suggestions focused on pedagogical knowledge and skills, specifically integrating EE/OE into subject areas beyond science, aligning EE/OE with core subject area standards, managing students outdoors, navigating barriers associated with integrating EE/OE, teaching through an inquiry-based approach, and working as a team of teachers to implement a project across disciplines rather than as individual teachers implementing more isolated and short-term EE/OE activities. Their suggestions also seem to indicate a range of needs, reflective of varying levels perhaps, with some suggesting knowledge and skills oriented toward more "entry-level" needs such as help with aligning lessons or activities with standards or managing students outdoors, whereas others indicated a desire to learn how use team teaching to implement longer-term projects across multiple subject areas. These represent different forms of EE, with somewhat differing associated procedural knowledge and skills. Thus, clarifying needs of teachers and intentions regarding the type of EE/OE integration to be achieved may be helpful in selecting or grouping teachers/school participants and designing professional development opportunities accordingly. The specific suggestions provided by teachers relating to desired outcomes, format, and resources also can be used to guide future professional development efforts.

Regarding student outcomes, Minnesota Comprehensive Assessment data suggests students were meeting academic standards in core subject areas, and potentially students in the EE/OE projects at two schools may be associated with stronger science and reading achievement than in comparable schools (with the effect on reading achievement moderated by gender at one school). Due to limitations associated with the data available and analysis approach used, further research is needed to measure impact of EE/OE participation on academic learning in the core subject areas and on MCA performance.

Teachers and students were consistent in their perception that participating in the EE/OE projects had a positive influence on their learning in science; participation may also have influenced learning in math, language arts, social studies, and physical education, but perceptions as to the degree of influence were not as strong as they were for science learning. In addition, teachers and students consistently perceived participation to have had a positive influence on academic engagement. Teachers attributed this influence on academic engagement and achievement to the outdoor/out-of-classroom learning experiences, active learning, novel topics and settings, real world projects and problem solving, student ownership in the projects, and connecting lessons and content together through team teaching across subject areas.

Other student learning outcomes included environmental sensitivity and an understanding of ecological systems. Teachers and students consistently perceived these outcomes to have been achieved through project implementation, and results further suggest a significant increase in understanding of ecological systems among participants. Perhaps strongest evidence of student learning outcomes stems from results from the Middle School Environmental Literacy Survey (MSELS). Data from the MSELS indicate

8th grade students from the two schools taking this assessment at the end of each school year of project implementation scored significantly higher than the national mean in the following areas measured on the MSELS: ecological knowledge; environmental sensitivity; general environmental feelings; issue analysis; intention to act; and pro-environmental behavior. Teachers provided suggestions that can be used to guide future integration of EE/OE into the academic curriculum.

Evaluation Plan

Evaluation Purpose and Questions

The purpose of this evaluation was to determine the effectiveness of the project's professional development activities and the outcomes associated with the environmental/outdoor programs implemented through this project. A secondary purpose of this evaluation was to identify characteristics of effective environmental/outdoor education programs. This information is intended to be used for accountability purposes to inform LCCMR, the project funder, of the project impact. The evaluation results can also be used by the MN Department of Education and Department of Natural Resources to inform future efforts toward integrating environmental and outdoor education into secondary education as a means for improving academic engagement and achievement.

Evaluation Questions Relating to Professional Development

1. Did participation in the professional development workshops increase teachers'
    a. Environmental sensitivity?
    b. Environmental knowledge and skills necessary for informed environmental decision-making and action?
    c. Attitudes toward taking students outdoors for learning?
    d. Pedagogical knowledge and skill relating to integrating environmental/outdoor education into the academic curriculum?
        - Teaching in an outdoor learning environment
        - Selecting and accessing natural and/or built areas in community for academic learning
        - Teaching students in learning environments beyond the classroom
        - Finding organizations that can assist with supervision, instructional delivery, financial resources, equipment/materials
        - Managing safety and liability concerns
        - Accessing and selection EE/OE resources, activities, and materials to support my core subject areas instruction
        - Aligning EE/OE activities to meet the academic standards in my core subject area
    e. Self-efficacy toward integrating environmental/outdoor education into the academic curriculum?
    f. Belief that environmental/outdoor education is academically-relevant?
2. How useful were the tools/resources/content and skills introduced during the professional development workshops?
3. What resources/tools/content and skills introduced during the professional development workshops were used by teachers, and in what ways?
4. What are teachers' recommendations regarding future professional development relating to integrating environmental and outdoor education into secondary education as a means for improving academic achievement and engagement?

Evaluation Questions Relating to the Integrated Environmental and Outdoor Education Programs

1. Did students who participated in the environmental/outdoor education programs meet/exceed academic standards in science, math, language arts, social studies, and/or physical education?
2. Did participation in the environmental/outdoor education programs increase students':
    a. Academic engagement?
    b. Environmental sensitivity?
    c. Understanding of ecological systems?
    d. Outdoor skills?

3. What characteristics of environmental and outdoor education programs are associated with influencing students' academic engagement and achievement in the core subject areas?
4. What are teachers' recommendations regarding future implementation of environmental and outdoor education as a means for improving academic achievement and engagement?

Evaluation Planning Matrix

Question	Data Collection Tool	Source(s) of Information:	Design and Sampling
Professional Development			
1. Did participation in the professional development workshops increase teachers' a. Environmental sensitivity? b. Environmental knowledge and skills necessary for informed decision-making and action? c. Attitudes toward taking students outdoors for learning? d. Pedagogical knowledge and skill relating to integrating EE/OE into the academic curriculum? e. Self-efficacy toward integrating EE/OE into the academic curriculum? f. Belief that EE/OE is academically-relevant	Professional Development Teacher Questionnaire (self-report items measuring teachers' perceived development of these areas)	Teachers	One-group Pretest-Posttest-Delayed Posttest Design (pre and post Dec. 2011 workshop; end of school year 2); No sampling (all teacher participants in the ENRTF Project)
2. How useful were the tools/resources/content and skills introduced during the professional development workshops?	Professional Development Teacher Questionnaire (items that have teachers rate usefulness of tools/resources/content and skills)	Teachers	One-group Posttest Only Design (post Dec. 2011 workshop) No sampling (all teacher participants)
3. What resources/tools/content and skills introduced during the professional development workshops were used by teachers, and in what ways?	Professional Development Teacher Questionnaire (open-ended item)	Teachers	One-group Delayed Posttest Only Design (end of school year 1); No sampling (all teacher participants)
4. What are teachers' recommendations regarding future professional development relating to integrating EE/OE into secondary education as a means for improving academic achievement and engagement?	Professional Development Teacher Questionnaire (open-ended item)	Teachers	One-group Delayed Posttest Only Design (end of school year 2); No sampling (all teacher participants)
Integrated Environmental and Outdoor Education Programs			
1. Did students who participated in the environmental/outdoor education programs meet academic standards in science, math, language arts, social studies, and/or physical education?	MCAs in relevant content areas	Students	Nonequivalent Comparison Group Posttest Only Intention to Treat Design (end of year 1; data from year 2 not yet available at

Did they outperform peers who did not participate in the program?			time of project reporting); All participating program serve in treatment group; peers from same school/district and state scores serve as comparison groups
	EE/OE Program Teacher and Student Questionnaire (items measuring teachers' perceptions of student academic learning)	Teachers and Students	Teachers: One-Group Posttest Only Design (at end of school year one and at end of year two); No sampling (all teacher participants) Students: One-Group Posttest Only Design (end of school year one and school year two for two classes in each school participating in "most" treatment); One-Group Pretest-Posttest Design (at beginning and end of school year two for youngest grade level participating in each program, student who hadn't participated prior)
2. Did participation in the EE/OE programs increase students': a. Academic engagement? b. Environmental sensitivity? c. Understanding of ecological systems? d. Outdoor skills?	EE/OE Program Student Questionnaire (self-report items, measuring students' perceptions of these areas; direct measures of academic engagement)	Students	One-Group Posttest Design (end of year one and year two for two classes in each program/school participating in "most" treatment); One-Group Pretest-Posttest Design (at beginning and end of school year two for youngest grade level participating in each program, student who hadn't participated prior)
	EE/OE Program Teacher Questionnaire (items measuring teachers' perceptions of these student outcomes)	Teachers	One-Group Posttest Only Design (end of school year one and two); No sampling (all teacher participants)
	Middle School Environmental Literacy Assessment (direct measure; 2009 version of Hungerford, Volk, McBeth and Bluhm, 2006)	Students	Nonequivalent Comparison Group Posttest Only Design (two 8th grade classes from two schools, compared against national baseline data; end of school year one and two)

3. What characteristics of environmental and outdoor education programs are associated with influencing students' academic engagement and achievement in the core subject areas?	EE/OE Program Teacher Questionnaire (teachers' perceptions of influential characteristics) Review and comparison of characteristics associated with schools with evidence of stronger v. less strong student outcomes	Teachers Program data	One-Group Posttest Only Design (end of school year one and two) No sampling (all teacher participants) --
4. What are teachers' recommendations regarding future implementation of environmental and outdoor education as a means for improving academic achievement and engagement? (what might encourage them to use more of an integrated for of EE/OE – across subjects where multidisciplinary projects v. integrated into isolated subjects?)	EE/OE Program Teacher Questionnaire (teachers' recommendations) and/or interviews/focus group	Teachers	One-group Posttest Only Design (after school year one and two) No sampling (all teacher participants)

Professional Development

Teacher Learning Outcomes

An understanding of what teachers learned through participating in the multi-day professional development workshop was addressed through the following evaluation question: *Did participation in the professional development workshop increase teachers' environmental sensitivity, environmental knowledge and skills, attitudes toward taking students outdoors for learning, pedagogical knowledge and skills relating to integrating environmental and outdoor education (EE/OE) into the academic curriculum, self-efficacy toward integrating EE/OE into the academic curriculum, and belief that EE/OE is academically-relevant?* Data was collected from 28 teachers using the teacher professional development questionnaire. The response-format for items on this questionnaire used a 5-point scale (1=strongly disagree to 5 = strongly agree). This questionnaire was administered before and immediately after the teacher workshop; this workshop was held after teachers had proposed a project idea and plan for implementation, but prior to the implementation of their projects. The questionnaire was administered again at the completion of the project (end of year two), in order to assess if these teacher learning outcomes were impacted through the mentoring they received during project implementation as well through the actual implementation of the projects (if mentoring and implementing the project become an avenue for teacher learning).

Results suggest participation in the professional develop workshop significantly increased teachers' pedagogical knowledge and skills relating to integrating EE/OE into the academic curriculum ($p < .001$) and in their self-efficacy toward integrating EE/OE into the academic curriculum ($p < .001$). Results suggest environmental sensitivity, attitudes toward taking students outdoors, and belief in the academic relevance of EE/OE did not significantly increase through participation in the workshop (there were observed differences, but these were not statistically significant). However, for each of these outcomes, teachers' pre-workshop scores were high, indicating they already possessed these desired outcomes prior to the workshop, with little opportunity for a workshop to further increase these areas. Teachers' environmental knowledge and skills did not appear to increase from pre- to post-workshop, however, this did not seem to be an emphasis of the workshop. Data from teachers collected at the end of the project implementation indicate the mentoring of teachers and the teachers' implementation of EE/OE projects/activities within their schools did not lead to a significant increase in any of professional development outcomes. This may be reflective of a "ceiling effect," as the post-workshop scores across the outcomes were high (4.21 – 4.71 on the 5-point scale), leaving little room for improvement during the course of the mentoring and project implementation. See Table 1 for scores from the pretest (prior to workshop), posttest (immediately after the workshop), and delayed posttest (end of year two).

Table 1

	Mean Score Prior to Workshop (SD)	Mean Score After Workshop (SD)	Mean Score at End of Project (SD)
Environmental Sensitivity	4.53 (.88)	4.67 (.48)	4.56 (.51)
Environmental Knowledge and Skills	4.05 (.19)	4.21 (.63)	4.28 (.46)
Attitudes toward Taking Students Outdoors	4.68 (.82)	4.71 (.46)	4.83 (.38)
Pedagogical Knowledge and Skills	3.48 (.62)	4.25 (.35)*	4.20 (.53)

relating to Integrating EE/OE into the Academic Curriculum			
Self-Efficacy toward Integrating EE/OE into the Academic Curriculum	3.61 (.92)	4.32 (.48)*	4.39 (.61)
Belief in the Academic Relevance of EE/OE	4.11 (.99)	4. 39 (.57)	4.56 (.62)

*Notes: response format was 1 = strongly disagree (that I have the particular trait, knowledge or skill) to 5 = strongly agree; * indicates a significant increase from prior measure; n = 28*

Recommendations for Future Professional Development

Based on the professional development outcomes of participating teachers, it appears a multi-day workshop can be an effective way for increasing teachers' pedagogical knowledge and skills, as well as their self-efficacy beliefs, relating to integrating EE/OE into the academic curriculum. Professional development outcomes and activities designed to further teachers' environmental sensitivity and attitudes toward taking students outdoors, as well as their beliefs regarding the academic relevance of EE/OE may not be a good investment of time and effort, when the audience for these efforts are teachers who have chosen to participate in implementing an EE/OE project, as they likely already possess and are being motivated to participate by this environmental sensitivity, positive attitudes toward taking students outdoors, and belief in the academic relevance of doing so. For teachers who are told (not voluntarily chosen) to integrate EE/OE into their curriculum, a pre-assessment measure of these areas would be helpful in guiding what to emphasis and target within professional development efforts, so that time and effort are not expended on knowledge, skills, dispositions, etc. that teachers already possess.

Recommendations for future professional development additionally stem from these three evaluation questions: *How useful did the teachers' anticipate the resources, content, and skills introduced during the professional development workshop to be for their projects? What resources/tools/content/skills introduced during the professional development workshop were used by teachers and in what ways? What are teachers' recommendations regarding future professional development relating to integrating EE/OE into secondary education as a means for improving academic achievement and engagement?*

Data regarding the first question was collected from teachers immediately after the workshop. Ratings from the 28 teachers indicated they anticipated each of the components from the professional development workshop to be useful in their future implementation of their EE/OE projects. They anticipated the component on skills and ideas for outdoor classroom management, examples of EE/OE resources and curricula, and resources relating to how EE/OE supports academic achievement to be most useful regarding their proposed EE/OE project. See Table 2 for teachers' ratings regarding anticipated usefulness in project implementation.

Table 2

	Mean (SD)
Academic standards and how to align them with EE/OE	3.96 (.69)
Goals and objectives of EE/OE and characteristics of quality EE/OE	4.32 (.77)
Information/resources relating to how EE/OE supports academic achievement	4.50 (.64)
Skills and ideas for outdoor classroom management	4.61 (.57)

Project-based learning	4.11 (.74)
Examples of EE/OE curricula and resources	4.54 (.64)
Skills and ideas for finding and using community resources	4.32 (.55)

Note: response format was 1 = not useful to 5 = very useful; n = 28

When asked through an open-ended question at the end year one as to what resources, tools, content, or skills introduced during the professional development workshop they used and in what ways, teachers provided these responses:

- EE/OE materials and resources, including sample lesson plans/activities
- Project Learning Tree activities in lesson planning
- Skills relating to outdoor classroom management
- Journaling in an EE/OE context
- Connections with other schools, organizations, and leaders
- Skills for integrating subject areas and aligning EE/OE with standards
- Mentor input regarding designing and/or using an outdoor space

Many teachers did not respond to this item, which may be reflective of difficulty recalling specifically what was introduced in the workshop or lack of time for completing a relatively long teacher questionnaire and phrasing of this item in a way that would take time/effort to complete.

When asked at the end of the second year of project implementation what recommendations they had regarding future professional development efforts relating to integrating EE/OE into the curriculum as a means to improve academic achievement through an open-ended question at the end of both year one and two, teachers provided the following responses (responses were stated by one to three teachers; no response was indicated by the majority of teachers):

Suggestions relating to outcomes for professional development:

- Integrating EE/OE across the curriculum (in subjects beyond science)
- Knowledge/skills relating to navigating barriers to EE/OE integration
- Comfort level and skills in outdoor teaching, particularly classroom management
- Aligning standards with EE/OE
- Procedural knowledge and skills relating to inquiry-based instruction
- Procedural knowledge and skills relating to how to implement longer-term projects rather than one-time lessons or one-day activities
- How to integrate EE/OE as a team of teachers; how to involve multiple teachers across subject areas in implementing a project and how to navigate barriers to doing so

Suggestions relating to resources:

- Examples of cross-curricular lessons/units /projects, particularly for non-science teachers
- Ideas for integrating technology
- Examples of community resources, particularly names of speakers and experts that could be used for a particular activity or topic area

Suggestions relating to format/approach:

- Opportunity for schools to share their projects (how they evolved, what they plan to do)

- More time to process, reflect, and apply
- Demonstrate (rather than tell about) the lessons that teachers can do with their students
- Acknowledge the challenges associated with integrating EE/OE and empathize with teachers who are embracing the challenge of teaching outdoors
- Learning how and being inspired to integrate EE/OE through presentations from other schools as to how they are successfully integrating EE/OE across grades and subject areas (projects they have done, what they learned, how they navigated challenges, etc.)
- Time within the workshop to plan and incorporate ideas into curriculum, with an opportunity to get help from experts/mentors for ideas and feedback during the planning time about project in general as well as feedback regarding the incorporation of what they are learning into their project ideas and curriculum plans (such as feedback on and help with aligning with standards)
- Follow up sessions, such as a session to re-energize teachers as initial enthusiasm wears off, or on-going sessions every few months for teachers to share ideas and be supported in their work
- Site visits by mentors following workshop to provide feedback on project implementation

In summary, multi-day workshops can be an effective way for increasing teachers' pedagogical knowledge and skills, as well as their self-efficacy beliefs, relating to integrating EE/OE into the academic curriculum. Professional development outcomes and activities designed to further teachers' environmental sensitivity and attitudes toward taking students outdoors, as well as their beliefs regarding the academic relevance of EE/OE may not be a good investment of time and effort, when the audience for these efforts are teachers who have chosen to participate in implementing an EE/OE project, as they likely already possess and are being motivated to participate by this environmental sensitivity, attitudes, and belief. This is consistent with teachers' suggestions relating to desired professional development outcomes, as their suggestions focused on pedagogical knowledge and skills, specifically integrating EE/OE into subject areas beyond science, aligning EE/OE with core subject area standards, managing students outdoors, navigating barriers associated with integrating EE/OE, teaching through an inquiry-based approach, and working as a team of teachers to implement a project across disciplines rather than as individual teachers implementing more isolated and short-term EE/OE activities. Their suggestions also seem to indicate a range of needs, reflective of varying levels perhaps, with some suggesting knowledge and skills oriented toward more "entry-level" needs such as help with aligning lessons or activities with standards or managing students outdoors, whereas others indicated a desire to learn how use team teaching to implement longer-term projects across multiple subject areas. These represent different forms of EE, with somewhat differing associated procedural knowledge and skills. Their specific suggestions relating to desired outcomes, format, and resources can be used to guide future professional development efforts.

Project Implementation

Student Learning Outcomes

A primary desired outcome for this project was to support academic knowledge and skills at the secondary level. The following evaluation questions were used to assess this desired outcome: *Did students who participated in the EE/OE program meet academic standards in science, math, language arts, social studies, and/or physical education? Did they outperform peers who did not participate in the program?* These questions were addressed using data from the Minnesota Comprehensive Assessments, as well as data from items on the teacher and student questionnaires.

Addressing this evaluation question using Minnesota Comprehensive Assessment (MCA) scores as a measure of student achievement was challenging for several reasons. Data from the MCAs in science, math, and reading were obtained for the six participating schools for both the 2011 (year prior to project implementation) and 2012 (after first year of implementation). Due to the delay in compiling and report within the Minnesota Department of Education, scores from 2013 were not used, as data from spring testing is not available until later in the summer. The analysis of this data involved an intention-to-treat approach, as recommended by a data specialist within the Minnesota Department of Education. This approach is based on the initial treatment assignment and not on the treatment actually received. While the intention was to have all students across a grade or school participate in the EE/OE projects, participation instead varied from school to school and grade to grade as to how many students participated. In some schools, students in a particular grade or set of grades participated, but in other schools, participation seemed to be by teacher(s). Because test data available from the Minnesota Department of Education is at the grade level rather than classroom or teacher level, data from students who did not participate in the EE/OE project were unable to be removed in the analysis. Consequently, non–participating students' scores may have contributed to the grade-level scores that were considered "treatment averages."

Further difficulty in the analysis was due to several treatment schools not having a school district comparison (as they are the only school at that level – middle or high school – in the district). For these schools and for the two schools considered to be academies, a comparable school was generated through a function within the Minnesota Department of Education's website. It is unclear as to how a comparable school is generated and if there are factors that may have affected student achievement not accounted for in generating the comparison school. Further, because of the change in test form from 2011 (MCA II) to 2012 (MCA III), comparing growth or change in scores from the year prior to treatment to the treatment year is difficult, as test metrics changed across the test. In addition, some schools elected to use the MCA II in 2012, rather than the MCA III, making comparisons further challenging. To address this, the analysis looked at treatment schools in 2012 to see which schools scored higher than the school district or state average. For those schools showing averages higher than the school district or state, their 2011 averages in were compared against 2011 school district and state averages to determine if the year prior to treatment they were outscoring their district and the state average. It would be less likely that the school's higher-than-district or higher-than-state results could be attributed to the treatment, if the year prior, the school also scored higher than the district or state (at that particular grade level).

The results of this analysis suggest one school, Rockford, may have had higher 8th grade science scores in 2012 (year one of the project) than their comparison (non-treatment) school, in contrast to in 2011 where their average science score was slightly lower than the comparison school's average science score. This was one of the schools where the majority of students participated in the treatment, which suggests that participation in the EE/OE project at that particular school may be associated with improved science standardized test scores. The intention-to-treat analysis indicated that none of the other five schools out performed comparable non-treatment schools, nor state averages; but results suggest test performance during the treatment year was relatively similar to performance the prior year. It is possible and perhaps likely that an effect of the project on test scores would not be seen until the second year of the project, as schools seemed to "do more" in the second year and likely implementation in the second year was improved from the prior year. Thus, until data from 2013 is available, and in light of the limitations to the intention to treat analysis approach, it is generally unclear as to the effects of participation on student achievement as measured by test scores.

One of the six schools, Kennedy, provided datasets directly from the test vendor, rather than through the Minnesota Department of Education's test data website. Schools can request rostering of data from the test vendor, with scores provided at the classroom and/or student level. A teacher at this school identified within the data set provided by the test vendor which students participated in the EE/OE project and which students did not (while removing information that could specifically identify individual students). This provided a way to compare participants from non-participants to investigate if there was a treatment effect at a grade-level within a school. Two-way analyses of variances (using the independent variables of participation and gender) indicated no significant difference between participating and non-participating students for science and math. There was a significant difference in reading scores between participating and non-participating students. This difference, however, was moderated by gender, with female students in the EE/OE project scoring significantly higher than female students who did not participate; male students in the EE/OE project scored significantly lower than male students who did not participate. It is not clear as to why there may have been this significant interaction of gender and participation, unless there is some underlying influence similar to why females tend to have more positive environmental attitudes and environmental concern than males. Further research would be needed to better explore the interaction effect of gender and participation on learning outcomes.

In summary, MCA data suggests students were meeting academic standards in core subject areas, and potentially students in the EE/OE projects at two schools may be associated with stronger science and reading achievement than in comparable schools (with the effect on reading achievement moderated by gender at one school). Due to limitations associated with the data available and analysis approach used, further research is needed to measure impact of EE/OE participation on academic learning in the core subject areas and on MCA performance.

For this evaluation, MCA data was supplemented by data from teachers and students as to their perceptions regarding the influence of participation in the EE/OE on achievement of academic standards. Based on data from 28 teachers at the end of school years one and two, teachers perceived their EE/OE projects to have helped students achieve academic standards in science ($M = 2.56$, $SD = .65$), math ($M = 2.16$, $SD = .60$), language arts ($M = 2.38$, $SD = .74$), social studies ($M = 2.05$, $SD = .72$), and physical education ($M = 2.17$, $SD = .71$), with an average response on these items corresponding to a

rating of somewhat to a lot (on a three point response scale, with 1 = not at all to 3 = yes, a lot). Based on the means and standard deviations, it appears teachers perceived their EE/OE projects helped students achieve science standards more so than standards in other subject areas.

Students at the end of school year one (n=198) indicated they perceived participating in their EE/OE project to have increased their academic learning somewhat , with response format options of not at all (1), yes, somewhat (2), and yes, very a lot (3). Students' perceived participation to most help them with science learning (M = 2.27, SD = .70). At the end of school year two, students who participated in the posttest-only assessment (n =158) indicated participating in their EE/OE projects increased their learning in science somewhat to a lot, and their learning in math , language arts, social studies, and physical education somewhat. One open-ended student response to note*: I learned that I really work and learn better in the outdoors.*

At the end of year two, students (n = 70) who participated in the pretest-posttest assessment (students in their first year of participation who had not participated in school year one) had posttest ratings indicating they perceived participation in the EE/OE projects to have somewhat increased their science learning (M = 2.35, SD = .53); math learning (M = 1.97, SD = .65); language arts learning (M = 2.12, SD = .73); social studies learning (M = 2.12, SD = .68); and physical education learning (M = 2.20, SD = .88). See Table 3 for a summary of the means and standard deviations associated with these responses relating to academic learning.

Table 3

	Teacher Mean (SD)	Year 1 Student Mean (SD)	Year 2 Student Mean (SD)	Year 2 Student Post Mean (SD) from pre/post students
Science	2.56 (.65)	2.27 (.70)	2.35 (.68)	2.35 (.53)
Math	2.16 (.60)	1.97 (.78)	1.89 (.74)	1.97 (.65)
Language Arts	2.38 (.74)	1.88 (.81)	1.77 (.70)	2.12 (.73)
Social Studies	2.17 (.71)	1.80 (.77)	1.86 (.73)	2.12 (.68)
Physical Education	2.17 (.71)	1.86 (.82)	1.96 (.75)	2.20 (.88)

Note: on a three point response scale, with 1 = not at all to 3 = yes, a lot.

Did participation in the EE/OE programs increase students' academic engagement, environmental sensitivity, understanding of ecological systems, and outdoor skills?

Based on data from 28 teachers at the end of the school years one and two, teachers perceived their EE/OE projects to have had a positive influence on students' academic engagement (M = 2.51, SD = .21 on a 15-item scale); environmental sensitivity (M = 2.51, SD = .51 on a 4-item scale), and understanding of ecological systems (M = 2.41, SD = .53 on a 5-item scale). The response format for these items was 1, corresponding with not at all, to 3, corresponding to yes, a lot. All teachers indicated they felt the projects contributed to students' learning outdoor skills, with skills ranging from outdoor recreation-related skills to skills that were more environmental learning, such as tree identification, tracking, gardening, and phenology.

At the end of school year one, students (n=198) reported that participating in their EE/OE project somewhat increased their academic engagement (M = 2.26, SD = .41 on the 15-item scale), environmental sensitivity (M = 2.32, SD = .51 on the 4-item scale), and understanding of ecological systems (M = 2.41, SD = .50 on the 5-item scale). The response format was 1 = not at all to 3 = yes, a lot. At the end of school year two, students (n = 158) who participated in the post-only assessment indicated they felt participating in the EE/OE projects increased their academic engagement somewhat (M = 2.19, SD = .42 on the 15-item scale), environmental sensitivity (M = 2.41, SD = .55 on the 4-item scale), and understanding of ecological systems (M = 2.36, SD = .44 on the 5-item scale). Students indicated learning outdoor skills such as survival skills (fire and shelter building), navigation, plant identification, tracking, gardening, and snow shoeing. Open-ended student responses to note: *This project encouraged me to teach my niece about the importance of taking care of the environment. Because of this class, I was inspired to go outside and pick up trash in my neighborhood with my niece;* and *I've learned to see outside the box, to see how everything is connected from a little bug to a big bear; I learned that your actions have a great impact on the world, so make good decisions. Several students noted teamwork or cooperation skills.*

	Teacher Mean (SD)	Year 1 Student Mean (SD)	Year 2 Student Mean (SD)
Academic engagement	2.51 (.21)	2.26 (.41)	2.19 (.42)
Environmental sensitivity	2.51 (.51)	2.32 (.51)	2.41 (.55)
Understanding of ecological systems	2.41 (.53)	2.41 (.50)	2.36 (.44)

At the end of school year two, students who participated in the pretest-posttest assessment (students in their first year of participation who had not participated in school year one; n = 86) had a significant increase in perceived understanding of ecological systems, $t(85) = 5.72$, $p < .001$., as measured on the 5-item scale with a response format of 1 = not much to 3 = a lot. There were no significant increases in academic engagement, environmental sensitivity, and environmental sensitivity as measured through an 11-item connectedness to nature. It is important to note that pretest measures in these three areas indicated a relatively high level of academic engagement, environmental sensitivity and connectedness to nature; thus, there may have been a "ceiling effect" with little opportunity for growth/change in these areas.

The Middle School Environmental Literacy Survey (MSELS), the 2009 version of Hungerford, Volk, McBeth and Bluhm, MSELS (2006), was administered to 8th graders in two of the six participating schools at the end of school year one and at the end of school year two (n = 108). The selection of these two schools was based upon the comprehensive nature of their proposed EE/OE projects. Data from the MSELS indicate 8th grade students from the two schools taking this assessment at the end of each school year of project implementation scored significantly higher than the national mean in the following areas measured on the MSELS: ecological knowledge, $t(107) = 5.30$, $p < .001$; environmental sensitivity, $t(107) = 2.89$, $p = .005$; general environmental feelings, $t(107) = 3.96$, $p < .001$; issue analysis, $t(107) = 3.91$ $p < .001$; intention to act, $t(107) = 3.53$, $p = .001$; and pro-environmental behavior, $t(107) = 5.68$, $p < .001$. See Table 4 for means and standard deviations for participating students and national averages (combined means from both years).

Table 4

	National Mean (SD)	Treatment Mean (SD)
Ecological knowledge	11.62 (3.32)	13.06 (2.81)*
Environmental sensitivity	30.11 (7.48)	31.74 (5.87)*
General environmental feelings	7.82 (2.06)	8.54 (1.77)*
Issue identification	1.29 (.95)	1.31 (1.39)
Issue analysis	2.86 (2.00)	3.66 (2.12)*
Action planning	7.86 (5.64)	8.79 (5.93)
Intention to act	41.10 (9.20)	43.69 (7.61)*
Pro-environmental behavior	35.14 (9.39)	39.11 (7.27)*

Notes: Treatment mean is from 108 participants from across both schools and years; national mean is from approximately 900 8th grade students nationwide (McBeth & Volk, 2010). Asterisks note where ENRTF means are significantly higher than national mean; significance value set at .006 to control for spiraling type I error rate (.05 /8).

Results by school and year are in Table 5. Results suggest 8th grade students at Kennedy in the project's second year scored significantly higher than the national mean in the following areas: ecological knowledge, $t(30) = 5.76$, $p < .001$; environmental sensitivity, $t(30) = 3.09$, $p = .004$; general environmental feelings, $t(30) = 3.72$, $p = .001$; issue analysis, $t(30) = 7.11$, $p < .001$; action planning, $t(30) = 3.01$, $p = .005$; intention to act, $t(30) = 5.10$, $p < .001$; and pro-environmental behavior, $t(30) = 6.33$, $p < .001$. In addition, students at Rockford in the first year of the project scored significantly higher than the national mean on ecological knowledge, $t(23) = 3.85$, $p = .001$.

Table 5

	Rockford Yr 1 Mean (SD)	Rockford Yr 2 Mean(SD)	Kennedy Yr 1 Mean (SD)	Kennedy Yr 2 (Mean SD)	National Mean (SD)
Ecological knowledge	13.29 (2.61)*	12.50 (3.01)	12.39 (2.50)	14.10 (2.76)*	11.62 (3.32)
Environmental sensitivity	30.83 (4.85)	29.17 (5.41)	34.17 (6.74) *(not significant due to higher SD)*	33.13 (5.45)*	30.11 (7.48)
General environmental feelings	8.57 (1.91)	8.23 (1.65)	8.42 (2.10)	8.90 (1.62)*	7.82 (2.06)
Issue identification	.71 (.91)	1.33 (1.36)	1.30 (.97)	1.93 (1.75)	1.29 (.95)
Issue analysis	3.17 (2.61)	3.03 (1.81)	3.48 (2.23)	4.72 (1.50)*	2.86 (2.00)
Action planning	5.67 (5.43)	8.33 (5.61)	8.22 (4.45)	11.48 (6.57)*	7.86 (5.64)
Intention to act	41.46 (6.26)	41.73 (8.27)	45.43 (9.51)	46.00 (5.35)*	41.10 (9.20)
Pro-environmental behavior	37.54 (6.76)	38.00 (7.66)	39.65 (9.28)	41.00 (5.15)*	35.14 (9.39)

Note: Asterisks indicated school mean scores that were significantly higher than the national mean, based on scores from approximately 900 8th grade students (McBeth & Volk, 2010); significance value set at .006 to control for spiraling type I error rate (.05 /8).

Program Characteristics Associated with Student Outcomes

To address the evaluation question, *What characteristics of the environmental and outdoor education projects/programs are associated with influencing students' academic engagement and achievement in the core subject areas?,* teachers were asked to respond to an open-ended item on the teacher questionnaire. Data from 28 teachers is summarized below, categorized by perceived influences on academic engagement first, followed by influences on academic achievement. Frequency of times a response was indicated by teachers varied; an asterisk notes a response was given by five or more teachers.

Characteristics/Components Influencing Students' Academic Engagement:

- Ownership in the project or in the place or space (in starting a garden on their own, getting to weigh in on decisions and do research to develop the plans; getting to help plan the course of the trail; having their "own" piece of space by the river and taking pride in caring for it);
- Outdoor learning/experience that excites, motivates, engages, and focuses students (students are excited to go outdoors and enjoy going outdoors; excitement becomes engagement in the classroom and motivates students to learn more about the environment; any outdoor experience heightens interest and motivation; students enjoy going outdoors and focus on the learning more; serves as a stimulus for learning)*;
- Out-of-classroom learning experiences that increase meaning and relevance for student learning (more buy-in to the learning at hand when they see it as relevant);
- Active or hands-on learning (for example, "doing" science) ;
- Novel topics/novel places/working on something students don't get to do at home (such as the pickling and dehydrating component of the gardening program);
- Having to transfer ideas from outdoor activities to indoor activities (or vice versa)

Characteristics/Components Influencing Students' Academic Achievement in Core Subjects:

- Solving real world problems;
- Hands-on or real-world learning that helps students connect to content; connections of curriculum in the classroom to the outside world (having the picture of the outdoors in their minds to recall and relate new information; applying math to real world activities instead of problems from a book requires students to construct knowledge and engage in using and applying math rather than just doing math; writing improves, as students can see and describe cause and effect from first hand experiences and are then able to write better descriptions ; having used their senses and make observations helps them write more descriptively; feel validated when writing about their observations)*;
- Whole-body experiences (these experiences engrains themselves into a student an in their memory; can be used as a reference point for learning the rest of the year;
- Writing activities addressing local environmental issues seemed to have increased academic achievement in science, social studies, and English;
- Having to analyze data and explain it helps them learn in multiple subject areas;
- Team teaching and tying lessons across subject areas;
- Having the outdoor learning reinforce core content knowledge and skills; and
- Learning about a place that they feel connected to (more engaged in writing assignments because they were writing about "their place")

Recommendations for Future Implementation

The characteristics and components identified in the prior section can guide future integration of EE/OE into the school curriculum. In addition, guidance for future implantation stems from the following evaluation question: *What are teachers' recommendations regarding future implementation of environmental and outdoor education as a means for improving academic engagement and achievement?* Data from the28 teacher respondents is summarized below.

- Utilizing community partnerships;
- Investment and support from school leaders and community members ;
- More working as a team in grade levels, allowing for similar topics/activities addressing multiple curricular areas;
- Determining necessary standards and then determining projects that can apply to those standards (rather than determining projects and then finding standards, as that makes it difficult to authentically meet core academic standards);
- Include a variety of activities to support diverse learners;
- Determine how to help students transfer effort in the outdoors to effort in classroom work (right now our students love being outdoors, but have yet to realize that level of effort can carry over to classroom work);
- Continued support of mentors/experts who visit and provide feedback;
- Having access to a clearing house of lessons or "bank" of lesson plans that are cross-curricular; access to additional standards-based lessons ;
- Having students take pre- and post-assessments so students can see for themselves how much knowledge they've gained; and
- Use of field trips/visits off site to places relevant to concepts being studied

The projects schools proposed and implemented varied in the degree to which EE/OE was integrated across the curriculum and the degree to which the EE/OE implemented was longer-term projects involving multiple teachers (v. isolated lessons or experiences). Similarly, professional development needs and recommendations indicated a range of where "teachers were at" in terms of integrating EE/OE across the academic curriculum. Thus, the following question was included in this evaluation to guide future project implementation when the aim is toward a more systemic integration of EE/OE*: What would encourage or support teachers in integrating environmental and outdoor education across the academic curriculum (collaborating with teachers on multidisciplinary projects rather than integrating it into isolated subjects or lessons)?* Teachers offered the suggestions below. An asterisk indicates a response given by five or more teachers.

Data from the teacher respondents are summarized below.

- Promoting recognition of and support for this form of learning among teachers and administrators through examples, student "testimonials," or data that supports environmental and outdoor education's effect on student achievement;
- Common planning time and planning time in general (time to plan together and even support/pay for planning together)*;
- Strong buy-in from all teachers;
- A format for teachers to share ideas, support each other, and collaborate with each other;

- Cross-curricular professional development opportunities and attendance as a team of teachers; and
- Follow-up grants to allow teachers to build on and improve upon the new ideas they have developed over the course of this pilot project.

Appendix B – Model Lessons

A collection of lessons produced by teachers in the EOE project.

Model Environmental and Outdoor Education Lesson Plan

Teacher name: Patricia Heldt

School: Clearwater Middle School

Phone: (952) 442-2760

E-mail: theldt@waconia.k12.mn.us

Title of lesson: Local Weathering

Content area: Science

Grade level: 5

Learning objective: Students will identify signs of erosion and weathering as well as ways people engineered stopping erosion at local sites.

Standard or benchmark addressed (include any inter-curricular connections):

Science 5.3.1.22, 5.1.3.2.1, 5.4.4.1.1

Description of lesson and how it is adapted for EOE:

- Students will investigate weathering and erosion using stream tables. They will learn to change one variable at a time while engineering solutions to slow the effects of water.
- Students will take a bus tour of a river, a farm field, a marsh and a lake shore. Students will map out the erosion the see, as they did on stream tables, and note how people attempted to slow the erosion.
- Students will complete a choice activity applying how they would slow erosion at one of the bus sites.

Teacher's role (i.e. specific activities and instructional strategies):

- Teachers ask leading questions which facilitate students ability to notice and document how the water moves soil as it flows.
- Teachers will lead students on the bus tour. They will ask students to point out areas of interest.
- Teachers will provide students with the time and guidelines to safely search the bus tour sites for more signs of erosion and engineering.

Other resources needed:

Stream Tables, bus, river, lake, marsh, contour farmed harvested field, student packet,

How students are assessed:

See attached rubrics and choice activities

Suggested enhancements or extensions:

Analyze topographical maps of the local sites.

Draw in predictions of erosion or where they saw erosion.

Time considerations:

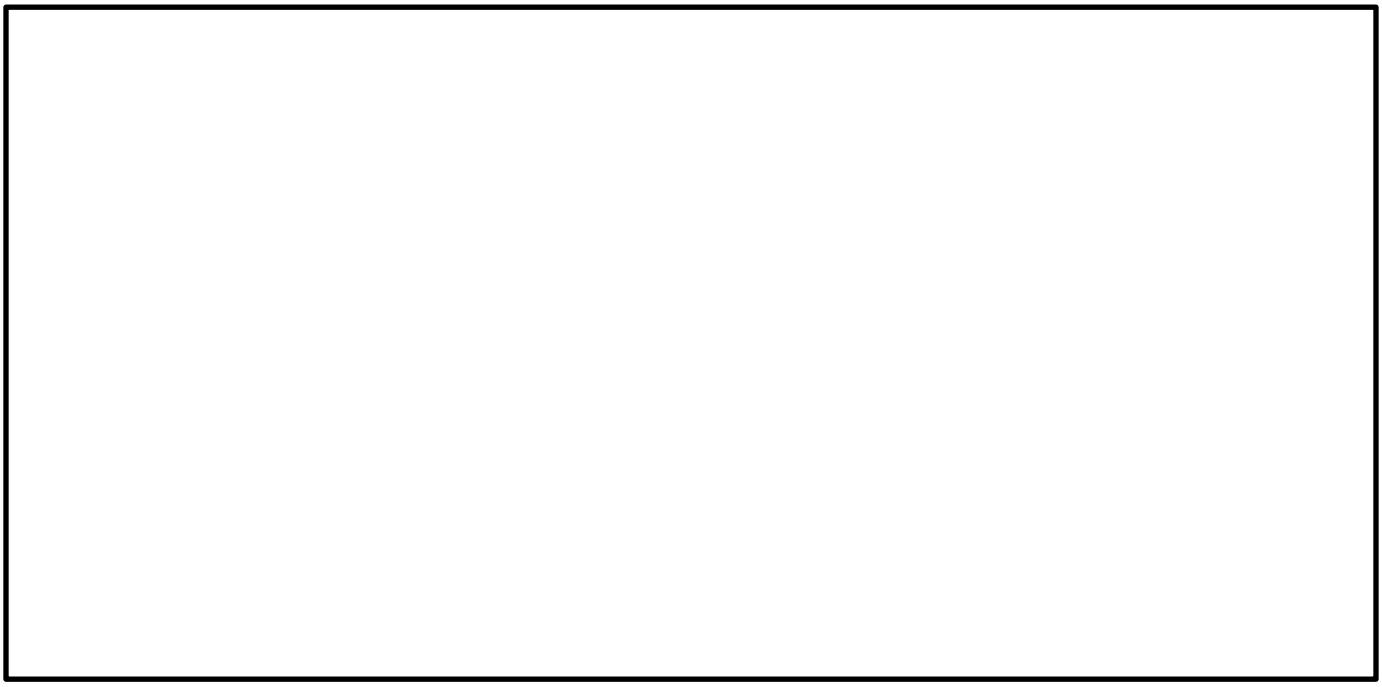
Three week unit

Three hour field trip (depending on distance traveled)

Two 75 minute periods for assessment

Bus Tour Site _____

Draw all living and non-living elements of the area that you see that cause or control erosion.



Describe the erosion that you see. _____

_____

_____

Describe natural elements of the area that slow erosion. _____

_____

_____

Describe human engineered ways to slow erosion. _____

_____

_____

How would engineer a way to slow the erosion. _____

_____

_____

Bus Tour Choice Activities

You may work as an individual or in a group of up to three people. Your partners may come from anyone who was on the bus with you. Each partner must write their own captions and be able to present to their class.

Circle if you are going to work alone or in a group.

Individual

Group: Partner 1 _____ Partner 2 _____

You may choose one activity to demonstrate your knowledge from the bus tour. 45 minutes of class time will be given to you to work. All other work must be finished at home. You must have a 60 second presentation which teaches your class what you learned.

Circle the choice that you are going to do.

Choice 1: Stream Table Design

Design a stream table to teach someone else what you saw at one of the erosion bus tour sites. Label each element with a flag (use the ones we used when we did stream tables in class or make new ones); write a caption explaining the weathering issue you saw and at least one solution that could solve it.

Choice 2: Putt Putt Golf Hole

Design a putt putt golf hole that will teach someone else what you saw at one of the erosion bus tour sites. Label each element with a flag (use the ones we used when we did stream tables in class or make new ones); write a caption explaining the weathering issue you saw and at least one solution that could solve it.

Choice 3: Creative Erosion Story

Write a creative story which will teach someone about what you saw at one of the erosion bus tour sties. Include the elements of weathering that you saw and how they could be solved. You may do this as a nonfiction or fiction story.

Stream Table Rubric:

	1	2	3	4
Stream table model example of Weathering	Model shows basic weathering in an unclear manner.	Model demonstrates basic weathering elements in a clear manner.	Model visually demonstrates weathering elements in a clear-precise manner.	Model visually demonstrates weathering elements in a clear-explanative manner.
Written Caption of weathering elements	Caption mentions weathering elements.	Caption relates weathering elements to the model.	Caption explains reasons for weathering shown in the model.	Caption thoroughly explains reasons and effects of weathering shown in the model.
Water in the model demonstrates water's natural course	Water does not mimic where it would go at one of the bus sites.	Water mimics with 30% accuracy where it would go at one of the bus sites.	Water mimics with 60% accuracy where it would go at one of the bus sites.	Water mimics with 95% accuracy where it would go at one of the bus sites.
Reflection on how you helped your group	Listed 3-4 adjectives describing how you helped or hurt your group.	Listed adjectives and verbs describing how you helped or hurt your group.	Explained using adjectives and verbs describing how you helped or hurt your group and the effects your performance had.	Explained using adjectives and verbs describing how you helped or hurt your group and the effects your performance had. Listing specific contributions you made.
Stream Table/ Bus Site relationship	Your model does not relate to what you saw on the bus tour.	Your model vaguely looks like one of what you saw on the bus tour.	Your model clearly represents one of the sites shown on the bus tour.	Your model clearly represents and is a scale model of one of the sites shown on the bus tours.

Putt Putt Golf Rubric:

	1	2	3	4
Putt Putt Golf Hole models example of Weathering	Model shows basic weathering in an unclear manner.	Model demonstrates basic weathering elements in a clear manner.	Model visually demonstrates weathering elements in a clear-precise manner.	Model visually demonstrates weathering elements in a clear-explanative manner.
Written Caption of weathering elements	Caption mentions weathering elements.	Caption relates weathering elements to the model.	Caption explains reasons for weathering shown in the model.	Caption thoroughly explains reasons and effects of weathering shown in the model.
Golf Ball demonstrates water's natural course	Golf ball does not move.	Golf ball mimics with 30% accuracy where water would go at one of the bus sites.	Golf ball mimics with 60% accuracy where water would go at one of the bus sites.	Golf ball mimics with 90% accuracy where water would go at one of the bus sites.
Reflection on how you helped your group	Listed 3-4 adjectives describing how you helped or hurt your group.	Listed adjectives and verbs describing how you helped or hurt your group.	Explained using adjectives and verbs describing how you helped or hurt your group and the effects your performance had.	Explained using adjectives and verbs describing how you helped or hurt your group and the effects your performance had. Listing specific contributions you made.
Putt Putt Hole/ Bus Site relationship	Your model does not relate to what you saw on the bus tour.	Your model vaguely looks like one of what you saw on the bus tour.	Your model clearly represents one of the sites shown on the bus tour.	Your model clearly represents and is a scale model of one of the sites shown on the bus tours.

Creative Story Rubric:

	1	2	3	4
Words allow someone to picture the effects of weathering.	Weathering description mentioned.	Reader is able to see basic picture of the effects of weathering.	Reader is able to picture what type of soil and weathering happened.	Reader is able to picture what type of soil and weathering happened and how the water would move.
Written description of weathering elements	Weathering elements mentioned.	Weathering elements described in detail.	Weathering explained in detail including reasons why it happened.	Weathering is thoroughly explained including reasons and effects of weathering shown at the bus site.
Story explains water's natural course	Description of water flow does not match where it really would go.	Description of water flow matches with 30% accuracy where it really would go.	Description of water flow matches with 60% accuracy where it really would go.	Description of water flow matches with 95% accuracy where it really would go.
Reflection on how you helped your group	Listed 3-4 adjectives describing how you helped or hurt your group.	Listed adjectives and verbs describing how you helped or hurt your group.	Explained using adjectives and verbs describing how you helped or hurt your group and the effects your performance had.	Explained using adjectives and verbs describing how you helped or hurt your group and the effects your performance had. Listing specific contributions you made.
Story/ Bus Site relationship	Your story does not describe what you saw on the bus tour.	Your story vaguely describes one of what you saw on the bus tour.	Your story clearly describes one of the sites shown on the bus tour.	Your story clearly describes in detail one of the sites shown on the bus tours.

Model Environmental and Outdoor Education Lesson Plan

Teacher name: Patricia Heldt

School: Clearwater Middle School

Phone: (952) 442-2760

E-mail: theldt@waconia.k12.mn.us

Title of lesson: Wetland

Content area: Science

Grade level: 5

Learning objective: Students will know the parts of a wetland and how they work together to filter water.

Standard or benchmark addressed (include any inter-curricular connections):

Science 5.4.2.1.1, 5.4.1.1.1

Description of lesson and how it is adapted for EOE:

1. Students visit a pond and a wetland near the school. Students write down all living and non-living elements they see.
2. Students predict the niche of each element of the wetland they noted.
3. Students read the information on Wetlands and take notes on why they are important.
4. Students read the Magic School Bus on Water Sanitation.
5. Students compare the parts of a wetland to the parts of a water cleaning station.
6. Students build a model to replicate each part of a wetland in a clear plastic tub.
7. Students note how their wetland model will clean water.
8. Students place an eye dropper in their wetland against the plastic.
9. Students add one teaspoon of red food coloring and observe what happens immediately, after five minutes, after thirty minutes and after twenty four hours.
10. Students compare how their model cleaned the dye to how water is cleaned in a wetland.

Teacher's role (i.e. specific activities and instructional strategies):

Wetland Investigation

- Lead students to wetland or wetland, point out points of interest in the area.
- As leading questions which make students think about the parts of a wetland and how they help one another.
- Check that students have documented the living and non-living parts of a wetland.

Reading Materials

- Hand out the MN Wetland packet, chapter 3 Minnesota Waters-Wetlands and Groundwater. Instruct students to read it as a group, to note the main ideas and supporting details of each section with a heading.
- Discuss the different parts and importance of a wetland with the class when everyone has completed their notes.
- Read Magic School bus to the class.
- Compare the similarities and differences between wetland areas and water purification center.

Wetland Investigation

- Have all bins, eye droppers and any wetland materials you are providing organized for students. (You may want to provide sand, peat moss, plant matter, and water for students. I have students bring in their own materials but have options for them to use if they forgot.)
- Review the parts of a wetland and what role they play.
- Instruct students to fill in the wetland worksheet. Make sure they note how their model replicates the wetland.

Other resources needed:

MN DNA Wetlands Chapter 3

Magic School Bus Water Purification

Clear Plastic Bin for each group

Red Food Coloring

Eye dropper per group with the top removed

How students are assessed:

Students compare how their model wetlands work to how actual wetlands work.

Suggested enhancements or extensions:

Project Wet wetland analogy sheet

Time considerations:

One period for wetland tour

One period for reading materials

One period to build and observe the wetland. Students may finish readings while doing observations.

Wetlands and Wetlands

Describe what living plants and animals live in wetlands.

Animal	Habitat	Niche (job or how it helps the ecosystem)

Plant	Habitat	Niche (job or how it helps the ecosystem)

Describe what non-living things live in wetlands.

Non-living Object	Where it is found	Niche (job or how it helps the ecosystem)

Wetlands and Water Purification

As your read the Magic School Bus note how cities clean water.

Look at your wetland notes. What parts of a wetland do the same job.

You will make your own wetland. What will you use to model or replicate each part of the wetland.

Part of Water Purification	Part of the Wetland	How they clean water	How you will replicate this in a model

Build a wetland in a clear tub.

Place an eye dropper in the wetland. Check that it is touching the clear plastic.

Add one teaspoon of red food coloring. Observe how your model cleans the ink.

Time Interval	Observation
Immediate	
Five Minutes	
Thirty Minutes	
Twenty-four Hours	

How does your model demonstrate how wetlands clean water?

_____

_____

Model Environmental and Outdoor Education Lesson Plan

Teacher name: Michael Jensen

School: Waconia High School

Phone: 952-442-0670

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Title of lesson: Stream Monitoring

Content area: Environmental Biology, Biology, Ecology

Grade level: 9-12

Learning objective: Students will be able to successfully…

1. Measure stream width and depth
2. Measure water temperature
3. Identify habitat and influences on local stream health
4. Measure stream velocity
5. Measure stream clarity

Standard or benchmark addressed (include any inter-curricular connections):

9.4.4.1.2
Describe the social, economic and ecological risks and benefits of changing a natural ecosystem as a result of human activity.

9.4.2.1.2
Explain how ecosystems can change as a result of the introduction of one or more new species.

9.3.4.1.2
Explain how human activity and natural processes are altering the hydrosphere, biosphere, lithosphere and atmosphere, including pollution, topography and climate.

9.3.4.1.1
Analyze the benefits, costs, risks and tradeoffs associated with natural hazards, including the selection of land use and engineering mitigation.

9.3.2.3.1
Trace the cyclical movement of carbon, oxygen and nitrogen through the lithosphere, hydrosphere, atmosphere, and biosphere.

9.1.3.1.1
Describe a system, including specifications of boundaries and subsystems, relationships to other systems, and identification of inputs and expected outputs.

Description of lesson and how it is adapted for EOE:

This lesson involves sampling and collecting data for local stream monitoring. These lesson involve students in the hands on collection and analysis of data and connecting with local and state agencies to communicate data.

Teacher's role (i.e. specific activities and instructional strategies):

1. Scout local streams and lakes
2. Lead students in pre instruction sampling methods
3. Lead students in day of sampling methods
4. Engage students in collection of multiple data sets and analysis

Other resources needed:

1. Waiters – set for 1 per 2-3 students
2. 100 ft tape measures – 1 per 2-3 students
3. D-nets – 1 per 2-3 students for invert collection
4. Thermometers
5. Floating object – tennis ball, fishing floats, blow up beach ball, etc.

How students are assessed:

1. Formative Unit Test
2. Summative journal entries

Suggested enhancements or extensions:

1. Use D-nets for invert collection à biodiversity index study
2. Extend stream data collection to local lakes

Time considerations:

1. Scouting – 1 class period (70min) with or without class to get a sense of the area of study
2. Sampling - 2 class period (70min) for steam characteristics, temperature, velocity, invert sampling, etc.
3. Analysis – 2 class period (70min) for group collaboration and anaylsis

Model Environmental and Outdoor Education Lesson Plan

Teacher name: Michele A. Melius (History/Geography) and Britta DeVinny (Science)

School: Clearwater Middle School Waconia, MN 55387

Phone: 952-442-0650 ext. 3198

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Title of lesson: The Edible Festival at the MN Landscape Arboretum (7th Grade Field Trip)

Content area: Science, History and Geography

Grade level: 7th grade

Learning objective:

Our goal was to provide an authentic learning activity that allows students to observe and experience, first-hand, the scientific process that goes into developing plants that can withstand Minnesota climate and soil.

Standard or benchmark addressed (include any inter-curricular connections):

Minnesota State Science Standards: Grade 7:

7.4.2.1.1 - Identify a variety of populations and communities in an ecosystem and describe the relationships among populations and communities in a stable ecosystem.

7.4.2.1.2 - Compare and contrast the roles of organisms with the following relationships: predator/prey, parasite/host, and producer/consumer/decomposer.

7.4.2.1.3 - Explain how the number of populations an ecosystem can support depends on the biotic resources available as well as abiotic factors such as the amount of light, water, temperature range, and soil composition.

7.4.2.2.1 - Recognize that producers use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms.

7.4.2.2.2 - Describe the roles and relationships among producers, consumers, and decomposers in changing energy from form to another in a food web within an ecosystem.

7.4.4.1.1 - Describe examples where selective breeding has resulted in new varieties of cultivated plants and particular traits in domesticated animals.

7.4.4.1.2 - Describe ways that human activities can change the populations and communities in an ecosystem.

Minnesota State Standards: Grades 4-8

V. Geography

A. Concepts of Location

Standard 2. The student will identify and locate major physical and cultural features that played an important role in the history of Minnesota.

Benchmark 1

C. Physical Features and Processes

Standard 3. The student will identify and locate geographic features associated with the development of Minnesota.

Benchmark 1.

Standard 4. The student will identify physical characteristics of places and use this knowledge to define regions, their relationships among regions, and their patterns of change.

Benchmark 3.

D. Interconnections

Standard 1. The student will give examples that demonstrate how people are connected to each other and the environment.

Benchmark 2

Standard 5. The student will describe how humans influence the environment and in turn are influenced by it.

Benchmark 1.

Description of lesson and how it is adapted for EOE:

Incorporating lesson ideas from *Food for Thought; Connecting Minnesota Geography, Agriculture and Communities* curriculum, we began the unit by discussing the difference between weather and climate. Using a variety of resources, such as; maps, images, articles, and Google Earth, we gathered data creating layers of information. This allowed us, while on the fieldtrip, to compare and see what correlations and causal relationships exist among the patterns of data examined earlier. Students were required to keep a daily journal in class as we went through the lessons. They were then asked to bring these with when visiting the Arboretum and Apple Farm experts so that their research could be documented. These journals were part of the Edible Festival packet that we created with the help of the Arboretum's Education team.

**This was the first time that we tried teaching cross-curricular lessons. The description given was our goal, we achieved most of what we had hoped to accomplish-time was our main problem because science is first semester and geography is second. From this experience, we know how to better prepare the students for the fieldtrip next year.

Other resources needed: The Arboretum provided most of the items needed. I brought a few items that would be linked to the history of the area-Chaska Brick.

How students are assessed:

After the field trip we met as a class to share and discuss individual findings. The students were asked to show their understanding by creating a Mind Map which teaches them how to structure information, helping them to better analyze, comprehend, synthesize, and communicate their experience.

Suggested enhancements or extensions:

There are many ways to extend this lesson. Incorporating Native American tribes and their farming practices, getting more in depth with the creating of hybrid, Minnesota hardy seeds and plants, and including elements of climate change.

Time considerations: This was a 3 hour field trip that could have easily been a full day. Prior to the field trip, Science and Geography spent 5 days/70 minutes per class, introducing and discussing the subjects so that the experience would enhance their understanding and give it relevance.

Model Environmental and Outdoor Education Lesson Plan

Lesson Title: Macro Photography

Name: Beth Russell

School email: russellb@rockford.k12.mn.us

School Forest: Rockford Middle School

Grade(s): 6-8

Objective(s): Students will understand the function of the macro setting on their digital camera, take pictures from multiple perspectives, and manipulate the images using photo-editing software.

Standards: (NETS/ISTE)

1. Creativity and Innovation: Students will demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. 1b: Students will create original works as a means of personal or group expression.

4. Critical Thinking, Problem Solving, and Decision Making: Students use critical thinking to plan, conduct, and manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

Equipment needed: Classroom set of cameras (students can share) and computers to download and edit images.

Procedure:

This lesson assumes students have discussed and worked with photography composition concepts such as rule of thirds and perspective.

1. Explore images online (via Google image search) of macro photography. Ask students to explain what the images have in common or what makes them unique.

2. Explain macro photography: sharp, focused images of an object up close and personal! Most digital cameras have macro settings; quite often it is expressed with a little flower detail on the settings button. Macro photos must be taken with the lens close to the subject without zooming.

3. Hand out cameras and have students find the correct setting; then go outside and take pictures with the following guidelines:

- use rule of thirds
- take multiple pictures of a subject from different angles
- play around with use of light/shadows
- look for interesting textures, colors, or patterns

4. When students come back inside, have them choose their own top two pictures from the camera. Students can upload photos to their computer or to the teacher's computer. Once photos are uploaded, the class can discuss the hour's best images.

5. The next day, students will be working with photo editing. In GoogleDocs (or Microsoft Word), have students create a table with columns labeled "before" and "after." Students should upload their best photo from the previous day to the "before" column.

6. Students will then upload their photos to an online editing website such as www.pixlr.com . Using this site, students can explore a variety of photo editing tools. One students are satisfied with their changes and edits, they will upload the new photo to their table labeled "after."

7. Students will then write a paragraph explaining:

- the steps they took when finding, composing, and taking the image
- why they chose this particular image
- the steps they took while editing the photo
- how the mood, feeling, or tone changed from one image to the next

Assessment: A rubric can be used to score students on:

- composition of original photo
- creation of table in GoogleDocs (shared with teacher) or in Word
- use of photo editing tool (pixlr.com)
- explanation of the photography and editing process

Model Environmental and Outdoor Education Lesson Plan

Teacher name: Jesse Maloney

School: CCLA

Phone: 651 793 6624

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Title of lesson: To Consume or Be consumed

Content area: _MS Science_____

Grade level: ___7th__

Learning objective: Students will understand the relationship between predators/prey and will know that producers are the start of all food webs/chains, that primary consumers eat producers and that secondary consumers eat primary consumers

Standard or benchmark addressed (include any inter-curricular connections):

2. Interdepen-dence Among Living Systems	1. Natural systems include a variety of organisms that interact with one another in several ways.	7.4.2.1.1	Identify a variety of populations and communities in an ecosystem and describe the relationships among the populations and communities in a stable ecosystem.
		7.4.2.1.2	Compare and contrast the roles of organisms with the following relationships: predator/prey, parasite/host, and producer/consumer/decomposer.

Description of lesson and how it is adapted for EOE:

NOTE: In preparation for this lesson, students have designed and engineered pvc marshmallow shooters. (see attached template). They should also have a basic understanding of how plants grow through photosynthesis.

This lesson is best suited for outdoors and is most effective in wooded or tall prairie grass areas.

Students are shown all of the plants and trees in the area. They are asked how these plants grow. Students will probably say “the sun, and rain”. Don’t forget to remind them that the very

act of them answering is helping the plants grow (CO2 from their breath). The combination of those 3 things helps a plant "*produce"* its own food by photosynthesis. That is why they are called PRODUCERS.

Let students know that many organisms get their energy by eating producers (plants). See if students can name or identify some of these organisms. These might include rabbits, woodchucks, caterpillars, deer, birds, etc. These animals are HERBIVORES. Since they are the first organisms to eat or *consume* in the food chain/web, they are also called PIMARY CONSUMERS.

Now explain that many animals eat or consume those primary consumers. If they are the *second* set of organisms to *consume* in the food web/chain, ask students what they think they are called. That's right, SECONDARY CONSUMERS.

Tell students there are names for organisms in these eat or be eaten relationships. The PREDATOR eats the PREY. A good way to remember who's who in this relationship is that if you are running from something that wants to eat you, you "pray" that you don't get caught! To not get caught, many of these organisms use CAMOUFLAGE to hide.

Teacher's role (i.e. specific activities and instructional strategies):

Now divide students up into two groups. Tell them that one group is going to be scared rabbits (you can also use deer, ducks, etc.) and that they will be the prey. Then tell them that the other group will be the hunters (predators). The hunters will be using their marshmallow shooters to hunt the rabbits in the woods/grass. The rabbits will be using camouflage to hide. If the rabbits can go for 5 minutes (in a designated area) without being shot by a marshmallow then they will be successful in survival. Hunters can flush out rabbits and the rabbits can run and hide again, they just can't get shot.

Have the predators count down 2 minutes while the rabbits go into the woods and hide. At the end of 2 minutes, the predators go in to hunt the prey. Start your 5 minute countdown and see which of the prey lives to eat producers another day!

At the end of the round, switch roles.

Other resources needed:

Stop watch, marshmallow shooters, camouflage clothing

How students are assessed:

Ask students which role they like to play more: PREDATOR/PREY. You might also ask them which one they would rather be in nature and why. The following day you might want to give a quiz using the vocabulary words underlined above.

Suggested enhancements or extensions:

See what happens when you have less predators and more prey or vise versa. For each surviving rabbit, have 2 more rabbits enter the next round because of their rapid reproduction.

Introduce other predators like dogs into the game (they would hunt without shooters). Try the activity with and then without camouflage.

Time considerations:

40 minutes minus travel time.

Model Environmental and Outdoor Education Lesson Plan

Teacher name: Sarah Oppelt

School: River's Edge Academy

Phone: 651-234-0150

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Content area: Biology- Elective

Grade level: 9-12

Learning objective: I can plan and build a rain barrel set-up for the school garden.

Standard or benchmark addressed (include any inter-curricular connections):

9.1.2.2.1 – Engineering Design

9.3.4.1.2 – How human activity is affecting the hydrosphere

9.4.4.1.2 – How ecosystems are affected by human activity

9.4.4.2.4 – How water quality affects health.

Description of lesson and how it is adapted for EOE:

The students developed a plan and installed rain barrels in the school garden area. The students learned about rain barrels and how they could be used in the garden and their benefits for water quality. This activity fit well with their prior studies of water quality and watersheds and our connection to the Mississippi River in Science class. The lesson gave them an opportunity to connect their understanding of water quality to an action plan for steps that they can use to make a difference. The students were directed in finding the best directions and plan for rain barrel installation. They turned this information into a proposal for the rain barrels that was then approved by school administration. The installation was a great activity for students that don't always succeed in a traditional academic setting. The students learned how to use new tools and solve problems during the installation.

Teacher's role (i.e. specific activities and instructional strategies):

I started with a lesson on rain barrels and their relationship to water quality. The students had some background knowledge from water quality lessons in science class and electives. I also arranged a visit to another school that had rain barrels as well as other garden features so the students could see how other schools had developed their rain barrel and garden plans. I provided quality resources for students to do basic research on rain barrels and to develop their plan for the school. Most of the activities were student-directed with teacher feedback.

Other resources needed:

Rain barrel information guides (County, Watershed Districts), building supplies for the rain barrels, and tools.

How students are assessed:

The assessment included the rain barrel project plan (see attached) and the installation of the rain barrels on the school property. Students also shared their rain barrel project at a school presentation night.

Suggested enhancements or extensions:

There could be more math done to figure out the area of the roof and capacity of rain barrels and how many barrels would be need to meet the capacity of the roof runoff.

Time considerations:

This lesson occurred during an intensive class that was all day long, which allowed for more undivided time to work on the plan and installation or the rain barrels. This could be completed over many class periods, or during a voluntary after school time, depending on the size of the project.

Model Environmental and Outdoor Education Lesson Plan

Teacher name: Rick Wilson

School: Kennedy Community School

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E-mail: richard.wilson@isd742.org

Title of lesson: Pondwater Organism Investigation

Content area: Ecology

Grade level: 7

Learning objective: Students will find organisms in pond water and research them. They will take that information and create food chains and food webs from them.

Standard or benchmark addressed (include any inter-curricular connections):

7.4.2.2.3- Total amount of matter in an ecosystem remains constant

7.4.2.2.2- Roles and relationships between producers, consumers, and decomposers

Materials Needed: ice cream pails (pre made with holes drilled in the bottom, and lines attached to them {use cotton twine} to swing out into the water), lab sheet, pond water organism identification sheet

Description of lesson and how it is adapted for EOE:

Students will preview the lab, including looking at the organisms that are likely to be found in your area. Students will go out and spread themselves out in the appropriate area. They will throw their buckets in a responsible manner to try to collect organisms. They record the organisms found and the numbers of organisms found.

Students then research briefly, about those organisms and construct a food web from what organisms they have found.

Teacher's role (i.e. specific activities and instructional strategies):

Create the fishing buckets, model how to appropriately toss the buckets, learn how to tie a slip knot, structure the lab for success; pick a relatively warm day.

Other resources needed:

Bring a scissors/knife and extra twine. The students are going to get the buckets tangled. Its easier/faster/more efficient to cut the line and re-tie it, so students can get back to work. Keep the line to reuse later or cut up and leave for birds to use for their nests. (Be sure to explain to students that you are not littering, but allowing nature to reuse the material)

How students are assessed:

Students will be assessed based on their level of engagement. It is not guaranteed that students will catch anything. Even if so, it may be hard to build a food web from it. Students will have filled out their lab sheet, researched any organisms they DID find and constructed as much of a food web or food chain as they can.

Suggested enhancements or extensions:

Students can look to include surrounding ecosystems in their food web. Perhaps amphibious creatures can be included that interact with the pond water organisms.

You could also hold Pond Water Elections. Each student would select which of the organisms found (all organisms, not just the ones they were able to catch) would make the best president of the pond. When they make their choice, place them into their groups. They will then work together to craft a speech or debate points to present to the class.

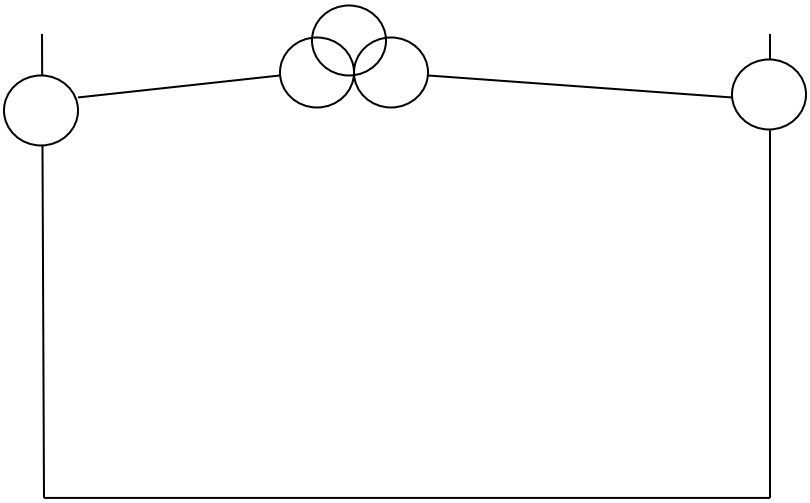
Time considerations:

The instruction and fishing should take two class periods, depending on your group and your location. The research and food webs should take no more than one class period. If you choose an extension activity, obviously allow for extra time.

Bucket Construction

Slip knot that goes around their wrist

(like a wii remote), so the bucket stays)



Slip Knots

Use slip knots on each end of all of the lines

Drill 1/8” holes

It keeps everything tight and they are easily fixed if they come out.

Model Environmental and Outdoor Education Lesson Plan

Teacher name: Kay Martin & Krishna Yuvaraj

School: _Simley High School

Phone: _651-306-7118

E-mail: yuvarajk@invergrove.k12.mn.us

Title of lesson: Identify organisms in the environment

Content area: Biology

Grade level: 11-12

Learning objective: Students will be able to identify natural ecosystems ranging from microscopic to macroscopic scales.

Standard or benchmark addressed (include any inter-curricular connections):

Natural systems include a variety of organisms that interact with one another in several ways.

Description of lesson and how it is adapted for EOE:

Students collected water samples from a local pond then identified the organisms both plant and animal within the samples under microscopes. Students identified trees in the same. Students' looked at how energy flowed through tropic levels in this area.

Teacher's role (i.e. specific activities and instructional strategies):

The teachers' role was very limited. We explained the days activities and expectations. Our role after that was to help where needed but this was primarily a student lead activity.

Other resources needed:

Waders, collection jars, micro/macro identification tables, tree identification tables, microscopes

How students are assessed:

Ability to follow directions, use of identification tables, use of microscopes

Suggested enhancements or extensions:

Better dichotomous keys would be good. Take water samples at various depths. Try this again in a different forest with different species.

Time considerations:

This took 2 days but could easily be extended to 4 days depending on size of the area and number of students.

Model Environmental and Outdoor Education Lesson Plan

Teacher name: Randy Bergman

School: Noble Academy

Phone: (763) 592-7706

E-mail: rbergman@nobleacademy.us

Title of lesson: Seeing The Woods from the Trees

Content area: Mathematics/Science

Grade level: 7

Learning objective: Students will be able to calculate the diameter, radius, and approximate height and the approximate density of trees in the Camden Neighborhood of North Minneapolis using perpendicular angles and formulas for a circle, area, volume, and density.

Standards or benchmarks addressed (include any inter-curricular connections):

MN Math Standards-2007

7.1.2.3 - Understand calculators and other computing technologies often truncate or round numbers.

7.1.2.5 - Use proportional reasoning to solve problems involving ratios in various contexts

7.2.1.1 - Understand that a relationship between two variables, x and y, is proportional if it can be expressed in the form y/x = k or y = kx. Distinguish proportional relationships from other relationships, including inversely proportional relationships.

7.2.2.2 - Solve multi-step problems involving proportional relationships in numerous contexts.

7.2.2.3 - Use knowledge of proportions to assess the reasonableness of solutions.

7.2.4.1 - Represent relationships in various contexts with equations involving variables and positive and negative rational numbers. Use the properties of equality to solve for the value of a variable. Interpret the solution in the original context.

7.3.1.1 - Demonstrate an understanding of the proportional relationship between the diameter and circumference of a circle and that the unit rate (constant of proportionality) is. Calculate the circumference and area of circles and sectors of circles to solve problems in various contexts.

7.3.2.2 - Apply scale factors, length ratios and area ratios to determine side lengths and areas of similar geometric figures.

6.2.1.1.1
Explain density, dissolving, compression, diffusion and thermal expansion using the particle model of matter.

7.4.3.2.3 - Recognize that variation exists in every population and describe how a variation can help or hinder an organism's ability to survive.

7.1.3.4.2 - Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analysis to describe and investigate natural and designed systems in a life science context.

8.2.1.1.2
Use physical properties to distinguish between metals and non-metals.

8.1.3.4.2 - Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts.

Description of lesson and how it is adapted for EOE:

Students work in groups or 3-4 to measure the a) width, b) area density, and c) heights of four trees. To do this, students need to know the a) proportional relationships between circumference and diameter or how to use a caliper, b) measure the length and width of an area being measured by:

1. Marking five points along a line on the string
2. Laying another string perpendicular to the main string at each point to make four quadrants
3. Find the closest tree to the point measuring 4 inches across at 4 feet from the ground
4. Determine the width of the tree by dividing circumference by P or using calipers
5. Measure the distance in meters from the starting point to this tree and write it down
6. Repeat this method with three other trees in the other quarters for that point
7. Repeat again for the points created along the same line
8. Add together the distances from the four trees to the point and divide the distances by four to find the average distance of the trees to each point
9. Repeat this procedure for the remaining points
10. Add these average distances for all five points and divide by five to find the overall distance of the trees in meters

11. Multiply the average distance in meters by itself to find the average area each tree occupies

12. Divide 10,000meters squared by the average tree area to determine the tree density per hectare

13. Determine the height of each tree using its shadow by indirect measurement

14. Calculate the average height of the trees times the average diameter and multiple this by the density to find the approximate total space density occupied by trees in the cubic space

15. (optional) Draw a scale model of the area and compare/contrast it with the entire 1 or 10 kilometer satellite image using Google maps per urban tree density

Teacher's role (i.e. specific activities and instructional strategies):

The teacher models measuring techniques to the students. The teacher assigns students to cooperative learning groups with the following roles and responsibilities:

A. Leader/Facilitator and Note-Taker—Is responsible for making sure every student does their part, laying the string around the area being measured for density, and for recording accurate measurements in the notebook.

B. Measurer –Is responsible for measuring the circumference, width (if using calipers), and length of shadows as well as measuring the string for the area being measured.

C. Calculator-Is responsible for calculating the width, distance, and height of trees using indirect measurement and expressing the values in meters and hectare.

D. Scale Model Drawer/Organizer (optional role—see extensions)-Draws scale models of the outside and perceived inside of the trees being measured, shadows, as well as all large items in the four-quadrant area being measured.

Other resources needed:

- Outdoor Notebooks & Sharpened Pencils
- Metric Measuring Tapes
- String
- Sunshine
- Trees
- Calipers (optional)
- Calculator (optional)
- Google Maps (optional)

How students are assessed:

The teacher has a selected tree with fairly easy measurements that has been pre-calculated for an authentic assessment of student skill in finding the diameter, radius, and approximate density. Additional practice problems, quiz and unit assessment questions are given throughout the unit to asses understanding of math and science standards using the same or similar contextualized problems.

Suggested enhancements or extensions:

Math Extensions to Address Additional Standards:

-Make scale drawings and compare studied area(s) with other areas using Google maps

7.3.2.3 - Use proportions and ratios to solve problems involving scale drawings and conversions of measurement units.

-Make a circle comparison chart and/or graphs comparing the tree density to other landmarks/objects (houses, streets, lawn…)

7.4.2.1 - Use reasoning with proportions to display and interpret data in circle graphs (pie charts) and histograms. Choose the appropriate data display and know how to create the display using a spreadsheet or other graphing technology.

Science Extensions to Address Additional Standards:

-Convert from Metric to English Units. Use scientific notation.

6.1.3.4.2 - Demonstrate the conversion of units within the International System of Units (SI, or metric) and estimate the magnitude of common objects and quantities using metric units.

-Write an persuasive essay using the data for increasing, maintaining, or decreasing the tree density in Minneapolis. Compare tree density in Minneapolis with St. Paul and/or other cities.

7.1.3.4.1 - Use maps, satellite images and other data sets to describe patterns and make predictions about natural systems in a life science context.

7.4.2.1.3 - Explain how the number of populations an ecosystem can support depends on the biotic resources available as well as abiotic factors such as amount of light and water, temperature range and soil composition.

-Explain why tree density is greater in one city or area than another. Use research and historic documents to validate claims.

7.4.4.1.2 - Describe ways that human activities can change the populations and communities in an ecosystem.

8.1.1.2.1 - Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.

Time considerations:

Demonstration of measuring techniques and using indirect measurement can be done before going outside and even the day before to build background. Students should have had prior knowledge of circle and density formulas before this activity. By using Calipers and Calculators the activity can be completed in a 50 minute session when students work in structured groups of three or four with clear roles and understanding of procedures. Having formulas readily available solved for different variables in student journals is an adaption that also increases student productivity time. In order for all students to complete the assessment additional time may be needed as well.

Appendix C - Environmental and Outdoor Education Advisory Committee

Ms. Janine Kohn
National Education Specialist
Pheasants Forever, Inc. and Quail Forever

Mr. Kim Kovich
Teacher, Science
Champlin Park High School

Mr. Dan Bodette
Principal
School of Environmental Studies

Mr. Dave Benke
Director, Prevention and Assistance
Minnesota Pollution Control Agency

Mr. Ryan Bronson
Conservation Manager
Federal Cartridge/ATK Ammunitions Group

Mr. Mike Sodomka
Principal
Humboldt Senior High School

Ms. Andrea Lorek Strauss
Extension Educator, Environmental Science
U of M Extension, Rochester

Dr. Mark Zmudy
Associate Professor
University of MN – Duluth

Mr. Tracy Fredin
Director
Center for Global EE
Hamline University

Ms. Becky Rennicke
Teacher, Science
Perham High School

Ron Hustvedt
Social Studies Teacher
Salk Middle School

Ms. Lee Ann Landstrom
Director, Eastman Nature Center
Three River Parks

Mr. Joe Cannella
Development Director
Minnesota Deer Hunters Association

Ms. Molly Malecek
Assistant Director
Deep Portage Conservation Reserve

Mr. Pete Cleary
Naturalist/Curriculum Coordinator
Dodge Nature Center

Ms. Mikaela Kraemer
REI

Mr. Karl Kaufmann
Teacher, Science
Pillager High School

Mr. Vern Wagner
Anglers for Habitat

Mr. John Olson
Science Specialist
MDE

Mr. Jack Wachlarowicz
Teacher, Special Education
White Bear Lake High School, North Campus

Ms. Amy Markle
Minnesota Association for Environmental Education

Ms. Dawn Flinn
Education Coordinator
DNR

Mr. Joshua Leonard
Education Director, Valley Branch ELC

Ms. Kristen Poppleton
K-12 Education Program Manager
Will Steger Foundation

Mr. Roland Sigurdson
MinnAqua Specialist
DNR

Ms. Laura Cina
Managing Director
Minnesota Renewable Energy Society

Ms. Amy Kay Kerber
Forestry Education
DNR

Appendix D – Pilot Training Agenda

EOE Training Schedule – Camp Courage, Maple Lake, MN

Dec. 8-9, 2011 - Woodland Campus

12/7/11 – JL

Dec. 8	Activity	Leader	Outcome
8:30 am	Registration	Terry Alvarado	Name Tags, Cabin Assignments, reimbursements, Louv Book, journals and kits
9 am	Welcome, Introductions, Agenda, Project outcomes	Jeff Ledermann, Kim Kovich	Resource people (list), logistics (meeting room, parking, meals, bathrooms, outdoors – clothing, hiking), diversity, project overview (handout, expectations), expenses, CEUs, tables, history, Jeffers, meet each other
9:45 am	Standards Overview/Journaling	Charon Tierney, MDE Language Arts Specialist	Better understanding of standards, prepared to do journaling during training
10:45 am	Break		
11 am	Evaluation	Julie Ernst, UMD	Research background and expectations for evaluation during project
12:00 pm	Lunch - Outdoor Classroom Video?	Jeff Ledermann	With administrators (Jeff meets with administrators after lunch – reporting requirements, data needs, future stuff)
1 pm	Taking kids outside	Cara Rieckenberg, Prior Lake-Savage, Kim Kovich	Skills and helpful ideas to manage classrooms outside
2 pm	Project-based learning and inquiry	Doug Paulson, John Olson, MDE	Skills and understanding of how to apply projects to standards
3 pm	Break		
3:15 pm	Team planning time	With trainers/coaches	Team building activity (Patty R.), consensus on project goals
5 pm	Break		
5:30 pm	Dinner		
6:30 pm	Team time	With trainers/coaches	Identify alignment with standards, by content area
8 pm	Nature lesson		Lessons around the Campfire
9 pm	Recess		Journal Homework – One thing you will apply from today in your classes and one colleague that you will share resources with

Dec. 9	Activity	Leader	Outcome
7:30 am	Breakfast		

8 am	EE/OE Samplers, NAAEE Guidelines, MAEE, SEEK, copies of curricula on hand	Patty Selly	Knowledge of quality EE/OE, resources available
10 am	Break		
10:15 am	School Forest and PLT activity	Amy Kay Kerber	Future School Forest training options, 2 free PLT guides
11:30 am	Lunch	With community reps	
12:30 pm	Finding Community resources	Su Beran, Teams with coaches	Community mapping by school
1:30 pm	Team Time	Teams with coaches	Next steps, future training plans
2:45 pm	Evaluation/Wrap-up	Jeff Ledermann	EOE can be integrated into the standards, Expectations for rest of the EOE project, Evaluation Form
3 pm	Depart		

Appendix E – Regional EOE Workshops Flyer

Minnesota Department of Education

Teachers and Administrators,

Do you and your students suffer from "Too Much Screen Time" or "Nature Deficit Disorder"?

The PRESCRIPTION is to take your kids outside!

Emerging research from across the country is showing that using the environment and the outdoors as an integrating context for learning results in higher student test scores and academic performance, more advanced critical thinking skills, greater achievement motivation and more responsible behavior by students in their school and community.




Join us for an Introduction to Integrating Environmental and Outdoor Education in Grades K-12:

"Teaching Outside the Box"

One Day Regional Workshops for K-12 Teachers and Administrators
Cost: $10/person

- Wednesday, July 11: Rochester – Cascade Meadow Wetlands & Environmental Science Center
- Tuesday, July 31: Collegeville – St. John's Arboretum
- Monday, Aug. 13: St. Paul – St. Paul Parks and Recreation, Como Streetcar Station
- Saturday, Sept. 29: Sandstone – Audubon Center of the North Woods

Presented by the Minnesota Department of Education in partnership with our workshop hosts and supported by:

Jeffers Foundation; Minnesota Association for Environmental Education; Minnesota Department of Natural Resources; Pheasants Forever; Environment and Natural Resources Trust Fund

SEEK Minnesota's home of environmental education resources

Designed for school teachers and administrators from any content area that are NEW to integrating environmental and outdoor education into formal classrooms.

Delivered by environmental and outdoor education experts, participants in the workshops will:

- learn about the value and benefits of integrating environmental and outdoor education (EOE) into formal education programs
- learn how EOE can be integrated into multiple content areas and achieve academic standards
- build knowledge and skills to take kids outside
- receive hands-on training on quality EOE programs from state experts
- receive free EOE materials and resources, including a journal, outdoor exploration kit and membership in MAEE
- identify other resources and community partners near your school and begin plans to further support efforts to integrate EOE into your school
- receive clock hours certificates from Minnesota Department of Education

Participants will spend a large amount of time outside in varied terrain - dress appropriately for the weather conditions.

Workshops attendance is limited to a maximum of up to 60 attendees per workshop depending on space available at each site, so register soon!

Workshops will start with registration at 8 a.m. and end at 4 p.m. Lunch is included in your registration.

Please bring a copy of your classroom curriculum and a reusable water bottle (no disposables).

Appendix F – Regional Green Schools Workshop Flyer

Minnesota Department of Education

Presents

Green Schools Workshops

Regional Workshops for K-12 Administrators, Staff, Teachers and anyone else interested in making schools more healthy, efficient, and effective.

Workshops will be held at Minnesota's 2012 Green Ribbon Schools National Award Winners:

- Monday, October 29: St. Joseph – Kennedy Community School
- Monday, November 5: West St. Paul – Garlough Environmental Magnet School
- Wednesday, November 28: Duluth – North Shore Community School

See first-hand the benefits of green schools and learn about resources available in the areas of green buildings and energy, health and safety and environmental education.

Cost: Free. Clock hour certificates available.

Presented by the Minnesota Department of Education in partnership with our workshop hosts and supported by:

Minnesota's home of environmental education resources

Designed for school teachers, administrators, school business officials, buildings and grounds staff, school board members, informal educators, environmental groups, parent and community volunteers, legislators and local officials and anyone else that has an interest in making their school more green.

Delivered by green school experts, participants in the workshops will:

- identify ideas, resources, mentors and support in their efforts to implement green school initiatives
- learn about the Green Ribbon Schools (GRS) program, including the benefits of green schools and the three pillars of the program:
    - Pillar One – Reduce environmental impacts and costs
    - Pillar Two – Improve the health and wellness of students and staff
    - Pillar Three – Provide effective environmental and sustainability education
- see Minnesota's 2012 Green Ribbon Schools National Winners and hear from staff and students

The following agenda is planned for each workshop:

- 3 p.m. – Registration and exhibits open
- 3:30 p.m. – Welcome and Overview of Green Schools – GRS process and pillars, hear from 2012 GRS national winners
- 4 p.m. – Break-out sessions and school tours
- 5 p.m. – Exhibits and networking
- 6 p.m. – The End

2012-13 Green Ribbon Schools Timeframe:

December 19 –Green Ribbon Schools application deadline

February 15 – MDE forwards nominations to U.S. Department of Education

April 22 – U.S. Department of Education announces awards

June 3 – Green Ribbon Schools Awards ceremony in Washington, DC

Legislative-Citizen Commission on Minnesota Resources

2010 Project Abstract
For the Period Ending June 15, 2011

PROJECT TITLE: Project GO Toolkit Activities
PROJECT MANAGER: Sara Grover
AFFILIATION: Project Get Outdoors, Inc.
MAILING ADDRESS: Whitewater State Park, 19041 Highway 74
CITY/STATE/ZIP: Altura, MN 55910
PHONE: 507-951-5885
E-MAIL: sara.grover@yahoo.com
WEBSITE: www.mnprojectgetoutdoors.org
FUNDING SOURCE: MN Environment and Natural Resources Trust Fund
LEGAL CITATION: ML 2010, Chap.[362], Sec.[2], Subd. 8h .

APPROPRATION AMOUNT: $15,000

Overall Project Outcomes and Results

Project GO has developed a toolkit to help local communities design, implement, evaluate and sustain free after-school and summer programs that introduce children to nearby public lands and outdoor activities and skills they can enjoy at these sites.

Through funds from the MNENRTF, Project GO was able to assemble 50 Activity Backpacks and 32 Equipment Trunks for Project GO program leaders to use in their communities. Each program leader is issued a backpack to keep during their involvement with the Project GO program. The Activity Backpacks provide basic supplies to help leaders implement 100 or more different outdoor games, projects and activities.

The Equipment Trunks focus on 16 different activities and are available for Project GO leaders to check out for free. These trunks are housed at Whitewater State Park for use in SE Minnesota and we anticipate the other set of 16 trunks will be housed out of Minneopa State Park for use by Project GO clubs in SW Minnesota.

At the time of this report, 14 backpacks have been issued. Equipment trunks are beginning to be checked out. Program leaders are excited to have these resources and so far, feedback has been very positive. The children are happy to have more diverse equipment and supplies to use while learning about the outdoors. We plan to evaluate the usefulness of these resources over the coming year via a program leader survey. One obstacle we are looking at is getting the equipment trunks to and from program sites that are farther from the storage site. We are hoping to develop a network of volunteer “runners” who would be reimbursed mileage for delivering and returning the equipment trunks when a GO site in a community such as Red Wing or Spring Grove desires to check out a trunk.

Project Results Use and Dissemination

The completed Activity Backpacks have already been issued to 14 sites. We will continue to help communities design Project GO programs that are unique as well as work with local staff at community organizations such as youth centers, school age child care programs, and other after school sites to introduce children in those programs to nature through our toolkit resources.

Since completing the assembly of the 50 Activity Backpacks and 32 Equipment Trunks, Project GO has formed a partnership with local public health and child care resource professionals to look at implementing our program into the larger child care centers that serve school age children during the after school hours. We are currently piloting this at a child care center in Caledonia and looking to work with two child care centers in Rochester. We will train the school age room staff at these centers to use our backpacks at least once a week. As an incentive for them to use the backpacks and journal their experiences, Project GO will provide a person to come out to their site no more than once a month to lead a hands-on nature activity using one of the Equipment Trunks. This new approach with child care centers will allow us to serve many more children. Project GO will be presenting at an upcoming Focus on the Child conference in Rochester, sharing this information with child care providers from across the southern region.

A number of colleges and college professors in Se Minnesota have expressed enthusiasm to connect their students to service learning, internship and practicum experiences with Project GO. We have found that college students bring great enthusiasm to the program which the children really enjoy and in exchange Project GO is able to provide real world learning experiences for these students.

We are already looking to secure additional funds to purchase more backpacks, as we anticipate the first 50 will be issued within a year. The US Fish & Wildlife Service Winona District is eager to help us acquire another batch of backpacks.

Environment and Natural Resources Trust Fund (ENRTF)
2010 Work Program Final Report

Date of Report: November 16, 2010
Final Report

I. PROJECT TITLE: Project Get Outdoors Toolkit Activities

Project Manager: Sara Grover
Affiliation: Project Get Outdoors Coordinator and Board Member
Mailing Address: Whitewater State Park, 19041 Hwy 74
City / State / Zip: Altura, MN 55910
Telephone Number: 507-932-3007 ext. 226 cell 507-951-5885
E-mail Address: sara.grover@yahoo.com
FAX Number: 507-932-5938
Web Site Address: www.mnprojectgetoutdoors.org

Location: Southern Minnesota, including the counties of *Goodhue, Wabasha, Winona, Houston, Fillmore, Olmsted, Dodge, Mower, Steele, Freeborn, Rise, Waseca, Faribault, Blue Earth, LeSueur, Sibley, Nicollet, Brown, Watonwan, Martin, Jackson, Cottonwood, Redwod, Renville, Lac Que Parle, Yellow Medicine, Lyon, Murray, Nobles, Rock, Pipestone, and Lincoln.*

Total ENRTF Project Budget:	**ENRTF Appropriation**	**$ 15,000.00**
	Minus Amount Spent:	**$ 14,874.95**
	Equal Balance:	**$ 125.05**

Legal Citation: ML 2010, Chap.[362], Sec.[2], Subd.[8h].

Appropriation Language: $15,000 is from the trust fund to the commissioner of natural resources for an agreement with Project Get Outdoors, Inc. to develop out of school programs connecting children to local nature experiences.

II. and III. FINAL PROJECT SUMMARY

Project GO has developed a toolkit to help local communities design, implement, evaluate and sustain free after-school and summer programs that introduce children to nearby public lands and outdoor activities and skills they can enjoy at these sites.

Through funds from the MNENRTF, Project GO was able to assemble 50 Activity Backpacks and 32 Equipment Trunks for Project GO program leaders to use in their communities. Each program leader is issued a backpack to keep during their involvement with the Project GO program. The Activity Backpacks provide basic supplies to help leaders implement 100 or more different outdoor games, projects and activities.

The Equipment Trunks focus on 16 different activities and are available for Project GO leaders to check out for free. These trunks are housed at Whitewater State Park for use

in SE Minnesota and we anticipate the other set of 16 trunks will be housed out of Minneopa State Park for use by Project GO clubs in SW Minnesota.

At the time of this report, 14 backpacks have been issued. Equipment trunks are beginning to be checked out. Program leaders are excited to have these resources and so far, feedback has been very positive. The children are happy to have more diverse equipment and supplies to use while learning about the outdoors. We plan to evaluate the usefulness of these resources over the coming year via a program leader survey. One obstacle we are looking at is getting the equipment trunks to and from program sites that are farther from the storage site. We are hoping to develop a network of volunteer "runners" who would be reimbursed mileage for delivering and returning the equipment trunks when a GO site in a community such as Red Wing or Spring Grove desires to check out a trunk.

IV. OUTLINE OF PROJECT RESULTS*:*

RESULT 1: Accessible & Practical Activity Planning Resources

Description: The resources available through the Start Up Backpacks, Activity Ideas Booklet, and Equipment Trunks will facilitate Project GO program start up and activity planning for a minimum of 50 communities located in Southern Minnesota, serving a minimum of 5000 registered participants and implementing a minimum of 1500 separate outdoor nature activities, fieldtrips and/or service projects.

Summary Budget Information for Result 1:	**ENRTF Budget:**	**$ 15,000.00**
	Amount Spent:	**$ 14,874.95**
	Balance:	**$ 125.05**

Deliverable	**Completion Date**	**Budget**
1. As of November 12, 2010 we have been able to purchase 100% of the needed supplies for the toolkit backpacks. All 50 backpacks have been assembled and 14 of them have already been issued to Project GO program leaders in Se Minnesota.	November 16, 2010	$9,130.60
2. . We were able to stretch out the $15,000 award and therefore purchase enough equipment to assemble 2 sets of 16 different equipment trunks (32 trunks total). These trunks include: Animal Calling, Animal Tracking, Bird Watching, Campfire Cooking, Fish Printing, Geo-caching, Insect Collecting, Intro to Camping, Knot Tying, Make A Walking Stick, Recycled Rhythm Makers & Nature Sing Along, Make A Nature Journal, Make A Dragonfly, Make A Kite, Make A Pet Rock, and Outdoor Olympics.	November 26, 2010	$5,869.40
3.		

(add or remove rows to Deliverable table as needed)

Final Report Summary: November 16, 2010

V. TOTAL ENRTF PROJECT BUDGET:

Personnel: $
Contracts: $
Equipment/Tools/Supplies: $ 14,874.95 for 50 Activity Backpacks and 32 Equipment Trunks.
Acquisition (Fee Title or Permanent Easements): $
Travel: $
Additional Budget Items: $

TOTAL ENRTF PROJECT BUDGET: $14,874.95

Explanation of Capital Expenditures Greater Than $3,500: Equipment trunks will be used for the same purpose for their lifetime, shared for free among the Project GO groups in region. This $15,000 investment by the Environment and Natural Resources Trust Fund will continue to aide local communities in their outdoor education efforts for years.

VI. PROJECT STRATEGY:

A. Project Partners:

The Project GO Board of Directors will be overseeing the project. The Board is composed of individuals who represent various agencies and organizations that share an interest in connecting kids to the outdoors. Members include; Maria Lamey – Wabasha County Social Services, Tony DeBusk – Boys Scouts of America, Julie Fassbender – City of Winona Park and Rec, Larry Gates – Farmer & retired DNR Watershed Coordinator, Sara Grover – MN State Parks, Jon Holger – Fillmore County Social Services & MN State Parks, Patrick Jirik – U of MN Extension Service, Kate O'Grady – MN State Parks & WSU Assistant Professor, Andrea Lorek Strauss – U of MN Extension Service, Dave Palmquist – MN State Parks, Ann Rethlefsen – Winona State University, Ellen Rollie – St. Charles Public Schools, Cindy Samples – US Fish & Wildlife Service (board liaison). Sara Grover serves as the lead project manager and will be assisted by the board and their partner agencies.

B. Project Impact and Long-term Strategy:

Project GO is helping Minnesota communities to implement free after school programs that get kids outdoors and engaged in nature. The 50 toolkits funded through this grant will be issued for free to 50 interested communities throughout the entire southern region. Like 4-H Clubs or Scout Troops, the Regional Project GO Coordinators will work with interested communities to train community volunteers how to start up and sustain their own unique programs. These Project GO programs will continue to operate in each community long after the completion of this grant period. Over the coming years, Project GO will continue to work with communities and partnering

organizations to secure more funding in order to assemble additional toolkits and expand the program reach throughout the entire state of Minnesota.

We plan to continue to partner with government and non-government agencies that share in our mission and to identify ways that partnering organizations can help contribute funds or other resources to aide in this effort.

Project GO received 501c3 tax-exempt status in February 2009. Since then, our Board of Directors has begun to move forward on developing a sustainable funding strategy. Prior to this, we operated under the fiscal sponsorship of the Parks and Trails Council of Minnesota.

C. Other Funds Proposed to be Spent during the Project Period:

The backpacks were donated by the US Fish & Wildlife Service with a few basic supplies in them, valued at $75/piece. The Sheltering Arms Foundation has awarded Project GO a $10,000 grant to assist with the expansion of the program into 50 communities providing start up funds to each new site and dollars for website re-design. The North Face Planet Explore has also recently awarded $2,500 to assist in this project. Also, the Minnesota Department of Natural Resources Division of Parks and Trails has created an 80% Interpretive Naturalist/Project GO Coordinator position at Whitewater State Park to help with the effort in Se Minnesota. The DNR is currently looking at creating a similar position for Minneopa State Park to help with Project GO outreach in SW Minnesota. This in-kind support provided by the MN DNR is valued at over $50,000.

D. Spending HIstory: Project GO has spent $9,130.60 to gather the supplies for all 50 of the toolkit backpacks. Equipment Trunk Costs totaled $5,869.40.

VII. DISSEMINATION:

The completed Activity Backpacks have already been issued to 14 sites. We will continue to help communities design Project GO programs that are unique as well as work with local staff at community organizations such as youth centers, school age child care programs, and other after school sites to introduce children in those programs to nature through our toolkit resources.

Since completing the assembly of the 50 Activity Backpacks and 32 Equipment Trunks, Project GO has formed a partnership with local public health and child care resource professionals to look at implementing our program into the larger child care centers that serve school age children during the after school hours. We are currently piloting this at a child care center in Caledonia and looking to work with two child care centers in Rochester. We will train the school age room staff at these centers to use our backpacks at least once a week. As an incentive for them to use the backpacks and journal their experiences, Project GO will provide a person to come out to their site no more than once a month to lead a hands-on nature activity using one of the Equipment Trunks. This new approach with child care centers will allow us to serve many more children. Project GO will be presenting at an upcoming Focus on the Child conference in Rochester, sharing this information with child care providers from across the southern region.

A number of colleges and college professors in Se Minnesota have expressed enthusiasm to connect their students to service learning, internship and practicum experiences with Project

GO. We have found that college students bring great enthusiasm to the program which the children really enjoy and in exchange Project GO is able to provide real world learning experiences for these students.

We are already looking to secure additional funds to purchase more backpacks, as we anticipate the first 50 will be issued within a year. The US Fish & Wildlife Service Winona District is eager to help us acquire another batch of backpacks.

VIII. REPORTING REQUIREMENTS: A final work program report and associated products is being submitted November 16, 2010.

IX. RESEARCH PROJECTS:

Attachment A: Budget Detail for 2010 Projects - Summary and a Budget page for each partner (if applicable)

Project Title: Project Get Outdoors Toolkit Activities

Project Manager Name: Sara Grover

Trust Fund Appropriation: $ 15,000

2010 Trust Fund Budget	**Result 1 Budget:**	**Amount Spent** *(date)*	**Balance** *(date)*	**TOTAL BUDGET**	**TOTAL BALANCE**
	Accessible & Practical Activity Planning Resources				
BUDGET ITEM					
Non-capital Equipment / Tools: **-** 50 Start Up Backpacks with basic supplies (blindfolds, magnifying glasses, rope, bug boxes, trail cards, animal calls, clipboards, balls, etc.) - Equipment Trunks with resources for Project GO clubs to experience a greater variety of outdoor recreation activities (binoculars, fishing poles, GPS units, digital cameras, tents, aquatic nets, art supplies,	$15,000.00	$14,874.95	$125.05	$15,000.00	$125.05
Other *(Describe the activity and cost) be specific*					
COLUMN TOTAL	**$15,000.00**	**$14,874.95**	**$125.05**	**$15,000.00**	**$125.05**

2010 Project Abstract
For the Period Ending June 30, 2012

PROJECT TITLE: Minnesota WolfLink
PROJECT MANAGER: Keith Youngquist
AFFILIATION: International Wolf Center
MAILING ADDRESS: 3410 Winnetka Ave. No., Suite 101
CITY/STATE/ZIP: New Hope, MN 55427
PHONE: 763-560-7374, ext. 223
E-MAIL: kyoungquist@wolf.org
WEBSITE: wolf.org
FUNDING SOURCE: Environment and Natural Resources Trust Fund
LEGAL CITATION: M.L. 2010, chp. 362, Sec. 2, Subd. 8j

APPROPRIATION AMOUNT: $193,000

Appropriation Language
$193,000 is from the trust fund to the commissioner of Natural Resources for an agreement with the International Wolf Center to develop interactive onsite and distance learning about wolves and their habitat. This appropriation is available until June 30, 2013, by which time the project must be completed and final products delivered.

Project Abstract

The project funded:

- 115 live interactive video broadcasts from the International Wolf Center in Ely, Minnesota to inner-city, suburban and rural schools throughout Minnesota.
- Two new loan boxes. These boxes are shipped to schools in advance of the broadcast. Each box contains: Wolf pelts, claws, teeth, scat, bones of the wolf prey, wolf related books, ink stamps, projects that they can work on and keep and lesson materials in English, Spanish, Hmong, Somali and Braille.
- New video broadcasting equipment. It will provide quality broadcasts for many years.
- A portion of an educator wages and benefits. The educator has a master's degree and many years of wolf exposure and training.
- The creation, printing and mailing of promotional materials and some promotional travel expenses.

The original goal was to offer 100 WolfLink programs reaching 2,500 students and teachers along with the wolf loan boxes to educate, engage, and promote future stewardship of the state's environmental resources. To provide translation for three languages and braille to the classroom educational materials. Also, to provide improved broadcasting technology by acquiring new technology.

Outcomes
International Wolf Center was able to reach 115 schools and 3,804 students, exceeding the original goal by 15 schools and 1,304 students. The 2 additional loan boxes were added and much needed due to the frequency of programs. One Minnesota school was able to be included in a broadcast with schools from Canada and Mexico, making their wolf education also a multi-cultural event with the ability to interact with these foreign students. The lesson materials are translated and opened the education to children where English is their second language.

There were several schools that were not aware they possessed the necessary technology to receive the live interactive broadcasts. After the wolf broadcasts those schools were open to Internet broadcast learning opportunities.

Minnesota tourism increased somewhat as many children brought home their souvenirs and other lesson materials from the wolf loan boxes and requested their family make a trip to Ely, where many families

visited the International Wolf Center and viewed in person the same live wolves seen in their WolfLink program.

The advanced technology made available by this grant will continue to serve well for many years.

The question may be asked why this education is important and even relevant today. It is best answered by the enthusiasm displayed by the children's faces when the wolves howled or showed other wolf behavior. They learned all about wolves based on scientific based research. They were able to figuratively leave their school, via the internet broadcast, to experience the great outdoors of Minnesota, all the while learning about taking care of Minnesota's natural resources. By involving children in this educational process it is preparing our next generation to be stewards of Minnesota resources. The facts are taught in the hopes that a better informed public can be involved in making better informed public policy relative to wolves and other Minnesota natural resources.

Project Results Use and Dissemination

The WolfLink programs reaching out to 115 schools has been spread by word of mouth. The original plan of having 100 interactive broadcasts was an aggressive goal at the time of grant application. Having exceeded it has shown how successful the new technology presents the materials. When a teacher in a school completed a program, they naturally shared their enthusiasm with their fellow teachers. This led to other teachers within the same school to request programs for their classroom.

Part of the marketing plan included printing of postcards which were done for less money than originally planned. The Internet and emails, which were not funded by this grant, were also used effectively to market the WolfLink programs to Minnesota schools. In all the communications credit was given to the Minnesota Environment and Natural Resources Trust Fund for making these free programs possible.

The lessons plans were updated before and during the WolfLink presentations. The updating is a continue process. The split screen capability allows the teacher and the wolves to be presented on the same screen to hold the attention of the class to what is being taught. We believe that part of this program that teachers will repeat this process each year, as the cost after the completion of this grant is not cost prohibitive.

Environment and Natural Resources Trust Fund (ENRTF)
2010 Work Program Final Report

Date of Report: June 30, 2013 (Final)
December 28, 2012
June 30, 2012
December 31, 2011
June 30, 2011
December 31, 2010
January 27, 2010

"FINAL REPORT"

Date of Work Program Amendment Request: December 28, 2012
November 28, 2011
September 13, 2010

Date of Work Program Amendment Approval: November 28, 2011
September 27, 2010

Date of Work Program Approval:
Project Completion Date: June 30, 2013

I. PROJECT TITLE: Minnesota WolfLink

Project Manager: Keith Youngquist
Affiliation: International Wolf Center
Mailing Address: 3410 Winnetka Ave. No., Suite 101
City / State / Zip: New Hope, MN 55427
Telephone Number: 763-560-7374, ext. 223
E-mail Address: kyoungquist@wolf.org
Fax Number: 763-560-7368
Web Site Address: www.wolf.org

Location: 3410 Winnetka Ave, No, Mpls, MN 55427

Total ENRTF Project Budget:	**ENRTF Appropriation**	**$193,000.00**
	Minus Amount Spent:	**$189,920.27**
	Equal Balance:	**$ 3,079.73**

Legal Citation: M.L. 2010, Chp. 362, Sec. 2, Subd. 8j

Appropriation Language:
$193,000 is from the trust fund to the commissioner of natural resources for an agreement with the InternationalWolf Center to develop interactive onsite and distance learning about wolves and their habitat. This appropriation is available until June 30, 2013, by which time the project must be completed and final products delivered.

II. FINAL PROJECT SUMMARY AND RESULTS:

The International Wolf Center's Minnesota WolfLink is a live, interactive onsite and distance learning experience for K-12 learners, their teachers, and other groups. Programs are led by International Wolf Center educators, who also develop standards-based lesson plans. WolfLink also provides kits, called Wolf Loan Boxes, which include objects, specimens, and printed materials to support the live outdoor and classroom learning experience. Minnesota WolfLink utilizes unique Minnesota wolf country habitat and videoconferencing technologies, including chroma key to provide real time links to wild wolves and their habitats.

International Wolf Center educators in Ely, Minnesota will be connected ("linked") to classrooms and other locations throughout the state through compatible videoconferencing delivery systems. Minnesota WolfLink will offer learning experiences that include:

1. Viewing of live wolves, their habitats, and behaviors.
2. Standards-based interactive lesson plans.
3. Activities before and after the video conference, including the use of Wolf Loan Boxes containing wolf-related objects, specimens, and curriculum materials.
4. Foreign language and Braille curriculum materials
5. Unique outdoor learning adventures throughout the three years.

We will promote, present, and evaluate 100 WolfLink distance learning programs and wolf loan box materials, reaching at least 2,500 students, teachers, and individuals, and we will create foreign language and Braille versions of our curriculum materials to reach new and previously underserved audiences.

Minnesota WolfLink will provide a live, real time connection to Minnesota's wildlife and habitats (focusing on wolves), encouraging interest, engagement, and future stewardship of the state's environmental resources. Minnesota WolfLink video conferencing will actively seek to serve rural and inner city schools and will be free of charge to all schools served during the project period. Minnesota WolfLink will seek and establish new partnerships with schools and school districts, park and recreation centers, civic organizations, and businesses in order to broaden the program's reach throughout the state and to serve more students and individuals.

Appropriation Language
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- o New video broadcasting equipment. It will provide quality broadcasts for many years.
- o A portion of an educator wages and benefits. The educator has a master's degree and many years of wolf exposure and training.
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The original goal was to offer 100 WolfLink programs reaching 2,500 students and teachers along with the wolf loan boxes to educate, engage, and promote future stewardship of the state's environmental resources. Provide translation for three languages and braille to the classroom educational materials. Also, to provide improved broadcasting technology by acquiring new technology.

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International Wolf Center was able to reach 115 schools and 3,804, exceeding the original goal by 15 schools and 1.304 students. The 2 additional loan boxes were added and much needed due to the frequency of programs. One Minnesota school was able to be included in a broadcast with schools from Canada and Mexico, making their wolf education also a multi-cultural event with the ability to interact with these foreign students. The lesson materials are translated and opened the education to children where English is their second language.

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The advanced technology made available by this grant will continue to serve well for many years.

The question may be asked why this education is important and even relevant today. It is best answered by the enthusiasm displayed by the children's faces when the wolves howled or showed other wolf behavior. They learned all about wolves based on scientific based research. They were able to figuratively leave their school, via the internet broadcast, to experience the great outdoors of Minnesota, all the while learning about taking care of Minnesota's natural resources. By involving children in this educational process it is preparing our next generation to be stewards of Minnesota resources. The facts are taught in the hopes that a better informed public can be involved in making better informed public policy relative to wolves and other Minnesota natural resources.

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The WolfLink programs reaching out to 115 schools has been spread by word of mouth. The original plan of having 100 interactive broadcasts was an aggressive goal at the time of grant application. Having exceeded it has shown how successful the new technology presents the materials. When a teacher in a school completed a program, they naturally shared their enthusiasm with their fellow teachers. This led to other teachers within the same school to request programs for their classroom.

Part of the marketing plan included printing of postcards which were done for less money than originally planned. The Internet and emails, which were not funded by this grant, were also used effectively to market the WolfLink programs to Minnesota schools. In all the communications credit was given to the Minnesota Environment and Natural Resources Trust Fund for making these free programs possible.

The lessons plans were updated before and during the WolfLink presentations. The updating is a continue process. The split screen capability allows the teacher and the wolves to be presented on the same screen to hold the attention of the class to what is being taught. We believe that part of this program that teachers will repeat this process each year, as the cost after the completion of this grant is not cost prohibitive.

III. PROGRESS SUMMARY AS OF *12.31.2010*

Minnesota WolfLink has enjoyed a successful launch. We began offering videoconferencing programs at the start of the school year and early participation has exceeded our expectations. We have connected with numerous schools who until this grant had not participated in either on-site or videoconferencing programs with the Center.

The new videoconferencing equipment was installed in the first week of December and has improved our ability to engage students and highlight wolf behavior significantly. Among the highlights of the equipment is the ability to freeze live video in both of our wolf enclosures and highlight specific physical and behavioral adaptations. The feedback we have received has been tremendous.

We have actively partnered with the Minnesota Rural Education Association and Minneapolis Public Schools to target urban and rural learners. We will continue to pursue opportunities to expand our audience as the grant progresses.

Progress Summary as of 6.30.2011

Minnesota Wolflink has transitioned fully into the implementation phase. We have completed 32 MN WolfLink programs to date, reaching approximately 600 students. With the large purchase of equipment completed successfully, we are working hard to get the word out to schools and other groups in Minnesota about the program. We met our expectations for the number of videoconference programs for the 2010-2011 school year. We hope to reach even more schools and students in the 2011-2012 school year.

One unexpected challenge has been the difficulty in finding quality translation services for the materials for our Wolf Loan Boxes. It has taken a significantly longer time than we expected to complete this aspect of the project.

After we were approved for the ENRTF support, we were faced with a difficult financial situation in the organization. It was decided that due to other cuts it would be best not to hire a new staff person to for the educator position described in our initial proposal. This was communicated to the LCCMR staff and approved. One of our current education staff has been the lead person on this project with significant contributions of time and energy by the Director of Education. There was a misunderstanding about how to document and submit salary for reimbursement. We will be addressing that and providing an accurate request for reimbursement once we have the opportunity to work through our plan with the DNR and get their approval. We will be submitting an additional work plan report, once we have a fully approved solution.

Amendment Requested: 11.28.2011
In pursuing completion of the translations for the wolf loan boxes, (Result 2) we found that the estimates associated with the initial work plan were inaccurate. The new estimates would not increase spending, but we would like the work plan to reflect that actual cost for translating materials for Spanish, Hmong and Somali students. This should be changed to $7,100. Braille translation ultimately was much less expensive than first projected and we would like to make that adjustment as well. That dollar amount should be $1,000. This will have no impact on overall budget dollars.
Amendment Approved: 11.28.2011

Progress Summary as of 12.31.2011
The Minnesota WolfLink program continues to be successful and has allowed us to reach students throughout the state of Minnesota. Between June 30, 20011 and December 27, 2011 we conducted 9 more videoconferencing programs for Minnesota students, reaching approximately 270 students. This brings our total to 41 programs and approximately 870 students.

The project has allowed us to connect two classes from Babbitt-Embarrass School with schools from Canada and Mexico in a joint learning project being called Wolves Without Borders. This cross-cultural learning opportunity uses our videoconferencing technology and wolf curriculum to engage students from Minnesota with peers from other countries.

To follow-up from previous updates, the translation projects for our Wolf Loan Boxes are all complete. It was very challenging to find qualified translators for our materials. These learning materials will be a tremendous addition to our boxes that go to all classes that participate in our videoconferencing programs. This will definitely help us reach our goal of expanding audiences.

We have also worked through all of the challenges concerning appropriate documentation for the project-funded staff person. We have received approval from the DNR concerning the documentation and submission of reimbursement for that staff person's salary and benefits. We do not expect a need to change our work plan based upon the solution as approved.

Progress Summary as of 6.30.2012
The Minnesota WolfLink program continues to move on schedule. We have implemented all initially planned projects outside the delivery of the videoconferencing programs. Between January 1, 2012 and June 15, 2012 we have delivered 18 programs serving 980 students. This brings the project total to 59 programs and 1850 students. We believe this puts us on a pace to deliver the 100 programs stated in the project before its conclusion on June 30, 2013.

We have also continued to connect students from the Northeast Range School District with classrooms in Canada in Mexico in a project called Wolves without Borders. The anecdotal feedback from this program as well as the tangible projects created by these students has been very positive.

Because of the success of this program and the positive feedback we have gotten from teachers and participants, we have begun to seek additional funding through a variety of sources to continue this project past June 30, 2013.

Amendment Requested 12.28.2012
We are requesting multiple amendments to our detailed accounting on Attachment A to fully meet the purpose and possibilities of the grant. First, we have combined the educator salary and benefits in order to address the challenge of projecting the split between benefits and salary at the beginning of the project. The dollar amount in the personnel category has not changed.

We have moved dollars out of other contracts into additional equipment to support the purchase of two new point-tilt-zoom cameras for our MN WolfLink Videoconferencing programs. There have also been dollars adjusted inside the "additional equipment" lines to meet that need. These cameras are needed to replace the current cameras that are now malfunctioning and unreliable. The increase in capability of the equipment purchased through this grant is such that it actually highlights the age and unreliability of the cameras. The purchase will allow us to bring the cameras up to date with the rest of the equipment in our studio. They have been priced with our current service provider to meet our needs.
We have adjusted the mailing list acquisition line under other and reassigned dollars from that line to allow us to print one more batch of postcards and to do another mailing to possible groups in January or early February.

We have also moved dollars from subsidized wolf box shipping to support an additional five programs for Minnesota students, teachers and other individuals. Though it will be a stretch to meet that full number, we believe we have made important connections in recent months that are allowing us to reach into new areas for participants. We have not submitted a project change from 100 to 105 programs but want to be certain funding is available should we exceed our targeted number of programs.
Amendment Approved 1.8.2013

Project Summary as of 12.28.12
Minnesota WolfLink has had another successful fall. At a time when wolves are in the news constantly, students, teachers and general citizens are hungry for accurate wolf information. Programs have been lively with great questions, giving us a chance to present accurate information about all wolf topics. Since July 1, 2012, we have conducted an additional 14 programs serving 350 students. This brings the project total to 73 programs and 2200 students. We feel confident that we will reach the project goals of 100 programs reaching 2500 students. In fact, we think we can surpass the 100 programs through an even more focused effort to connect with urban and rural students this spring.

Amendment Request: May 17, 2013
The IWC requests a change in Project Manager. Jerritt Johnston left the employ of the International Wolf Center in January 2013 and since then Keith Youngquist (KY), the Director of Finance/Administration has assumed the IWC internal LCCMR

responsibilities. The new contact information has been added to page one of this document, with the information requiring to be replaced lined out.

The IWC requests another change to the budgeted funds to provide additional funding to the delivery of Distance Learning Programs to Minnesota Schools. This area is the primary focus of this grant. The programs, called Distance Learning, are presented to Minnesota schools with interactive presentations using the Internet, complete with an ability to provide videos, live shots and time for questions and answers with a trained wolf educator. Originally there were 100 WolfLink programs funded by this LCCMR grant and at the end of 2012 an additional five programs were funded. At this time we would like to request the additional funding of 15 more Distance Learning Programs.

Jerritt Johnston left IWC unexpectedly in January 2013. In February I was contacted by our primary wolf educator associated with this project and she requested that I request an amendment realigning funds to allow 15 more Distance Learning Programs ($2,250). I told her the activity surrounding year end, and my unfamiliarity to this process, that she should go ahead and present the programs and I would request an amendment prior to the end of the program. We have either requested reimbursement at six month intervals or annually, so my personal reference to the LCCMR grant has been oriented to six month intervals.

By word of mouth and positive referrals by those who have previously participated in the program resulted in more requests for the free programs by schools than was anticipated. Therefore, this request is for additional funding of 15 more Distance Learning programs by shifting $2,250 ($150 X 15 = $2,250) funded from excess funds in the projects identified below:

Fund Names	Amount
From:	
Braille specialist, etc. (Note 1 below**) In doing the final plan there was an inaccuracy in the math. Therefore we used the correct numbers from approved by LCCMR, based on Attachment A, in the email dated 5/21/13 from Michael McDonough to Keith Younqquist (our former Director of Finance). The funds should be coming from the Mailing List in the amount of $750 NOT from the Braille Specialist for $250. Amount changed from $250 to $750 (by Sharon Reed)**	$750.00
Marketing Specialist, Comm. plan, print & on-line materials (Note 2 below)	1,500.00
Total Transferred to Distance Learning Programs	$2,250.00

Note1: The excess funds from Braille specialist and creation of Braille curriculum materials for WolfLink Loan Boxes was completed with fewer funds than was budgeted. Therefore the request is to reallocate a portion of these unused funds to Distance Learning Programs. (Request to use $250.00). **In doing the final plan and looking at the amended approval email, based on Attachment A, from LCCMR (Michael McDonough) dated 5/21/13, the funds should be coming from the Mailing List in the amount of $750 NOT from the Braille Specialist in the amount of $250. (Sharon Reed)**

Note 2: The Marketing Specialist for Communications Plan, Print and On-Line Materials was never used because in March 2011, after this grant was provided to IWC, IWC hired a very qualified Director of Communications and we were able to utilize his talents to promote primarily via the IWC website, teacher conferences and by videos—all utilizing internal expertise. (Request to use $1,500.00)

Amendment Approved 5.21.2013

Project Summary Final: June 30, 2013

International Wolf Center was able to reach 115 schools and 3,804, exceeding the original goal by 15 schools and 1,304 students. The 2 additional loan boxes added and much needed due to the frequency of programs. One Minnesota school was able to be included in a broadcast with schools from Canada and Mexico, making their wolf education also a multi-cultural international event with the ability to interact with foreign students and educator. The lesson materials were translated and has opened the education for children where English is their second language.

There were several schools that were not aware they possessed the necessary technology to receive the live interactive broadcasts. After the wolf broadcasts those schools could search for other free or low cost broadcast learning opportunities.

Minnesota tourism increased somewhat as many children brought home their souvenirs and other lesson materials from the wolf loan boxes and requested their family make a trip to Ely, where many families visited the International Wolf Center.

The advanced technology made available by this grant will continue to serve well for many years in the future.

The question may be asked why this education is important and even relevant today. It is best answered by the enthusiasm displayed by the children's faces when the wolves howled or showed other wolf behavior. They learned all about wolves based on scientific based research. They were able to figuratively leave the their school, via the internet broadcast, to experience the great outdoors of Minnesota, all the while learning about taking care of one of Minnesota's natural resources. By involving children in this educational process it is preparing our next generation to be stewards of Minnesota resources. The facts are taught in the hopes that a better informed public can be involved in making better informed public policy relative to wolves and other Minnesota natural resources.

IV. OUTLINE OF PROJECT RESULTS*:*

RESULT/ACTIVITY 1: Present 100 WolfLink distance learning programs and wolf loan box materials. **(per approved amendment, based on Attachment A, via an email on 5/21/13 from Michael McDonough to Keith Youngquist, our former Director of Finance), this final amount was 115 WolfLink distance learning programs) Sharon Reed**

Description:

Minnesota WolfLink will connect our educators, through state of the art technology, to teachers, their classrooms, libraries, senior citizen centers, and nature centers. Programs will be offered in real time, via outdoor learning experiences and video conferencing, enabling direct person-to-person interaction between Ely, Minnesota and remote locations throughout the state. All learners will view the Center's ambassador wolves and talk directly with educators, who will interpret wolf behavior, pack dynamics, wolf ecosystems, wildlife management, species interdependence, and the wild lands of Minnesota's boreal forest biome. Science, social studies, language arts, mathematics, art, and geography will be incorporated into the WolfLink field trips. WolfLink Loan Boxes will assist teachers to develop their curriculum (related to their virtual field trip). WolfLInk Loan Boxes will contain objects and specimens including samples of wolf hide, scat, and paw prints as well as curriculum materials. Braille and foreign language versions of printed curriculum materials will be prepared.

Offering WolfLink distance learning programs without charge enables the broadest access to the programs, the least stress on already-challenged budgets, and an opportunity for the International Wolf Center to develop significant new audiences. During the project period, new sources of funding for distance learning will be researched and identified, and it is intended that Minnesota WolfLink outdoor and distance learning programs will continue, with new revenue streams to fund them, beyond the LCCMR project period.

A pledge from a private donor has been secured to provide support for project evaluation and support for travel and transportation that may be involved to establish new partnerships with distance learning presenters in rural areas. Private funds for this purpose will not exceed $5,000.

Deliverables/outcomes to be completed:

1. Promote, present, and evaluate 100 WolfLink distance learning programs and wolf loan box materials from July 1, 2010 – June 30, 2013, reaching at least 3,000 students, teachers, and individuals. **(per approved amendment, based on Attachment A, via an email on 5/21/13 from Michael McDonough to Keith Youngquist, our former Director of Finance), the final amount was 115 WolfLink distance learning programs) Sharon Reed**
2. Prepare and disseminate print and on line materials to reach teachers and groups with Minnesota WolfLink information, web links, and enrollment details.
3. Purchase and install video conferencing equipment that is compatible with that in use in schools across the state.

Summary Budget Information for Result/Activity 1:

ENRTF Budget:	**$184,650.00**
Amount Spent:	**$182,371.03**
Balance:	**$ 2,278.97**

8/22/13 – Addition errors for the numbers above. Corrected to match Attachment A. Sharon Reed

Deliverable/Outcome	Completion Date	Budget
Delivery and presentation of 115 free-of-charge WolfLink distance learning programs, building/shipping of WolfLink Loan Boxes and outdoor onsite programs	6/30/13	$145,750
Development of a marketing plan, preparation and dissemination of print and on line materials, and distribution of print and on line materials to teachers and other end users. Includes travel within Minnesota.	12/31/12	$ 5,975
Purchase and installation of video conferencing equipment that is compatible with equipment available in Minnesota schools, including rural and underserved urban districts. See note below.	12/31/10	$ 32,925

The International Wolf Center received cost estimates from two vendors and will seek one more before accepting a bid. Costs of product including installation, maintenance and training will be evaluated. Final costs will be within the defined budget.

Result One Completion Date: *June 30, 2013*
Result Status as of: *December 31, 2010*
Deliverable 1: To date we have completed 25 videoconferencing programs in 15 different districts throughout the state, serving approximately 450 students. We have successfully partnered with the Minnesota Rural Education Association and Minneapolis Public Schools to reach our targeted audiences of urban and rural students. Districts participating in programs so far include: Minneapolis, Moorhead, Sartell,Each of the classes that have done a program has also received a Wolf Loan Box. Feedback from teachers is that the hands-on materials and supplemental curriculum have greatly enhanced the experience. We have been unsuccessful in our attempts to make a strong connection with St. Paul Public Schools.

Deliverable 2: We worked with a designer to create a visually appealing and informational post card as well as a pdf of that card. Because we were able to connect with two organizations who agreed to distribute information electronically, we have achieved significant savings in this area to date. We will continue to look for creative ways to reach new audiences.

Deliverable 3: The purchase and installation of the equipment outlined in this grant was completed the first week of December. This equipment represents a significant step forward in technology and will allow us to continue to develop standards-based curriculum that engages participants in traditionally underserved populations.

Result Status as of *June 30, 2011*
Deliverable 1: To date we have completed 32 videoconferencing programs, thirteen of those having occurred in 2011. We have reached approximately 600 students and teachers. Program feedback continues to be very positive and we continually work to improve curriculum. Our December 31, 2011 status update had in inaccurate report of the number of programs we conducted in 2010. This mistake was due to the use of a new registration system and the inaccuracies were reported to LCCMR staff. The actual number of programs completed was 19. The dollar amount submitted for reimbursement was for the correct number of programs.
Deliverable 2: No additional work was done on this deliverable. We will be assessing our materials and possibly doing additional work in this area leading up to the 2011-2012 school year. We continue to look for creative ways to connect with the target audience.
Deliverable 3: The equipment is working very well and has improved our ability to communicate content and connect with students.

Result Status as of *December 31, 2011*
Deliverable 1: To date we have completed 41 programs reaching approximately 870 students from around Minnesota. We continue to work to connect with urban and rural students in particular. Feedback on the programs continues to be very good. We continue to adjust programs based on the feedback and our staff person is working hard

at continuing to refine curriculum to meet the needs of students of different ages and learning styles.
Deliverable 2: We edited the current Minnesota WolfLink postcard and did a large printing. We continue to use this item to promote the learning opportunities offered by this project.
Deliverable 3: The equipment continues to be a highlight of our project. Using funding from outside of this project we improved our internet connection and that has had a major positive impact on the connection quality with classrooms.

Result Status as of *June 30, 2012*
Deliverable 1: To date we have completed 59 programs reaching approximately 1850 students. Two of the programs were to very large audiences, which accounts for the large number of students served in this number of programs. We continue to market this program through multiple channels and continue to look for new partners with which to work. We have connected with multiple new schools, particularly in rural communities, including Dawson and Renville to name just two.
Deliverable 2: We have been distributing Minnesota WolfLink postcards at nearly all events we attend and make them available at the Center in Ely. Our plan is to do a significant mailing using the approved funding in early fall to extend our reach even farther.
Deliverable 3:
The equipment purchased during this project continues to be one of our greatest assets. The organization also committed to upgrading the speed of our internet connection which has allowed the equipment to function at an even better level.

Result Status as of *December 31, 2012*

Deliverable 1: Since July 1, 2012, we have conducted an additional 14 programs serving 350 students. The brings the project total to 73 programs and 2200 students. We feel confident that with new connections we can reach or exceed our goal of 100 programs by June 30, 2013.
Deliverable 2: Working with a direct mail company, we sent a postcard to principals and science teachers throughout the state to promote Minnesota WolfLink Programs. We hope to do so again in early 2013.
Deliverable 3: The equipment purchased through this project continues to function very well and provide a great experience to our participants. Our two aging point-tilt-zoom cameras (not replaced as a part of this project) have become unreliable and are malfunctioning. We have submitted a work program amendment in hopes of replacing those to meet the standards of the rest of our equipment.

FINAL REPORT, June 30, 2013
International Wolf Center was able to reach 115 schools and 3,804, exceeding the original goal by 15 schools and 1,304 students. The 2 additional loan boxes were added and much needed due to the frequency of programs. One Minnesota school was able to be included in a broadcast with schools from Canada and Mexico, making their wolf education also a multi-cultural event with the ability to interact with these foreign students. The lesson materials were translated and open the education to children where English is their second language.

There were several schools that were not aware they possessed the necessary technology to receive the live interactive broadcasts. After the wolf broadcasts those schools could search for other free or low cost broadcast learning opportunities.

RESULT/ACTIVITY 2: Make Minnesota WolfLink accessible to new and broader audiences.

Description:
Minnesota WolfLink will create and provide services and materials for specific audiences. Included will be foreign language translation of WolfLink curriculum materials and preparation of WolfLink materials in Braille.

Summary Budget Information for Result/Activity 2:

ENRTF Budget:	**$8,350**
Amount Spent:	**$7549.24**
Balance:	**$800.76**

Deliverable/Outcome	Completion Date	Budget
Create and distribute WolfLink curriculum materials, included in WolfLink Loan Boxes, in foreign languages upon teacher request. Spanish, Hmong, and Somali versions will be prepared and available.	6/30/11	$7,100
Create Braille versions of curriculum materials for WolfLink Loan Boxes.	6/30/11	$1,000
Print foreign language curriculum materials for WolfLink Loan Boxes.	6/30/11	$ 250

Result Two Completion Date: June 30, 2013.

Result Status as of: *December 31, 2010.*
We have begun to look at exactly what items we hope to translate. We have also made contact with possible translators for Spanish and Somali languages. We will actively work on this result in the upcoming months.

Result Status as of: *June 30, 2011.*
It has been much harder to connect with and contract with translators than we initially imagined. We have selected all of the materials we want translated, and have delivered them to translators. We have received the price quotes and are moving forward with translations.

Result Status as of: *December 31, 2011.*
All of the translation projects have been completed. We have received the materials and will be connecting with native speakers of Hmong, Somali and Spanish as well as

teachers with students who speak those languages for feedback on the materials. We want to ensure there usability for students. The Braille project was also finished and we are working to find reviewers for these items as well.

This will be a significant step towards expanding our audiences and give us even more opportunity to connect with diverse learners.

Result Status as of: *June 30, 2012.*
The translated materials are a great addition to the Wolf Loan Boxes and the Minnesota WolfLink Project. We are working hard to make connections with teachers who will be interested in the use of these supplemental materials, but that has been a challenge.

Result Status as of: *December 31, 2012.*
We continue to have difficulty finding teachers who work with students who need the translated materials who want to make use of them. We have had our materials reviewed by people proficient in each language and the translation results are very good. We are hopeful that we can make good connections early in 2013 to make full use of these supplemental materials.

Final Report Summary: *June 30, 2013*
All of the translation and Braille projects have been completed. The lesson materials that are provided inside the Wolf Loan Boxes are now fully equipped with versions in English, Hmong, Somali, Spanish to assist those students where English is their second language. A Braille version of the lesson materials has also been created and included in the Wolf Loan Bozes. Copies of these translations are enclosed part of this report.

V. TOTAL ENRTF PROJECT BUDGET (SEE DETAILS ON ATTACHMENT A):

Personnel: $ 125,700
Contracts: $ 12,848
Equipment/Tools/Supplies: $ 28,927 (Distance Learning Delivery Systems)
Acquisition (Fee Title or Permanent Easements): $00
Travel: $ 750
Additional Budget Items: $24,775 (see breakdown below)

a. $18,000: This amount underwrites the delivery of 115 distance learning programs free of charge throughout Minnesota.
b. $4,300: Construction of WolfLink Loan Boxes to accompany and support distance learning curricula.
c. $400: Mailing and distribution list acquisition for three Postcard Promotions.
d. $1,825: Three Postcard Promotions to inform teachers about how to learn more about, and enroll in, the Minnesota WolfLink program, encouraging them to visit the WolfLink section of the International Wolf Center's web site to enroll.
e. $250: Printing of curriculum materials in foreign languages.

Explanation of Capital Expenditures Greater Than $3,500:
Because of changes in available technology and a better understanding of desired educational outcomes the type of project equipment needed was reassessed. A new competitive bid process was issued. There are two items that exceed $3500. The Tandberg QuickSet C20 with camera, microphone and remote control costs $11,845 including the required 3 year service plan. The Annotation Graphics processor with SDI/HD-SDI input and DVI-D Output costs $6,366.50. All other items cost less than $3500. All equipment purchased will continue to be utilized throughout their useful life for Minnesota WolfLink distance learning initiatives.
Amendment Request: September 13, 2010
Amendment Approved: September 27, 2010

Distance learning programs will continue (under the Minnesota WolfLink brand) beyond the LCCMR project completion date, supported by private and federal grants and other funds for this purpose.

VI. PROJECT STRATEGY:

A. Project Partners: While the International Wolf Center does not yet have signed contractual agreements with prospective providers of WolfLink distance learning programs, it has begun to meet and talk with prospective partners and participants throughout Minnesota. Thus far, the following schools, school districts, park systems, and organizations have expressed interest in participating: Three Rivers Park District, the Bell Museum of Natural History, Tierney Brothers, Pillager School District (Cass County) and the Duluth Public Schools.

B. Project Impact and Long-term Strategy: Outdoor and distance learning programs during WolfLink are anticipated to reach 3,000 Minnesota students, teachers, and other individuals Materials for challenged and foreign language users will reach aproximately 300 individuals. The specific impacts, including numbers served and reached, will be measured through WolfLink project evaluation made possible by a private gift from a major individual donor. The long term strategy includes evaluation of effectiveness/reach of each WolfLink deliverable, and the publication of results and findings that will assist the Center in establishing long range planning priorities for distance learning, exhibit planning, and service to challenged and/or underserved constituencies.

While Minnesota WolfLInk will be established with LCCMR funding support, it is planned that outdoor programming and distance learning will continue as an important International Wolf Center priority. As WolfLink builds awareness and participation, private and federal funding sources will be identified and sought, in order to maintain a commitment to distance learning beyond June 30, 2013.

C. Other Funds Proposed to be Spent during the Project Period: A pledge from a private donor has been secured to provide support for project evaluation and support for travel and transportation that may be involved in establishing new partnerships with distance learning presenters in rural areas. Private funds for this purpose will not exceed $5,000.

D. Spending HIstory: *(N/A)*

VII. DISSEMINATION: The project evaluation will be available through a Web link on the organization's Web site, www.wolf.org; a limited number of printed copies will be produced for participating partners in the WolfLink project and other interested parties. Cost of dissemination of materials will be provided through the private grant mentioned in Section C, above.

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than June 30 in 2011, 2012, and 2013 and not later than December 31 in 2010, 2011, and 2012. A final work program report and associated products will be submitted between June 30 and August 1, 2013 as requested by the LCCMR.

IX. RESEARCH PROJECTS: *(N/A)*

Attachment A: Budget Detail for 2010 Projects

Keith left the International Wolf Center on 8/15/2103. Completion of the spreadsheet was made by Sharon Reed (Accounting)

Project Title: Minnesota WolfLink,

Project Manager Name: Keith Youngquist, Director of Finance

Trust Fund Appropriation: $193,000

2010 Trust Fund Budget	Result 1 Revised Budget 5/21/13	Result 1 Total Spent 6/30/13	Result 1 Balance Remaining 6/30/13	Result 2 Revised Budget 11/28/11	Result 2 Total Spent 12/15/11	Balance Remaining Result 12/15/11	Results 1 & 2 Total Budget 6/30/13	Results 1 & 2 Total Amount Spent 6/30/13	TOTAL Remaining BALANCE 6/30/13
BUDGET ITEM									
PERSONNEL: wages and benefits									
100% FTE new outdoor educator for WolfLink ($100,000) new outdoor educator benefits ($25,000)	$125,700.00	$125,700.00	$0.00	$0.00	$0.00	$0.00	$125,700.00	$125,700.00	$0.00
CONTRACTS:									
Professional/technical									
Somali, Hmong, and Spanish Translators	$0.00	$0.00	$0.00	$7,100.00	$6,871.24	$228.76	$7,100.00	$6,871.24	$228.76
Braille specialist and creation of Braille curriculum materials for WolfLink Loan Boxes	$0.00	$0.00	$0.00	$1,000.00	$678.00	$322.00	$1,000.00	$678.00	$322.00
Marketing Specialist for Communications Plan, Print and On Line Materials	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Design of print and on-line materials	$750.00	$370.00	$380.00	$0.00	$0.00	$0.00	$750.00	$370.00	$380.00
Ely equipment installation, training, and maintenance	$4,748.01	$4,385.50	$362.51	$0.00	$0.00	$0.00	$4,748.01	$4,385.50	$362.51
Capital equipment over $3,500									
Tandberg Quickset C20	$11,845.00	$11,845.00	$0.00	$0.00	$0.00	$0.00	$11,845.00	$11,845.00	$0.00
Annotation Graphics Processor	$6,367.00	$6,366.50	$0.50	$0.00	$0.00	$0.00	$6,367.00	$6,366.50	$0.50
Subtotal	**$18,212.00**	**$18,211.50**	**$0.50**	**$0.00**	**$0.00**	**$0.00**	**$18,212.00**	**$18,211.50**	**$0.50**
Additional Equipment									
Outdoor Camera	$1,795.00	$1,795.00	$0.00	$0.00	$0.00	$0.00	$1,795.00	$1,795.00	$0.00
32" LCD Display 1366 x 768 3000 (w/ speakers no tuner) - 1080p capable	$760.00	$760.00	$0.00	$0.00	$0.00	$0.00	$760.00	$760.00	$0.00
iMMCam Desktop Document Camera	$920.00	$920.00	$0.00	$0.00	$0.00	$0.00	$920.00	$920.00	$0.00
HP Laptop	$499.99	$499.99	$0.00	$0.00	$0.00	$0.00	$499.99	$499.99	$0.00
Two Serial Four Flex I/O	$870.00	$870.00	$0.00	$0.00	$0.00	$0.00	$870.00	$870.00	$0.00
19" Touch Screen Monitor	$970.00	$970.00	$0.00	$0.00	$0.00	$0.00	$970.00	$970.00	$0.00
Pre-made Cabling	$850.00	$850.00	$0.00	$0.00	$0.00	$0.00	$850.00	$850.00	$0.00
Bulk Cabling, Connectors	$1,800.00	$1,800.00	$0.00	$0.00	$0.00	$0.00	$1,800.00	$1,800.00	$0.00
2 Point_Tilt Zoom Cameras	$1,500.00	$1,500.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$0.00
Subtotal-Additional Equipment	**$9,964.99**	**$9,964.99**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	$9,964.99	**$9,964.99**	**$0.00**
Equipment total	**$28,176.99**	**$28,176.49**	**$0.50**	**$0.00**	**$0.00**	**$0.00**	$28,176.99	**$28,176.49**	**$0.50**
Printing									
Postcard promotion throughout project, encouraging web site visit for information on WolfLink program	$1,825.00	$1,225.00	$600.00	$0.00	$0.00	$0.00	$1,825.00	$1,225.00	$600.00
Printing Foreign Language Translations for Curriculum	$0.00	$0.00	$0.00	$250.00	$0.00	$250.00	$250.00	$0.00	$250.00
Travel expenses in Minnesota									
Travel to/from Ely and within Minnesota to promote WolfLink	$750.00	$670.70	$79.30	$0.00	$0.00	$0.00	$750.00	$670.70	$79.30
Other									
Mailing list acquisition and distribution of distance learning piece	$400.00	$325.88	$74.12	$0.00	$0.00	$0.00	$400.00	$325.88	$74.12
115 Distance Learning programs @ $150; includes distance connections	$18,000.00	$17,250.00	$750.00	$0.00	$0.00	$0.00	$18,000.00	$17,250.00	$750.00
subsidized wolf box shipping	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
build two new boxes for above programs	$4,300.00	$4,267.46	$32.54	$0.00	$0.00	$0.00	$4,300.00	$4,267.46	$32.54
COLUMN TOTAL	**$184,650.00**	**$182,371.03**	**$2,278.97**	**$8,350.00**	**$7,549.24**	**$ 800.76**	**$193,000.00**	**$189,920.27**	**$3,079.73**

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Wednesday, January 16, 2013 3:25 PM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (1/16/2013 1:00 PM) Wolf Research

Program Evaluation

Provider Name: International Wolf Center
Program Title: Wolf Research
Program Date/Time: 1/16/2013 1:00 PM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Strongly Agree**
was engaging: **Strongly Agree**
The program:
was engaging: **Strongly Agree**
was appropriate for the advertised age/grade range: **Strongly Agree**
aligned to the advertised educational standards: **Strongly Agree**
met the advertised educational objectives: **Strongly Agree**
had an impact on student learning: **Strongly Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **Yes**
Program was a good value for fee charged: **Yes**
If materials were supplied, they arrived in a timely manner: **Yes**

How do you feel student learning was impacted for those who participated in this program?
For my Intensive Readers, who have been studying the gray wolf since October, I feel that they were able to see a connection between the goals and activities we are doing in class with the wolf presentation.

Did you as an educator, gain new knowledge or skills from participating in this program?
Yes
This is the first time I have participated in a videoconferencing program. The use of technology with students can take them places previously not even thought of.

Would you recommend this program to others?
Yes
Why or why not?
The biggest reason would be because of all the standards that were covered in a session. It is free to Minnesota schools. The anticipation that my students had for this event was truly amazing. They will be sharing with each other for a long time to come. I also liked that students could form their own opinions.

Technology:
Video was clear: **Yes**

Audio was clear: **Yes**
Good connection was sustained: **Yes**

Comments:
This just fit so well with what I am doing in my classroom. The use of technology greatly enhances learning and provides motivation. The wolf is fascinating, it is controversial, it is in the news. Why not study the gray wolf?

Tara Johnson was an excellent presenter. I could tell that she is a teacher. Awesome Job? Wow!

School/Site Name: Menahga Elementary
School District: 821
Participating Teacher(s): Judy Maaninga
Grade Level: 3
Number of Participants in Program: 46
Phone: 218-564-4141
Fax: same as phone
E-Mail: jmaaninga@menahga.k12.mn.us

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Wednesday, January 30, 2013 9:26 AM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (1/23/2013 1:00 PM) Wolf Research

Program Evaluation

Provider Name: International Wolf Center
Program Title: Wolf Research
Program Date/Time: 1/23/2013 1:00 PM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Strongly Agree**
was engaging: **Strongly Agree**
The program:
was engaging: **Strongly Agree**
was appropriate for the advertised age/grade range: **Strongly Agree**
aligned to the advertised educational standards: **Strongly Agree**
met the advertised educational objectives: **Strongly Agree**
had an impact on student learning: **Strongly Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **Yes**
Program was a good value for fee charged: **Yes**
If materials were supplied, they arrived in a timely manner: **Yes**

How do you feel student learning was impacted for those who participated in this program?
It helped us understand a wolf's territory and how to track wolves. It made our study more real. We learned that wolves can grow really fast.

Did you as an educator, gain new knowledge or skills from participating in this program?
Yes
The second program was just a little different than the first. Since I have students in both groups, it was interesting to compare the learning of students.

Would you recommend this program to others?
Yes
Why or why not?
It was amazing. My students were so excited and learned many things.

Technology:
Video was clear: **Yes**
Audio was clear: **Yes**
Good connection was sustained: **Yes**

Comments:
When children study a topic in their world it fosters their long-term development.

School/Site Name: Menahga Elementary
School District: 821
Participating Teacher(s):
Grade Level: 3
Number of Participants in Program: 46
Phone: 218-564-4141
Fax: 218-564-4141
E-Mail: jmaaninga@menahga.k12.mn.us

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Thursday, March 07, 2013 8:32 AM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (1/24/2013 11:15 AM) Pup 101

Program Evaluation

Provider Name: International Wolf Center
Program Title: Pup 101
Program Date/Time: 1/24/2013 11:15 AM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Strongly Agree**
was engaging: **Strongly Agree**
The program:
was engaging: **Strongly Agree**
was appropriate for the advertised age/grade range: **Strongly Agree**
aligned to the advertised educational standards: **Strongly Agree**
met the advertised educational objectives: **Strongly Agree**
had an impact on student learning: **Strongly Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **N/A**
Program was a good value for fee charged: **N/A**
If materials were supplied, they arrived in a timely manner: **N/A**

How do you feel student learning was impacted for those who participated in this program?
Students were very engaged and learned a lot of new information!

Did you as an educator, gain new knowledge or skills from participating in this program?
Yes
A lot of great information was given out!

Would you recommend this program to others?
Yes
Why or why not?
The staff are very knowledgable and kid-friendly!!

Technology:
Video was clear: **Yes**
Audio was clear: **Yes**
Good connection was sustained: **Yes**

School/Site Name: Weaver Lake Elementary
School District: Osseo ISD 279
Participating Teacher(s): Katie Emerson
Grade Level: 1
Number of Participants in Program: 24
Phone: 763-420-3337
Fax:
E-Mail: emersonk@district279.org

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Friday, January 25, 2013 4:54 PM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (1/25/2013 10:15 AM) Pup 101

Program Evaluation

Provider Name: International Wolf Center
Program Title: Pup 101
Program Date/Time: 1/25/2013 10:15 AM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Strongly Agree**
was engaging: **Strongly Agree**
The program:
was engaging: **Strongly Agree**
was appropriate for the advertised age/grade range: **Strongly Agree**
aligned to the advertised educational standards: **Strongly Agree**
met the advertised educational objectives: **Strongly Agree**
had an impact on student learning: **Strongly Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **Yes**
Program was a good value for fee charged: **Yes**
If materials were supplied, they arrived in a timely manner: **No**

How do you feel student learning was impacted for those who participated in this program?
The students were engaged in the lesson. Tara had a nice mix of discussion, participation, videos, hands-on activities and question/answer time. I feel my students learned a lot about wolves, their habitat and wolf pups.

Did you as an educator, gain new knowledge or skills from participating in this program?
Yes
I always learn some new and interesting facts about wolves.

Would you recommend this program to others?
Yes
Why or why not?
Tara is very knowledgable and appropriately gears the lesson for younger learners.

Technology:
Video was clear: **Yes**
Audio was clear: **Yes**
Good connection was sustained: **Yes**

School/Site Name: Weaver Lake Elementary
School District: Osseo
Participating Teacher(s): Jami Haugstad
Grade Level: 1
Number of Participants in Program:
Phone:
Fax:

This e-mail was automatically generated at [redacted], please do not reply directly to this e-mail.

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Friday, January 25, 2013 4:52 PM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (1/25/2013 11:15 AM) Pup 101

Program Evaluation

Provider Name: International Wolf Center
Program Title: Pup 101
Program Date/Time: 1/25/2013 11:15 AM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Strongly Agree**
was engaging: **Strongly Agree**
The program:
was engaging: **Strongly Agree**
was appropriate for the advertised age/grade range: **Strongly Agree**
aligned to the advertised educational standards: **Strongly Agree**
met the advertised educational objectives: **Strongly Agree**
had an impact on student learning: **Strongly Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **Yes**
Program was a good value for fee charged: **Yes**
If materials were supplied, they arrived in a timely manner: **Yes**

How do you feel student learning was impacted for those who participated in this program?
They provided materials that we used to provide information that may not be found in a book. The students were engaged in hands on learning with the use the Wolf Kit that was provided. It was a great resource.

Did you as an educator, gain new knowledge or skills from participating in this program?
Yes
There were specifics about the new wolves that were not there last year.

Would you recommend this program to others?
Yes

Technology:
Video was clear: **Yes**
Audio was clear: **Yes**
Good connection was sustained: **Yes**

Comments:
The program was a great way for students to learn about something that is right here in our state, but not in our specific area. They

were engaged and very interested in learning about wolves. It directly related to habitats and life cycles which are both first grade standards.

School/Site Name: Weaver Lake Elementary
School District: Osseo Area Schools
Participating Teacher(s): Dawn Caven
Grade Level: 1
Number of Participants in Program: 25
Phone: 763-420-3337
Fax:
E-Mail: cavend@district279.org

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Sunday, February 03, 2013 12:16 PM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (1/30/2013 1:30 PM) Wolf 101

Program Evaluation

Provider Name: International Wolf Center
Program Title: Wolf 101
Program Date/Time: 1/30/2013 1:30 PM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Strongly Agree**
was engaging: **Strongly Agree**
The program:
was engaging: **Strongly Agree**
was appropriate for the advertised age/grade range: **Strongly Agree**
aligned to the advertised educational standards: **Strongly Agree**
met the advertised educational objectives: **Strongly Agree**
had an impact on student learning: **Strongly Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **Yes**
Program was a good value for fee charged: **Yes**
If materials were supplied, they arrived in a timely manner: **Yes**

How do you feel student learning was impacted for those who participated in this program?
Students were able to get questions answered by an expert, which encouraged them to ask authentic questions.

Did you as an educator, gain new knowledge or skills from participating in this program?
Not applicable (I've participated in the program before);

Would you recommend this program to others?
Yes
Why or why not?
Being able to see the wolves and hear information that's from an expert (in real time) is invaluable.

Technology:
Video was clear: **Yes**
Audio was clear: **Yes**
Good connection was sustained: **Yes**

Comments:
Wonderful program--thank you

School/Site Name: Weaver Lake Elementary
School District: ISD 279
Participating Teacher(s): Gaab
Grade Level: 4
Number of Participants in Program: 30
Phone: 7634203337
Fax:
E-Mail: gaabj@district279.org

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Friday, March 08, 2013 9:50 AM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (3/07/2013 11:40 AM) Wolf Ecology

Program Evaluation

Provider Name: International Wolf Center
Program Title: Wolf Ecology
Program Date/Time: 3/07/2013 11:40 AM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Strongly Agree**
was engaging: **Strongly Agree**
The program:
was engaging: **Strongly Agree**
was appropriate for the advertised age/grade range: **Strongly Agree**
aligned to the advertised educational standards: **Strongly Agree**
met the advertised educational objectives: **Strongly Agree**
had an impact on student learning: **Strongly Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **Yes**
Program was a good value for fee charged: **Yes**
If materials were supplied, they arrived in a timely manner: **No**

How do you feel student learning was impacted for those who participated in this program?
Program content directly correlating to Mn standards. It will serve as a great springboard and foundation for my unit on ecosystems.

Did you as an educator, gain new knowledge or skills from participating in this program?
Yes
Relating food chain and ecosystems directly to our home state is a piece that had been missing from my curriculum.

Would you recommend this program to others?
Yes
Why or why not?
Quality content.
Excellent presentor.
Great organization and communication.
Well worth the instructional time.

Technology:
Video was clear: **Yes**

Audio was clear: **Yes**
Good connection was sustained: **Yes**

Comments:
"energy from the sun" food chain activity was not done during the video conference.
Appreciated time for student questions and continual prompts for student interaction.

School/Site Name: Goodhue Elem.
School District: Goodhue #253
Participating Teacher(s): Jodie Alpers
Grade Level: 5
Number of Participants in Program: 39
Phone: 651-923-4447
Fax:
E-Mail: jalpers@goodhue.k12.mn.us

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Saturday, March 16, 2013 5:57 AM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (3/15/2013 2:30 PM) Pup 101

Program Evaluation

Provider Name: International Wolf Center
Program Title: Pup 101
Program Date/Time: 3/15/2013 2:30 PM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Strongly Agree**
was engaging: **Strongly Agree**
The program:
was engaging: **Strongly Agree**
was appropriate for the advertised age/grade range: **Strongly Agree**
aligned to the advertised educational standards: **Strongly Agree**
met the advertised educational objectives: **Strongly Agree**
had an impact on student learning: **Strongly Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **Yes**
Program was a good value for fee charged: **Yes**
If materials were supplied, they arrived in a timely manner: **Yes**

How do you feel student learning was impacted for those who participated in this program?
The program was wonderful. We loved the wolf materials box. My students are so inspired by our activities with the wolf center. This program was perfect. For second graders, they are very knowledgeable about wolves.This program has also sparked their interest in many animals' homes and life cycles. Tara was awesome!

Did you as an educator, gain new knowledge or skills from participating in this program?
Yes
I had not done a live program like this so it was a good learning experience for me. I would be able to do it again.

Would you recommend this program to others?
Yes
Why or why not?
As a member of the wolf center, I would promote any educational activities you do.

Technology:
Video was clear: **Yes**
Audio was clear: **Yes**
Good connection was sustained: **Yes**

Comments:
This lesson fit in nicely with our science standards on life cycles and appreciating nature. My students listened and were much more attentive to Tara and the things she could show us. My students will always remember this and have developed a true appreciation for wolves.

School/Site Name: Madelia Elementary
School District: 837
Participating Teacher(s): Bonnie Brown
Grade Level: 2
Number of Participants in Program: 21
Phone: 507-642-3234
Fax:
E-Mail: bonniebrown@isd837.org

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Thursday, April 04, 2013 4:57 PM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (4/03/2013 2:00 PM) Wolf Research

Program Evaluation

Provider Name: International Wolf Center
Program Title: Wolf Research
Program Date/Time: 4/03/2013 2:00 PM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Strongly Agree**
was engaging: **Strongly Agree**
The program:
was engaging: **Strongly Agree**
was appropriate for the advertised age/grade range: **Strongly Agree**
aligned to the advertised educational standards: **Strongly Agree**
met the advertised educational objectives: **Strongly Agree**
had an impact on student learning: **Strongly Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **Yes**
Program was a good value for fee charged: **Yes**
If materials were supplied, they arrived in a timely manner: **Yes**

How do you feel student learning was impacted for those who participated in this program?
The kids were engaged and curious about the program. The presenter was very friendly and knowledgeable, and was willing to add time onto the presentation to answer all their questions. The pace of the program was rapid and effective at holding their interest. My students are doing research reports on wolves and the information they learned will enhance their reports.

Did you as an educator, gain new knowledge or skills from participating in this program?
Yes

Would you recommend this program to others?
Yes
Why or why not?
Presenter's enthusiasm, energy and knowledge made the program a lot of fun. The kids learned a lot. They really enjoyed seeing the live wolves in their habitat at the Wolf Center.

Technology:
Video was clear: **Yes**
Audio was clear: **Yes**
Good connection was sustained: **Yes**

School/Site Name: Lakeside Elementary
School District: Chisago Lakes #2144
Participating Teacher(s): Anthony Maahs
Grade Level: 5
Number of Participants in Program: 30
Phone: 651-213-2349
Fax:
E-Mail: amaahs@chisagolakes.k12.mn.us

This e-mail was automatically generated at , please do not reply directly to this e-mail.

This email was sent by:
The Center for Interactive Learning and Collaboration, Inc. (CILC)
251 E Ohio St, Indianapolis, IN 46204

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Sunday, April 21, 2013 8:29 PM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (4/17/2013 9:30 AM) Pup 101

Program Evaluation

Provider Name: International Wolf Center
Program Title: Pup 101
Program Date/Time: 4/17/2013 9:30 AM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Strongly Agree**
was engaging: **Strongly Agree**
The program:
was engaging: **Strongly Agree**
was appropriate for the advertised age/grade range: **Strongly Agree**
aligned to the advertised educational standards: **Strongly Agree**
met the advertised educational objectives: **Strongly Agree**
had an impact on student learning: **Strongly Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **Yes**
Program was a good value for fee charged: **Yes**
If materials were supplied, they arrived in a timely manner: **Yes**

How do you feel student learning was impacted for those who participated in this program?
The students loved the program. I feel they were very engaged and interested. They have come away with a better understanding of wolves.

Did you as an educator, gain new knowledge or skills from participating in this program?
Yes
I always learn new things with the students!

Would you recommend this program to others?
Yes
Why or why not?
It's a great program and a new experience for many students and teachers. It was fun and interesting to do the video-conferencing.....almost like being there at the center!

Technology:
Video was clear: **Yes**
Audio was clear: **Yes**
Good connection was sustained: **Yes**

School/Site Name: Four Seasons Elementary
School District: Saint Paul school district 625
Participating Teacher(s): Deb Wilson, Lisa Frandsen
Grade Level: 2nd
Number of Participants in Program: 52
Phone: 651-290-7595
Fax:
E-Mail: deb.wilson@spps.org

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Monday, April 29, 2013 12:54 PM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (4/25/2013 9:30 AM) Wolf Tales

Program Evaluation

Provider Name: International Wolf Center
Program Title: Wolf Tales
Program Date/Time: 4/25/2013 9:30 AM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Strongly Agree**
was engaging: **Strongly Agree**
The program:
was engaging: **Strongly Agree**
was appropriate for the advertised age/grade range: **Strongly Agree**
aligned to the advertised educational standards: **Strongly Agree**
met the advertised educational objectives: **Strongly Agree**
had an impact on student learning: **Strongly Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **Yes**
Program was a good value for fee charged: **Yes**
If materials were supplied, they arrived in a timely manner: **Yes**

Did you as an educator, gain new knowledge or skills from participating in this program?
Yes

Would you recommend this program to others?
Yes

Technology:
Video was clear: **Yes**
Audio was clear: **Yes**
Good connection was sustained: **Yes**

Comments:
Thank you for a wonderful experience for the students.

School/Site Name: Kimblery Lane Elementary
School District: Wayzata Pulic Schools
Participating Teacher(s): Andrea Barbknecht
Grade Level: 3rd

Number of Participants in Program: 26
Phone: 763-745-5687
Fax:

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Friday, May 17, 2013 2:55 PM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (5/17/2013 2:00 PM) Wolf Tales

Program Evaluation

Provider Name: International Wolf Center
Program Title: Wolf Tales
Program Date/Time: 5/17/2013 2:00 PM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Strongly Agree**
was engaging: **Strongly Agree**
The program:
was engaging: **Strongly Agree**
was appropriate for the advertised age/grade range: **Strongly Agree**
aligned to the advertised educational standards: **Strongly Agree**
met the advertised educational objectives: **Strongly Agree**
had an impact on student learning: **Strongly Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **Yes**
Program was a good value for fee charged: **Yes**
If materials were supplied, they arrived in a timely manner: **Yes**

How do you feel student learning was impacted for those who participated in this program?
Our kindergarteners were thrilled to see the wolves. It made such an impact on them. They will remember the information for a long time.
Thank you!

Did you as an educator, gain new knowledge or skills from participating in this program?
Yes
It gave me more information about wolves and how they live. I wil be able to answer questions in class with better information.

Would you recommend this program to others?
Yes
Why or why not?
A great use of class time.

Technology:
Video was clear: **Yes**
Audio was clear: **Yes**
Good connection was sustained: **Yes**

School/Site Name: Cedar Creek Community school
School District: St. Francis #15
Participating Teacher(s): Van Gilder and Majerles
Grade Level: k
Number of Participants in Program: 40
Phone: 763-213-8899
Fax:
E-Mail: holvan@stfrancis.k12.mn.us

This e-mail was automatically generated at [redacted], please do not reply directly to this e-mail.

This email was sent by:
The Center for Interactive Learning and Collaboration, Inc. (CILC)
251 E Ohio St, Indianapolis, IN 46204

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Wednesday, July 24, 2013 1:43 PM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (7/16/2013 9:00 AM) Pup 101

Program Evaluation

Provider Name: International Wolf Center
Program Title: Pup 101
Program Date/Time: 7/16/2013 9:00 AM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Agree**
was engaging: **Agree**
The program:
was engaging: **Agree**
was appropriate for the advertised age/grade range: **Agree**
aligned to the advertised educational standards: **Agree**
met the advertised educational objectives: **Agree**
had an impact on student learning: **Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **Yes**
Program was a good value for fee charged: **Yes**
If materials were supplied, they arrived in a timely manner: **Yes**

How do you feel student learning was impacted for those who participated in this program?
Great way to introduce our students to the beginning stages of a wolf's development.

Did you as an educator, gain new knowledge or skills from participating in this program?
Yes
Great to have our students learn from the IWC staff as well as our staff.

Would you recommend this program to others?
Yes
Why or why not?
Good information for young children.

Technology:
Video was clear: **Yes**
Audio was clear: **Yes**
Good connection was sustained: **Yes**

School/Site Name: Sebeka Summer Targeted Services Program
School District: Sebeka
Participating Teacher(s): Kari Carlson
Grade Level: 1-6
Number of Participants in Program: 36
Phone: 218-837-5101
Fax:
E-Mail: kcarlson@sebeka.k12.mn.us

Tara Johnson

From: CILC <mailer@cilc.org>
Sent: Wednesday, July 24, 2013 1:39 PM
To: wolflink@wolf.org
Cc: jheighway@cilc.org
Subject: [CILC] "Program Evaluation": (7/18/2013 9:00 AM) Wolf 101

Program Evaluation

Provider Name: International Wolf Center
Program Title: Wolf 101
Program Date/Time: 7/18/2013 9:00 AM

Please rate the following by choosing the box which best describes your reaction to the program.
The presenter:
was knowledgeable about the content: **Strongly Agree**
was engaging: **Strongly Agree**
The program:
was engaging: **Strongly Agree**
was appropriate for the advertised age/grade range: **Strongly Agree**
aligned to the advertised educational standards: **Strongly Agree**
met the advertised educational objectives: **Strongly Agree**
had an impact on student learning: **Strongly Agree**
Additional feedback:
Content Provider was available for communication prior to the program: **Yes**
Program was a good value for fee charged: **Yes**
If materials were supplied, they arrived in a timely manner: **Yes**

How do you feel student learning was impacted for those who participated in this program?
They were asked many questions which they had to think about as Tara lead the session. I like this for our children because ithelps them stay on task and excited about their own learning.

Did you as an educator, gain new knowledge or skills from participating in this program?
Yes
I learned to use technology and it was a great way for us to connect our prior knowledge to new information. We were also able to have our questions answered.

Would you recommend this program to others?
Yes

Technology:
Video was clear: **Yes**
Audio was clear: **Yes**
Good connection was sustained: **Yes**

Comments:
Great info in the 30 minute session.

School/Site Name: Sebeka Summer Targeted Services
School District: Sebeka
Participating Teacher(s): Kari Carlson
Grade Level: 1-6
Number of Participants in Program: 38
Phone: 218-837-5101
Fax:
E-Mail: kcarlson@sebeka.k12.mn.us

Tara Johnson

From: Bonnie Brown <bonniebrown@isd837.org>
Sent: Monday, March 25, 2013 1:24 PM
To: Tara Johnson
Subject: Thank you
Attachments: DSC06042.JPG

Tara,
Thank you again for the outstanding wolf program. We completed the pup development charts and dens last Monday. Today we watched the current wolf video and enjoyed seeing the development of Luna and Boltz this past year. Mrs. Brown and class

--
Bonnie Brown
Second Grade Teacher
Madelia Elementary School
121 E. Main
Madelia, MN 56062
507-642-3234 Ext. 307

Tara Johnson

From: Litwinczuk, Mary (WVR) <LitwinczukM@District279.org>
Sent: Thursday, January 31, 2013 10:45 AM
To: 'Tara Johnson'
Subject: RE: Follow up

Tara,

The teacher's and students loved these video conference programs. I have been seeing them for several years now, and you guys have really stepped up your game! The programs are so interactive and the students loved them!

Thank you, thank you!

Mary

Mary Litwinczuk
Library Media Specialist
ISTE NETS*T Certified Teacher
Weaver Lake Elementary
15900 Weaver Lake Road
Maple Grove, MN 55311
Direct - 763.391.8886
School - 763.420.3337

Got questions about Windows 7, Office 2010, or the Employee Purchase Program? Here are answers:

http://d279.us/win7

More technology answers:

https://my279.org/hesk/knowledgebase.php

From: Tara Johnson [mailto:tjohnson@wolf.org]
Sent: Thursday, January 31, 2013 10:17 AM
To: Litwinczuk, Mary (WVR); Gaab, Jennifer (WVR)
Subject: Follow up

Jen and Students,

Thank you for an outstanding videoconferencing program! It was great to meet all of you and spend time learning about wolves together. Here are some items that will help you continue learning about wolves:

Wolf Cam
Wolf Logs
Wolf Videos
Wolf Information
Wild Kids!
Adopt-A-Wolf Kit

Wolf Tracking Kit
Track Wild Wolves Data

You had excellent questions in the program! If you have any further questions about wolves that did not get answered in our program or would like to schedule another program, please feel free to contact us at the email address listed below.

Please take a few minutes of your time to fill out this online program evaluation with your group: http://www.cilc.org/evaluation.aspx?pass=L205le7UXs. We take your feedback seriously and this is one way that you can help us continue to improve our programming.

Remember to pass on what you learned in this program to help others learn about wolves, too! We look forward to hearing from you again.

Take care!
Tara Johnson
--

Tara Johnson
Program Specialist

218-365-4695, ext. 33
tjohnson@wolf.org

Educational Services
1396 Highway 169
Ely, MN 55731

www.wolf.org
The International Wolf Center advances the survival of wolf populations by teaching about wolves, their relationship to wildlands and the human role in their future.

International Wolf Center

2010 Project Abstract
(For the Period Ending June 30, 2012)

PROJECT TITLE: Minnesota River Experts: An Educational Field Trip Online
PROJECT MANAGER: Kimberly Musser
AFFILIATION: Minnesota State University, Mankato Water Resources Center
MAILING ADDRESS: 189 Trafton Science Center South
CITY/STATE/ZIP: Mankato, MN 56001
PHONE: 507-389-5492
E-MAIL: kimberly.musser@mnsu.edu
WEBSITE: http://mrbdc.mnsu.edu/learn
FUNDING SOURCE: Environment and Natural Resources Trust Fund
LEGAL CITATION: M.L. 2010, Chap. 362, Sec. 2, Subd. 8k
APPROPRIATION AMOUNT: $124,000.00

Overall Project Outcome and Results

Considerable public funding and effort has gone into better understanding and restoring the Minnesota River. Research about the river is housed in an array of scientific publications not easily accessible for the public. This project helps to bridge the information gap between researchers and the public and to generally improve environmental education about the river. The project's goal is to increase public awareness about the river's health by using new media techniques to engage students and the public.

Major results included 1) developing and delivering the "Ask an Expert about the Minnesota River" website and 2) performing educational outreach. This project developed a multi-media virtual field trip with accompanying educational materials to showcase what scientists are learning about the Minnesota River. Citizens have a unique opportunity to learn directly from natural resource experts about the current state of the Minnesota River. Video clips of interviews and related information are available online on the Minnesota River Basin Data Center website: http://mrbdc.mnsu.edu/learn

Online Educational Website – Ask an Expert about the Minnesota River

Video clips of scientist and citizen experts answering questions about the river's health are the central feature of the website enriched by accompanying handouts, and graphics. Specifically, the major features of the website include:

- 171 video clips of experts answering questions;
- 27 handouts with background information developed to enrich each theme;
- 9 panoramic virtual tours and 20 slideshows;
- 5 educator's guides and 7 accompanying PowerPoint presentations on prairies, wetlands, agriculture, fish, and mussels.

Educational outreach and learning stations

Four computer kiosks (learning stations) were installed at key educational centers across the basin – specifically Treaty Site History Center in St. Peter, MN; Regional River History Center in New Ulm, MN; Ney Nature Center in Henderson, MN; and Clean Up the River Environment (CURE) office in Montevideo, MN – likely reaching 4,000-8,000 people in the upcoming year. Open houses at the four educational centers and other events directly reached approximately 349 people during the project period. Four school classroom presentations reached approximately 371 students.

Project Results Use and Dissemination

The broad dissemination goals for the project are to share data with the public, students and teachers through both traditional and nontraditional outreach methods. The dissemination of this project proceeded at several levels. All the project data is available on the web in a user-friendly format. Computer kiosks (learning stations) highlighting the project were developed and installed in four key river and history centers across the basin. We also conducted outreach to three schools and four

educational centers that included presentations and open houses. We have also used social media resources such as Facebook and YouTube to disseminate information about the project.

We worked collaboratively with a wide range of state and local agencies (MPCA, MDNR, Department of Agriculture, etc.) and citizen organizations (CURE, Ney Nature Center, Nicollet County Historical Society) to develop and publicize the project. Project staff have spoken about the project to local and state officials and staff, nonprofit organizations, teachers and students, and citizens. The project has received attention at scientific meetings (both poster session in 2011 and presentation in 2012 at the Minnesota Water Resources Conference) and educational training (DNR Naturalists). The project team plans to continue outreach to schools and putting on public events to promote the project and further raise public awareness about the Minnesota River.

Environment and Natural Resources Trust Fund (ENRTF)
2010 Final Report

Date of Report: August 15, 2012
Final Report
Date of Work Program Approval: June 9, 2010
Project Completion Date: June 30, 2012

I. PROJECT TITLE: Minnesota River Experts: An Educational Field Trip Online

Project Manager: Kimberly Musser
Affiliation: Minnesota State University, Mankato Water Resources Center
Mailing Address: 189 Trafton Science Center South
City / State / Zip: Mankato, MN 56001
Telephone Number: 507-389-5492
E-mail Address: kimberly.musser@mnsu.edu
FAX Number: 507-390-5493
Website Address: http://mrbdc.mnsu.edu/learn

Location: *Regions:* Southwest, Central, Metro and Southeast
Counties within the Minnesota River Basin: Big Stone County, Blue Earth County, Brown County, Carver County, Chippewa County, Cottonwood County, Dakota County, Douglas County, Faribault County, Freeborn County, Grant County, Hennepin County, Jackson County, Kandiyohi County, Lac qui Parle County, Le Sueur County, Lincoln County, Lyon County, Martin County, McLeod County, Murray County, Nicollet County, Otter Tail County, Pipestone County, Pope County, Ramsey County, Redwood County, Renville County, Rice County, Scott County, Sibley County, Stearns County, Steele County, Stevens County, Swift County, Traverse County, Waseca County, Watonwan County, Yellow Medicine County

ENRTF Project Budget:	**ENRTF Appropriation**	**$ 124,000.00**
	Minus Amount Spent:	**$ 113,005.95**
	Equal Balance:	**$ 10,994.05**

Legal Citation: M.L. 2010, Chap. 362, Sec. 2, Subd. 8k

Appropriation Language:
$124,000 is from the trust fund to the commissioner of natural resources for an agreement with Minnesota State University - Mankato to develop online educational materials on the Minnesota River for schools and outreach centers.

II. and III. FINAL PROJECT SUMMARY

Overall Project Outcome and Results
Considerable public funding and effort has gone into better understanding and restoring the Minnesota River. Research about the river is housed in an array of scientific publications not easily accessible for the public. This project helps to bridge the information gap between researchers and the public and to generally improve environmental education about the river. The project's goal is to increase public awareness about the river's health by using new media techniques to engage students and the public.

Major results included 1) developing and delivering the "Ask an Expert about the Minnesota River" website and 2) performing educational outreach. This project developed a multi-media virtual field trip with accompanying educational materials to showcase what scientists are learning about the Minnesota River. Citizens have a unique opportunity to learn directly from natural resource experts about the current state of the Minnesota River. Video clips of interviews and related information are available online on the Minnesota River Basin Data Center website: http://mrbdc.mnsu.edu/learn

Online Educational Website – Ask an Expert about the Minnesota River
Video clips of scientist and citizen experts answering questions about the river's health are the central feature of the website enriched by accompanying handouts, and graphics. Specifically, the major features of the website include:

- 171 video clips of experts answering questions;
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- 5 educator's guides and 7 accompanying PowerPoint presentations on prairies, wetlands, agriculture, fish, and mussels.

Educational outreach and learning stations
Four computer kiosks (learning stations) were installed at key educational centers across the basin, likely reaching 4,000-8,000 people in the upcoming year. Open houses at the four educational centers and other events directly reached approximately 349 people during the project period. Four school classroom presentations reached approximately 371 students.

IV. OUTLINE OF PROJECT RESULTS*:*

RESULT 1: Develop and deliver online educational field trips

Description:
This project will develop an innovative multi-media virtual field trip and educational materials available online to teach the public about the Minnesota River. This interactive website will enable people to choose from a map or list of key questions about the Minnesota River. Using concise video clips, key questions about the river's health will be answered by scientific experts working in the field. Other interactive features and new media techniques (such as Google-Earth flybys and panoramic images) will be woven into the website to create a rich, virtual experience for the website user. The project will be housed on the Minnesota River Basin Data Center website http://mrbdc.mnsu.edu.

Major steps to develop the online educational field trips include: 1) conduct interviews 2) develop graphics and website and 3) develop Minnesota River based educational materials.

Deliverable 1: Interview Video Clips
The project will commence with the assembly of an advisory group of scientists, high school teachers, agency personnel, and citizens who will help to identify the list of interviewees and key Minnesota River water quality questions. The same group will advise the project throughout and test the final product.

We will conduct 20 video interviews with natural resource scientists focusing on environmental issues affecting the Minnesota River. Interviews will largely take place in the field as

researchers, land managers, and conservationists perform research and explain key findings or summarize river conditions or trends. We will strive to capture these charismatic experts immersed in the field as they clearly and concisely explain issues that help people understand major topics about the health of the Minnesota River. Another aim of the project is to help people understand the diverse array of research and restoration activities that are underway across the basin to improve water quality and ecosystem health. Each expert interview will be videotaped and edited to distil key video clips.

Timeline: July 31, 2010 – June 30, 2012
Budget: $23,000

Deliverable 2: Graphics and website
The interactive website will include expert interview video clips along with maps, graphics, photos, aerial imagery, and access to a rich array of information. Major tasks include: performing graphics research, constructing web pages, creating maps, researching historical photographs, processing aerial imagery, and taking new photos. Google-Earth fly-throughs will also be developed to give people a birds-eye view of the landscape and particular interview sites. Additionally, 360-degree panoramic images of interview or research sites will enable visitors to feel immersed in the location. Other explanatory graphics such as graphs and charts will be included. This array of multimedia graphics will provide a rich site context and additional information to clarify the question or issue at hand.

The website will be available online at the Minnesota River Basin Data Center website (http://mrbdc.mnsu.edu). We will also utilize a variety of new media venues (e.g. YouTube, Facebook) to publicize the products. The goal is to make this information readily available to a broader audience and delivered in an engaging format.

Timeline: July 31, 2010 – June 30, 2012
Budget: $40,600

Deliverable 3: Minnesota River based educational materials
Educational materials that accompany the online interviews will be developed to further illustrate or explain the "ask-an-expert" questions. Working with the advisory group and especially with the three high school teachers and their students, we will craft educational materials related to particular interview topics that will be suitable for high school students and the general public. To help develop these educational materials, we will draw from existing publications such as the data-rich the Minnesota River Trends Report, an easy-to-read overview summarizing some of the major demographic, land use, water quality, biological and recreational trends in the basin. We will work with team teachers and the broader advisory group to identify a few "ask-an-expert" interview topics to highlight what best fits into existing high school curricula and merge with Minnesota Academic Standards.

Timeline: July 31, 2010 – June 30, 2012
Budget: $20,400

Summary Budget Information for Result 1:	**ENRTF Budget:**	**$ 84,012.54***
	Amount Spent:	**$ 83,977.02**
	Balance:	**$ 35.52**

***Actual per accepted budget spreadsheet – p.10 of 10 in the ENRTF 2010 Work Program. Rounded to $84,000 in the ENRTF 2010 Work Program narrative.**

Deliverable	Completion Date	Budget
1. *Interview Video Clips* A series of video clips from each of the 20 natural resource expert interviews.	June 30, 2012	$23,000
2. *Graphics and website* Website that contains video clips, maps, graphics, photos, multimedia imagery, and access to a rich array of information.	June 30, 2012	$40,600
3. *Educational materials* Educational materials that accompany the online interviews and help to illustrate or clarify the "ask-an-expert" question.	June 30, 2012	$20,400

Result Completion Date: June 30, 2012

Final Report Summary:

RESULT 1: Develop and deliver online educational field trips

Deliverable 1: Interview Video Clips:

Advisory Committees
We worked with two advisory committees to create the framework for the project – in the lower and upper portions of the Minnesota River Basin. We wanted to ensure that the advisory committee contained an array of citizen, agencies, non-profits, watershed groups, Soil and Water Conservation Districts (SWCDs), educators as well as broad geographic representation from across this large river basin. We were fortunate to have advisory teams of this caliber with diverse views, rich experience and insight.

Lower Watershed Advisory Committee (Henderson, MN – October 28, 2010)
The group worked together to (1) identify key questions affecting the environmental health of the Minnesota River; (2) identify additional experts to interview; and (3) brainstorm educational materials and graphic/visual aids for the project. The first advisory committee brainstorming session was held on October 28, 2010 at the Ney Nature Center. Ten members of the committee attended the three hour session: Pat Baskfield (MPCA), Carrie Jennings (MN State Geological Survey), Tom Kalahar (Renville SWCD), Bernard Sietman (MDNR), Lauren Klement (Le Sueur County), Art Straub (Educator), Barb Straub (Educator), Paul Wymar (Chippewa River Watershed Project), Becky Pollack (Ney Nature Center) and Katie Rassmussen (MSUM Water Resources Center). We also conducted one-on-one meetings with members of the advisory committee who are unable to attend the brainstorming sessions. For example, we had a follow up meeting with Ben Leonard of the Nicollet County Historical Society to ensure that we are effectively integrating historical perspectives into the project.

Upper Minnesota River Watershed (Montevideo, MN - February 3, 2011)
A second meeting with members of the advisory committee was held in Montevideo on February 3, 2011 to refine the project's framework. The group brainstormed and identified (1) key questions affecting the environmental health of the Minnesota River; (2) additional experts to interview; and (3) educational materials and graphic/visual aids for the project. Ten members attended this advisory meeting: Brett Arne (Pomme de Terre River Association), Audrey Arner (Moonstone Farm), Chris Domeier (MDNR), Butch Halterman (Montevideo High School), Jennifer Hoffman (Chippewa River Watershed Project), Joe Montonye (Grant SWCD), Patrick Moore (Clean Up the River Environment), Cory Netland (Hawk Creek Watershed Project), Kylene Olson (Chippewa River Watershed Project), and Del Wehrspann (Landowner and Citizen Advocate).

Video Partnering (Sub-contract with Friends of the Minnesota Valley /EPIC Media)
This project was greatly enriched by our involvement with the film documentary "River Revival: Working Together to Save the Minnesota River" produced by EPIC Media, Ron Schara Productions and the MSUM Water Resource Center. The one-hour was broadcast prime time on KARE 11 TV on June 12th. Approximately 38,000 households (~85,000 viewers) watched the show and the ratings tied with 60 Minutes. The documentary was hosted by Ron Schara and 10-minute excerpts were featured in a 4-part series on his *Minnesota Bound* TV shows - http://www.mnbound.com/ in March 2011. The show is broadcast twice weekly on KARE 11 averaging 220,000 viewers per week so we assume the 4-part documentary series was viewed by this large audience as well. The video can be viewed at http://mnriver.org/. Ask an Expert project was able to build upon the success of this documentary by highlighting the Minnesota River. It helped to build momentum, generate publicity and interest in the Minnesota River Basin Data Center website (where the Ask an Expert resides).

Videographer Jon Carlson and Producer John Hickman of www.h2ovideos.com videotaped dozens of people across the Minnesota River Basin. They interviewed a diverse selection of citizens, government staff, nonprofit leaders, watershed specialists and others covering a wide range of topics. As part of their subcontract, the filmmakers generously donated all of their used and unused footage for use in the Minnesota River Experts project. This partnership ultimately enabled us to integrate more topics and a richer array of information into the project. At the onset of our project we joined them on numerous interviews. Award-winning videographer Jon Carlson mentored our team about the overall approach, interview process, video equipment as well as editing techniques.

We inventoried the video and used many landscape shots and aerial imagery as well as excerpts from numerous interviews. For example, the types of video footage that we integrated into this project includes:

- MDNR staff Lee Sundmark and Dirk Peterson, Fisheries Chief discussing the state of the fisheries in the Minnesota River Basin.
- Environmental scientist Megan Ulrich from the Upper Sioux Community illustrating macroinvertebrates as important bioindicators of the river's health.
- Geologist Dr. Carrie Jennings from the Minnesota Department of Natural Resources describing area geology and the formation of the Minnesota River valley.

Interviews
A central portion of this project centered on interviewing citizen and scientist experts about the health of the river. With video and still cameras in hand, we tromped through wetlands and

prairies, rode combines and toured farms. We have waded into rivers, rode on fishing boats, and walked along the banks of the Minnesota River to conduct interviews capturing the expert's answers to key questions about the current and historic condition of the river. We captured excellent footage covering the major themes identified by our advisory committees.

To characterize the historic landscape, we interviewed MDNR Geologist Carrie Jennings who explained Minnesota River Valley geologic history. Mary Mueller, Randy Schindle and Henry Panowitsch all answered questions about prairies in the Minnesota River Basin. To characterize the current and historic role of wetlands in the basin, we interviewed Dr. Brad Cook, biology professor at Minnesota State University Mankato and Mary Mueller, a wetland and prairie restoration expert.

To characterize landscape today, we interviewed conventional corn and soybean farmers (Dave Craigmile, Dave Bergeson, Brad Link) and a livestock operator Paul Schroedl. We toured an organic farm (Carmen Fernholz) and a Community Supported Agriculture (CSA) Farm (Earthrise Farm: Annette and Kay Fernholz).

The water quality story featured interviews with Pat Baskfield of MPCA, Scott Matteson of MDA, and Paul Wymar of the Chippewa River Watershed Project and Katie Rassmussen of the MSU Water Resources Center. We spent quite a bit of time with conservation leaders like Tom Kalahar of Renville SWCD and Cory Netland of the Hawk Creek Watershed Project to capture case studies of successful restoration efforts.

To explore biological indicators, we interviewed MDNR malacologists (mollusk biologist) Mike Davis and Bernard Sietman. We videotaped Brad Koenen of MDNR fisheries conducting a fish survey on the Minnesota River and Chris Domeier (Ortonville MDNR fisheries) talking about impacts of dams on fisheries. Paul Wymar explained what clues macroinvertebrate communities give about the health of the Chippewa River. We also videotaped community events including the Henderson Hummingbird Hurrah, New Ulm Riverblast, and the Ney Nature Center Fall Festival.

The following profiles are included in our "Meet the Experts" web page:

Pat Baskfield - Hydrologist, Minnesota Pollution Control Agency

David Bergeson - Farmer, Lac qui Parle County

Dr. Brad Cook - Biology Professor, Minnesota State University, Mankato

Mike Davis - Malacologist, Minnesota Department of Natural Resources (Minnesota DNR)

Chris Domeier - Assistant Fisheries Supervisor, Minnesota DNR, Ortonville Office

Dr. Dan Engstrom - Director, St. Croix Watershed Research Station

Carmen Fernholz - Organic Farmer, Madison, MN

Kay and Annette Fernholz - Organic Farmers, Earthrise Farm

Bob Finley - Regional Manager, Minnesota Pollution Control Agency

Dr. Carrie Jennings - Geologist, Minnesota Department of Natural Resources

Tom Kalahar - Renville Soil and Water Conservation District

Brad Koenen - Fisheries Technician, Minnesota DNR, Hutchinson Office

Scott Matteson - Monitoring Hydrologist, Minnesota Department of Agriculture

Mary Mueller - Farmer conservationist, Lower Minnesota River Watershed

Cory Netland - Coordinator, Hawk Creek Watershed Project

Henry Panowitsch - Prairie Advocate

Randy Schindle - Private Lands Specialist, Minnesota DNR, Division of Wildlife

Dr. Shawn Schottler - Senior Scientist, St. Croix Watershed Research Station

Bernard Sietman - Malacologist, Minnesota DNR

Paul Wymar - Watershed Scientist, Chippewa River Watershed Project

Deliverable 2: Graphics and website

We revised, updated and expanded the Minnesota River Basin Data Center (MRBDC) website – the online location for the Ask an Expert project. Web link: http://mrbdc.mnsu.edu This overhaul makes significant strides towards making the website the central portal for Minnesota River data. We have transferred the entire site into a new content management system (Drupal). Changing the web platform greatly enriched the end result of this project. With the new website design, site visitors can conduct a comprehensive search and be able to view videos, photos, contacts, reports, articles, educational materials and other information. Major components of the revised site features: general information about the Basin, all the major watersheds, a large selection of reports related to the Minnesota River, contacts, and Maps & GIS data. It also summarizes how people can get involved with the effort to improve water quality and includes a section about exploring the basin. One of the most exciting aspects of this redesign is the use of a visually immersive 360 panoramic images that can incorporate sound, photos, flash files, video and other links within the panoramas. Link to 360 virtual tours: http://mrbdc.mnsu.edu/ask-expert-360%C2%B0-virtual-tours

On June 12, 2011 we launched the newly expanded and updated MRBDC website in conjunction with the airing of the "River Revival" documentary. Website statistics from January 2010 through August 2011 indicate a striking peak in June when the website received nearly a half million hits (471,973) compared to an average of just under 100,000 for the previous months. This is likely correlated with the publicity generated by the documentary. It played an important role in the significant jump in web traffic. A preliminary pattern indicates that the average number of hits per month before the website redesign was 78,000 (January 2010 – May 2011) while after the launch of the website indicates over a three-fold increase to average

monthly hits of 278,000 (June – August 2011) after the redesign. The revised website now includes social features allowing all users to both view and contribute information in several formats. We have developed Facebook and YouTube and flickr sites associated with the MRBDC that will be enriched and expanded over the coming year. A Minnesota River Basin Blog has also been created on Tumblr to let people share their views and opinions about the Minnesota River.

On October 7, 2010 we obtained a $60,000 grant from the McKnight Foundation to redesign and update the Minnesota River Basin Data Center (http://mrbdc.mnsu.edu). Our vision was to seamlessly integrate and highlight this project with this web redesign.

Deliverable 3: Educational materials

Initially, we collected and compiled available educational materials related to the Minnesota River. Our goal was to learn what had already been created by other organizations and to draw from existing lesson plans and other publications before developing new materials.

We asked the broader advisory committee about existing educational materials. We also met with teachers involved in the project in January 2011 to learn more from them about existing educational materials and target state standards. Teachers in the basin including Butch Halterman from Montevideo Public School and Anthony Sonnek and Nicole Kotassek of the Minnesota New Country School (Henderson) to learn about existing educational materials, to brainstorm educational modules to create and to discuss the best approach to integrate educational standards into the Ask an Expert project. We obtained useful feedback about what might be helpful to teachers to make the product useful in the classroom.

Five major themes were enriched with lesson plans to be used in classroom presentations in conjunction with the video clips. A team of three interns researched, compiled and developed educational materials. Interns reviewed state standards, collected existing lesson plans, modified and created new lesson plans, and assembled PowerPoint presentations. The educational modules were developed with teachers and tested in area classrooms to ensure that they fit with existing high school curricula and merge with Minnesota Academic Standards.

Educational Guides were created for the following themes:

- Prairies
- Wetlands
- Agriculture
- Mussels
- Fish

RESULT 2: Educational Outreach and learning stations

Description:
Interactive, multimedia kiosks will be located in four key history and river interpretive centers across the basin. Visitors will be able to access quick, web-style information about the project. The long-term kiosk installations will provide ongoing outreach for the project. The kiosk's intuitive touch-screen interactivity will make it easy for visitors to navigate through the site and

explore questions of interest to them and hear researchers explain key information about the river.

The goal of these learning stations is to introduce visitors to the project, to enable them to explore some of the interviews while at the site, and hopefully return to the website later (on their own) as questions about the river arise. The ideal outcome after exploring the multimedia kiosk will be to inspire students and the public to want to learn more about the river and to take the next step to explore and protect the dynamic river environment.

We will promote the website and learning stations with classroom and public presentations and build a richer relationship with the three partner schools. Outreach to promote the website will include kiosks at key educational centers and public presentations. We will also employ new media techniques to continue the development and delivery of the project including the use of YouTube, Facebook, Twitter, news releases, etc. We will share project information with the public, students and teachers via both traditional and nontraditional outreach.

Deliverable 1: Learning Stations/Multimedia kiosks
We will design, develop, and set up four learning stations (multimedia kiosks) at key educational centers across the Basin. A wooden kiosk base will support a large printed map of the Minnesota River Basin in back of a computer touch screen. The kiosk's panel graphics will provide geographic context to the Minnesota River Basin and an overview of the project. It will be done in a format to grab the visitor's attention and spark their interest in exploring the website. Based on average annual visitation of 16,000 people for the four educational centers, we estimate 25 to 50 percent of visitors (4,000-8,000 people) per year might use multimedia kiosks.

Learning stations sites include:

- Treaty Site History Center, St. Peter, MN
- Regional River History Center, New Ulm, MN
- Ney Nature Center, Henderson, MN
- Clean Up the River Environment (CURE) Office, Montevideo, MN

Treaty Site History Center: St. Peter, MN
As the headquarters of the Nicollet County Historical Society, the Treaty Site History Center allows visitors to stroll through a restored prairie, discover the historical Traverse des Sioux crossing on an oxbow of the Minnesota River and learn about the history of the region. The Treaty Site History Center holds three exhibit halls with permanent and changing displays along with a research library.
Annual Visitation: 9,100 people

Regional River History Center: New Ulm, MN
Located on the Minnesota River at Riverside Park, the Regional River History Center of New Ulm provides citizen access to the Minnesota River and Cottonwood River watershed basins including online data, along with area historical and cultural artifacts. This history center strives to sponsor presentations related to the historical, cultural and natural aspects of the Minnesota River Basin.
Annual Visitation: 1,200 to 1,500 people

Ney Nature Center: Henderson, MN

The Ney Nature Center is dedicated to establishing a place where time is forgotten and heard only in the echoes of pioneer efforts to sustain themselves in what to them was a wilderness. It allows the land to return to a state where time is measured by the seasons and cycles of the moon, returning to a state once known by the first Americans. It is designed to maintain a safe refuge for native creatures – plant and animal, securing a healthy habitat for their continued survival.
Annual Visitation: 3,000 to 4,000 people

Clean Up the River Environment: Montevideo, MN
Founded in 1992, Clean Up the River Environment (CURE) works to restore, celebrate and protect the Upper Minnesota River Watershed. CURE seeks to inspire area youth and the general public through river trips and field trips. This nonprofit organization has over 500 members advocating for public policy at the local, regional, and national level.
Annual Visitation: 1,300 to 1,500 people

Timeline: July 31, 2010 – June 30, 2012
Budget: $23,700

Deliverable 2: School and Public Outreach

Schools:
We will work with three partner schools and teachers to directly reach at least 150 students by conducting hands-on presentations on how the website can be used both inside and outside of the classroom. We will develop a richer and on-going relationship with these partner schools to broaden the experience of students by connecting them with existing Minnesota River programs such as river cleanups, surveying for frogs or mussels, etc.

In order to evaluate knowledge gained from using the "ask-an-expert" website, we will work with teachers and the broader advisory group to construct an evaluative tool that will assess pre- and post knowledge related to the website and educational materials.

Educational Centers:
We will host a public event/reception at each of the four educational centers after the learning stations have been installed to directly reach approximately 200 -300 citizens. A presentation about the project will be given at each of these events to publicize the website. The overarching goal of these events is to publicize the project and website with the broader aim to increase public awareness of river issues and promote environmental stewardship.

Kiosk use will be tracked by a counter on each kiosk. In order to give kiosk users an opportunity to learn more, we will include an e-mail sign up to connect them to upcoming river events across the basin, obtain the Minnesota River Weekly Update and/or River Talk newsletters. Similarly at presentations, we will track attendance and offer participants ways to learn about the river and river events.

Through both traditional and nontraditional outreach, we will share project information with the public, students and teachers. We will employ new media techniques to publicize the website through use of YouTube, Facebook, Twitter, etc. Website access will likely exceed many thousand website visits. Website use will be monitored by tracking use statistics on the Minnesota River Basin Data Center website.

Timeline: July 31, 2010 – June 30, 2012
Budget: $16,300

Summary Budget Information for Result 2: **ENRTF Budget: $ 39,987.46***
Amount Spent: $ 29,028.93
Balance: $ 10,958.53

***Actual per accepted budget spreadsheet – p.10 of 10 in the ENRTF 2010 Work Program. Rounded to $40,000 in the ENRTF 2010 Work Program narrative.**

Deliverable	Completion Date	Budget
1. *Design, develop, and install learning stations* Four wooden multimedia kiosk with computer screen and large graphic panel installed at key river educational centers across the basin.	June 30, 2012	$23,700
2. *School and public outreach* Outreach and presentations to three schools and four educational centers directly reaching at least 150 students and 200 citizens. Educational center kiosks will potentially reach 4,000-8,000 people per year while online website can reach many thousands. Will also include an evaluative tool to assess knowledge gained from use of the project.	June 30, 2012	$16,300

Final Report Summary:

RESULT 2: Educational Outreach and learning stations

Deliverable 1: Learning Stations/Multimedia kiosks

We researched regional museums to find models for engaging, interactive interfaces for the learning stations to draw attention to the project. One feature that we discovered and added to this project was to integrate 360 panoramas into the kiosk interface. We worked with area history and river centers to design and develop four kiosks. We researched area museums to find the best model for the physical design of the kiosk and ended up using the high quality exhibits from the Nicollet County Historical Center (NCHS) as a model. A local cabinetmaker crafted four birch wood kiosks. A large map of the Minnesota River Basin and logos were developed and graphics were produced by a graphics vendor. Large scale (20-inch monitors) touch-screen computers (HP Touchsmart 9300) were purchased and programmed and inserted into the kiosks.

Kiosks were assembled and delivered to the following educational centers:

- Treaty Site History Center, St. Peter, MN
- Regional River History Center, New Ulm, MN
- Ney Nature Center, Henderson, MN
- Clean Up the River Environment (CURE) Office, Granite Falls, MN

There was a change in kiosk location per CURE suggestion that the kiosk be located in their office in Granite Falls on the banks of the Minnesota River in the recently restored historic K.K. Berge building. CURE assumed that this new location would draw more visitors and be a better location for the interactive kiosk than their office in downtown Montevideo.

We have $10,994.05 remaining in the project budget. The remaining funds are in this category (Result 2) and largely due to kiosks costing less than anticipated. We originally envisioned needing a computer and monitor but later found a high quality touch screen computer with an integrated computer and monitor. This enabled significant cost savings for the project. We were able to purchase all the supplies with $4,597.84 remaining.

Project staffing also changed during the project period. Project staff member Scott Kudelka took another position, and we were unable to completely utilize the reallocated funds for staff salary. The slight overage in student salary ($597.72) was due to hiring additional assistance to work with Scott before he left. We also saved time and reduced project cost by using some video interviews that Jon Carlson and John Hickman (of h20videos) conducted.

Deliverable 2: School and Public Outreach

Promotion of the project has been ongoing involving public presentations, classroom sessions, informational tables, one-on-one contacts, fact sheets, posters, etc. We were able to publicize the Ask an Expert Project through other Water Resources Center projects and will continue to do this in the future. One of the best ways to promote the project we discovered involves the topics of mussels, macroinvertebrates and fish. People are very interested in these subjects and they provide an interesting way to talk about the health of the Minnesota River. Both public and classroom presentations across the Minnesota River Basin have received positive feedback from citizens, students and resource specialists. Future presentations are being planned to continue to publicize the project and to broaden the project's appeal beyond the basin's borders (in particular through the Minnesota Department of Natural Resources Naturalists). Fact sheets developed for the project will also help to promote the project whether it is citizens using them as field guides or teachers integrating them into their classroom curriculum.

Schools:
We worked with partner schools and teachers to directly reach 371 students by conducting hands-on presentations on how the website can be used both inside and outside of schools. We developed the educational modules with help from teachers and delivered the modules in three schools (listed below).

Montevideo High School (Montevideo, MN)
Scott Kudelka and Kimberly Musser presented the Bioindicator - Mussel presentation to approximately 49 Junior and Senior Biology class students on May 16, 2012.
Teachers: Danny Kurkiewicz and Richard Halterman

Nicollet County Environmental Education Day at Fort Ridgely State Park (Fairfax, MN)

Scott Kudelka presented a program focusing on water including mussels, macroinvertebrates and fish in 7 sessions to 285 students on May 17, 2012.

Minnesota New Country School (Henderson, MN)
Nicole Hogan presented the agriculture module to 15 students on May 24, 2012.
Teachers: Nichole Kotasek and Anthony Sonnek

Bridges Community School (Mankato, MN)
Scott Kudelka and Kimberly Musser presented the mussel and macroinvertebrate presentation to 22 students on May 25, 2012.
Teacher: Meghan Wall

Our initial proposal included presenting to Dawson-Boyd Public School but we were not able to due to conflicting time commitments. Instead we did presentations at the Nicollet County Environmental Education Day and Bridges Community School.

Initially, we proposed a formal pre- and post-knowledge assessment of the Ask an Expert website. After consulting our advisory board and teachers, it became clear that conducting a series of more informal assessments with both students and citizens who participated in a classroom session or public presentation would be a more effective evaluation method. We used this feedback while developing the project and feel that it has led to a more useable product.

We developed one theme (mussels) as a pilot and gained valuable feedback from reviewers (experts, teachers, students and others) about what worked and what needed to be changed. They provided input about the overall organization of the website, about incorporating the various educational materials (fact sheets, power-point presentations, slideshows, etc.) and integrating the 360 virtual tour into the project structure. A key point came from students exploring the pilot theme who expressed it was important to be able to launch all the different elements of Ask an Expert within the website instead of being redirected. Originally, the videos were launched from YouTube until we redesigned the website structure to directly launch videos within the website.

Our experts, students and videographers reviewed some of the first videos and provided feedback during the development of the project. We learned that the most successful videos were fast-paced, graphic-rich videos that distilled key points. This helped us integrate more imagery and maps to support the expert's main points. We were also able to change our approach during the interview process by seeking out and capturing more action scenes from the experts.

Informal feedback also proved to be valuable during the classroom sessions when teachers and students noted how effective and useful the summary handouts are for understanding a particular theme. They pointed out that the strongest handouts were visually engaging, reinforced concepts and summarized main points. Teachers noted that the most useful handouts were those that they could easily integrate into existing lesson plans and curriculum. They stressed the importance of these products to complement existing materials and provide a local context to what typically a more generic (or statewide) perspective. Feedback from

biology teachers resulted in the development of handouts and field guides for the mussel, fish and macroinvertebrate sections to encourage field trips and outdoor adventures.

We were able to informally assess student knowledge of topics within our class presentations. For example, during a mussel presentation we started by brainstorming with the class about their knowledge of mussels. Most had limited awareness and exposure. By the end of class, they had a good knowledge of mussel life cycle, diversity, ecological role, and importance as an indicator of watershed health. Finally, we received enthusiastic responses from teachers, students and experts about the use of the visually immersive 360 panoramic virtual tours. In response, we added this element to the Ask an Expert project wherever feasible. This iterative and ongoing evaluation process enabled us to obtain feedback throughout the development of the project which ultimately strengthened the final product.

Educational Centers & Public Events:
Our vision for the public events was to provide an overview of the Ask an Expert project and invite one or two of the experts to discuss the type of research they are conducting in the Minnesota River Basin. We also developed a poster and a fact sheet explaining the project to the public. Outreach included a poster session at the annual Water Resources Conference (October 18-19, 2011) and the four open houses. We have been invited to present a summary of Ask an Expert at the 2012 Water Resources Conference on October 16-17, 2012 (one of three education and engagement talks invited statewide).

We hosted a public event/reception at each of the four educational centers and directly reached 349 citizens. We can track kiosk use for each computer and assess the relative use of each kiosk at the four locations. We have included handouts near the kiosks that includes the web address so that kiosk users can take with them and continue to explore the site further after their visit. Additional information about other Minnesota River related information such as the Minnesota River Weekly Update is included to help citizens learn more about the river and upcoming events. Overall website use will be monitored by tracking use statistics on the Minnesota River Basin Data Center website.

Ney Nature Center, Henderson, MN
We hosted our first open house on October 15, 2011 at the Ney Nature Center in conjunction with their annual Fall Festival. Approximately 60 people of all ages filled their historic barn to learn about the Minnesota River from citizen advocates and conservation leaders Art and Barb Straub. Their interactive talk used a wide range of river artifacts (e.g. bison bones, mussel shells) to enrich their engaging stories about the Minnesota River. We created a poster and Ask an Expert project handout and provided a project overview to the group.

Treaty Site History Center, St. Peter, MN
Tom Kalahar spoke about "Beaver Creek Water Quality Success Story" on May 16, 2012. Approximately 7 people attended. Project staff provided materials and an overview of Ask an Expert for approximately 40 people on May 15, 2012 (Le Sueur Civic Engagement Potluck) and 50 people on May 19 (Red Jacket Trail Dedication) and 37 people on May 19, 2012 (Minnesota Master Naturalist Conference). We are working with Nicollet County Historical Center Staff to plan another event to publicize Ask an Expert in the St. Peter area.

Regional River History Center, New Ulm, MN

Carrie Jennings presented "Minnesota River Geology" at the public library in New Ulm on May 2, 2012. Approximately 10 people attended (due to tornado warnings). To reach a larger audience in the New Ulm area, we plan to highlight the kiosk at the Regional River History Center and publicize Ask an Expert at the Riverblast Celebration in September 2012. This event draws thousands of area residents.

Clean Up the River Environment (CURE) Office, Montevideo, MN
Fisheries Biologist Chris Domeier of the Minnesota Department of Natural Resources (MDNR) was the featured expert giving a presentation on the health of the fish and dams in the Minnesota River on May 16, 2012. It was held at the Montevideo/Chippewa County Public Library (across from the CURE office) and approximately 40 people attended.
Newspaper Article in the Advocate Tribune:
http://www.granitefallsnews.com/news/x1035954290/Domeier-to-talk-about-Fish-and-Dams-in-the-Upper-Minnesota-River-Wed-May-17

Minneopa State Park, Mankato, MN
To reach a broader audience, numerous Ask an Expert-based presentations highlighting mussels, macroinvertebrates and fish were conducted at Minneopa State Park. The audience included the general public and park campers.

- Mussels - May 26, 2012 - 37 people
- Fish - June 9, 2012 - 26 people
- Macroinvertebrates - June 15, 2012- 42 people

V. TOTAL ENRTF PROJECT BUDGET:

Personnel: ~~$ 104,100~~ **105,406.59**
Kimberly Musser, Assistant Director, Minnesota State University, Mankato Water Resources Center.
Tasks: Project manager; conduct interviews; develop graphics, website, and education materials, promotion.
Percent full-time employment: 25%

Scott Kudelka, Communications Coordinator, Minnesota State University, Mankato Water Resources Center
Tasks: Conduct interviews, develop education materials, promotion.
Percent full-time employment: 33%

Richard Moore, GIS Specialist, Minnesota State University, Mankato Water Resources Center
Tasks: Conduct interviews; create maps and graphics such as Google Earth fly-throughs.
Percent full-time employment: 14%

Contracts: $4,000 - Friends of the Minnesota Valley
Tasks: A portion (roughly 20 percent) of videography and video editing.

Equipment/Tools/Supplies: $ 13,600

Kiosks - $12,400

Each of the four kiosks will include a computer, touch screen monitor, graphic panels, and wooden kiosk

Camcorder with hard disk/wireless microphone/external hard drive - $1,200
Purchasing new digital video recorder will save time and money. Replacing outdated equipment will enable us to increase efficiency going direct to digital video shortening processing and editing time significantly.

Travel: ~~$2,300~~ **$1,001.45**- Travel to interview locations and project meetings.

TOTAL ENRTF PROJECT BUDGET: $124,000

Explanation of Capital Expenditures Greater Than $3,500: N/A

VI. PROJECT STRATEGY:

A. Project Partners:

Minnesota State University, Mankato Water Resources Center Staff
Kimberly Musser, Assistant Director, Minnesota State University, Mankato Water Resources Center.
Scott Kudelka, Communications Coordinator, Minnesota State University, Mankato Water Resources Center
Rick Moore, GIS Specialist, Minnesota State University, Mankato Water Resources Center

Scientists and Citizens
Natural resource scientists and citizen and that will be interviewed, help to develop education materials, and will serve as an advisory team include:

- Bernard Sietman and Mike Davis (mussels), Chris Domier (fisheries) and Bob Beck (state park naturalist) – Minnesota Department of Natural Resources;
- Pat Baskfield, Hydrologist – Minnesota Pollution Control Agency;
- Carrie Jennings, Senior Scientist - Minnesota Geology Survey;
- Joel Wurscher, Project Coordinator - High Island Creek Project;
- Brooke Patterson, Project Coordinator - Rush River Project;
- Tom Kalahar, District Technician - Renville Soil and Water Conservation District;
- Lauren Klement, Le Sueur County Water Planner;
- Paul Wymar, Watershed Scientist - Chippewa River Watershed Project

Teachers, Educational Center, and Nonprofit Staff

- Greg Wyum, Science Teacher - Dawson-Boyd Public School;
- Greg Elseth, Science Teacher - Sibley East Public School;
- Anthony Sonnek and Nicole Kotasek, Science Teachers - MN New Country School;
- Becky Pollack, Executive Director - Ney Nature Center;
- Ron Bolduan, Curator - Regional River History Center;
- Ben Leonard, Executive Director - Minnesota River Treaty Center
- Patrick Moore, Executive Director - Clean Up the River Environment (CURE)
- John Hickman - Friends of the Minnesota Valley

B. Project Impact and Long-term Strategy:

This project is part of a larger strategy to increase public awareness about the health of the Minnesota River. The online interviews would offer an innovative way to educate citizens about what scientists are learning about rivers and lakes in the basin. The proposed project would improve information flow, enrich and update the Minnesota River Basin Data Center website (http://mrbdc.mnsu.edu). This project would also serve as a tool for future efforts to integrate Minnesota River research into the high school science curriculum across the Minnesota River Basin.

In order to move forward with the effort to clean up the Minnesota River, we need to engage and inform citizens about the state of the river. This project will help to bridge the information gap between scientific experts and citizens. After exploring a virtual tour hosted by a variety of experts, website users will leave with a richer understanding of this diverse river basin and also gain exposure to many one-of-a-kind places. They will get to experience some of the many rivers, streams and lakes across the basin that awaits exploration. Exposing people to the river and capturing their interest is an important step in improving and protecting it for today and future generations.

C. Other Funds Proposed to be Spent during the Project Period:

Each of the project partners listed above (citizen, scientists, teachers and educational center staff) will provide in-kind donation of approximately $500.

D. Spending History:

VII. DISSEMINATION:
The main plans for disseminating information include 1) Learning Stations - Multimedia kiosks located in four key river and history centers across the basin 2) School and Public Outreach at three schools and four educational centers involving presentations, open houses, and stewardship projects.

Result number two (deliverable 2) details the dissemination plans for the project. The broad dissemination goals for the project include sharing data with the public, students and teachers by both traditional and nontraditional outreach. The ultimate aim is to increase public awareness about the Minnesota River and promote environmental stewardship.

The website will be housed on the Minnesota River Basin Data Center website: (http://mrbdc.mnsu.edu).

VIII. REPORTING REQUIREMENTS: Periodic work program progress reports will be submitted not later than November 30, 2010, May 31, 2011, and November 30, 2011. A final work program report and associated products will be submitted between June 30 and August 1, 2012 as requested by the LCCMR.

Reimbursement Request – Invoice Summary Spreadsheet - Part 2

Attachment A: Budget Detail for 2010 Projects - **Summary and a Budget page for each partner (if applicable)**

Project Title: *MN River Experts: An Educational Field Trip On-Line*

Project Manager Name: *Kimberly Musser*

Trust Fund Appropriation: $ *124,000.00*

Legal Citation: Laws of Minnesota 2010, Chapter 362, Section 2, Subdivision 8k.

Period Covered by Reimbursement Request: 12/01/11-06/30/12 FINAL REPORTING

2010 Trust Fund Budget	Result 1: Develop and deliver on-line educational field trips.							Result 2: Educational Outreach and learning stations.							PROJECT TOTAL						
	Budget	Revised Budget Result 1 03/28/12	Revised Budget Result 1 05/15/12	Beginning Balance	Current Invoice	Expenditure Total (to-date)	Ending Balance	Budget	Revised Budget Result 2 03/28/12	Revised Budget Result 2 05/05/12	Beginning Balance	Current Invoice	Expenditure Total (to-date)	Ending Balance	BUDGET (Original)	Revised Budget 03/28/112	Revised Budget 05/05/12	BEGINNING BALANCE	CURRENT INVOICE	TOTAL EXPENDED (to-date)	ENDING BALANCE
				40,877.00	41,129.00		41,129.00				40,877.00	41,129.00		41,129.00				40,877.00	41,129.00		40,877.00
BUDGET ITEM																					
PERSONNEL: wages and benefits	**77,764.54**	**77,764.54**	**77,813.09**	**26,271.87**	**26,271.87**	**77,813.09**	**-**	**26,369.20**	**26,369.20**	**27,593.50**	**24,808.88**	**18,406.31**	**21,190.93**	**6,402.57**	~~104,133.74~~	~~104,133.74~~	**105,406.59**	**51,080.75**	**44,678.18**	**99,004.02**	**6,402.57**
Kimberly Musser -50% FTE	~~24,474.93~~	~~25,395.54~~	26,420.84	3,199.61	3,199.61	26,420.84	-	~~5,594.27~~	~~6,587.17~~	6,971.82	4,187.20	2,334.26	5,118.88	1,852.94	~~30,069.20~~	~~31,982.71~~	33,392.66	7,386.81	5,533.87	31,539.72	1,852.94
Scott Kudelka - 33.25% FTE	~~22,859.66~~	~~29,939.69~~	29,939.69	8,722.01	8,124.29	29,341.97	597.72	~~14,918.93~~	~~19,782.03~~	13,704.34	13,704.34	13,553.78	13,553.78	150.56	~~37,778.59~~	~~49,721.72~~	43,644.03	22,426.35	21,678.07	42,895.75	748.28
Richard Moore - 13.85% FTE	~~14,640.00~~	~~6,639.36~~	8,932.59	3,187.66	3,187.66	8,932.59	-	~~5,856.00~~	~~-~~	6,917.34	6,917.34	2,518.27	2,518.27	4,399.07	~~20,496.00~~	~~6,639.36~~	15,849.93	10,105.00	5,705.93	11,450.86	4,399.07
STUDENT 100% summer employment(8hrs/day, 40 day/wk) 45% academic year (20 hrs/wk max allowed)	11,696.26	~~11,696.26~~	8,426.28	7,068.90	7,068.90	8,426.28	-	-	-	-	-	-	-	-	~~11,696.26~~	~~11,696.26~~	8,426.28	7,068.90	7,068.90	8,426.28	-
STUDENT 100% summer employment(8hrs/day, 40 day/wk)	4,093.69	4,093.69	4,093.69	4,093.69	4,691.41	4,691.41	(597.72)	-	-	-	-	-	-	-	4,093.69	4,093.69	4,093.69	4,093.69	4,691.41	4,691.41	(597.72)
				-	-	-	-										-	-	-	-	-
Contracts	**4,000.00**	**4,000.00**	**4,000.00**	**-**	**-**	**4,000.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**4,000.00**	**4,000.00**	**4,000.00**	**-**	**-**	**4,000.00**	**-**
Professional/technical: Friends of the MN Valley *videography and video editing*	4,000.00	4,000.00	4,000.00	-	-		-	-	-	-	-	-	-	-				-	-	4,000.00	-
Supplies	**1,198.00**	**1,198.00**	**1,198.00**	**41.87**	**-**	**1,156.13**	**41.87**	**12,393.96**	**12,393.96**	**12,393.96**	**12,393.96**	**7,838.00**	**7,838.00**	**4,555.96**	**13,591.96**	**13,591.96**	**13,591.96**	**12,435.83**	**7,838.00**	**8,994.13**	**4,597.83**
Graphics Panel (4)	-		-	-	-		-	2,733.96	2,733.96	2,733.96	2,733.96	1,436.00	1,436.00	1,297.96	2,733.96	2,733.96	2,733.96	2,733.96	1,436.00	1,436.00	1,297.96
Touch Screen Monitor (4)	-		-	-	-		-	3,760.00	3,760.00	3,760.00	3,760.00	1,112.00	1,112.00	2,648.00	3,760.00	3,760.00	3,760.00	3,760.00	1,112.00	1,112.00	2,648.00
Computer (4)	-		-	-	-		-	3,000.00	3,000.00	3,000.00	3,000.00	2,880.00	2,880.00	120.00	3,000.00	3,000.00	3,000.00	3,000.00	2,880.00	2,880.00	120.00
Kiosk (4)	-		-	-	-		-	2,900.00	2,900.00	2,900.00	2,900.00	2,410.00	2,410.00	490.00	2,900.00	2,900.00	2,900.00	2,900.00	2,410.00	2,410.00	490.00
Camcorder with hard disk/wireless microphone/external hard drive	1,198.00	1,198.00	1,198.00	41.87	-	1,156.13	41.87	-	-	-	-	-	-	-	1,198.00	1,198.00	1,198.00	41.87	-	1,156.13	41.87
Travel expenses in Minnesota	**1,050.00**	~~1,050.00~~	**1,001.45**	145.65	152.00	1,007.80	**(6.35)**	**1,224.30**	~~1,224.30~~	**-**	**-**	**-**	**-**	**-**	~~2,274.30~~	~~2,274.30~~	**1,001.45**	**145.65**	**152.00**	**1,007.80**	**(6.35)**
COLUMN TOTAL	**84,012.54**	**84,012.54**	**84,012.54**	**26,459.39**	**26,423.87**	**83,977.02**	**35.52**	**39,987.46**	**39,987.46**	**39,987.46**	**37,202.84**	**26,244.31**	**29,028.93**	**10,958.53**	**124,000.00**	**124,000.00**	**124,000.00**	**63,662.23**	**52,668.18**	**113,005.95**	**10,994.05**


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