



Minnesota Department of Natural Resources Minnesota Board of Water and Soil Resources

Program Process and Project Evaluations

Appendix A: 2020 Legacy Fund Restoration Evaluation Report

April 2020

Minnesota Department of Natural Resources Minnesota Board of Soil and Water Resources Restoration Evaluations 500 Lafayette Rd, St. Paul, MN 55155-4040 888-646-6367 or 651-296-6157 email@state.mn.us mn.gov

Legislative Charge Parks and Trails Fund: M.S. 85.53, Subd. 5. Outdoor Heritage Fund: M.S. 97A.056, Subd. 10. Clean Water Fund: M.S. 114D.50, Subd. 6.

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Legislative Charge and Statutory Requirements

Parks and Trails Fund: M.S. 85.53, Subd. 5.

The commissioner of natural resources may convene a technical evaluation panel comprised of five members, including one technical representative from the Board of Water and Soil Resources, one technical representative from the Department of Natural Resources, one technical expert from the University of Minnesota or the Minnesota State Colleges and Universities, and two other representatives with expertise related to the project being evaluated. The commissioner may add a technical representative from a unit of federal or local government. The members of the technical evaluation panel may not be associated with the restoration, may vary depending upon the projects being reviewed, and shall avoid any potential conflicts of interest. Each year, the commissioner may assign a coordinator to identify a sample of up to ten habitat restoration projects completed with parks and trails funding. The coordinator shall secure the restoration plans for the projects specified and direct the technical evaluation panel to evaluate the restorations relative to the law, current science, and the stated goals and standards in the restoration plan and, when applicable, to the Board of Water and Soil Resources' native vegetation establishment and enhancement guidelines. The coordinator shall summarize the findings of the panel and provide a report to the chairs of the respective house of representatives and senate policy and finance committees with jurisdiction over natural resources and spending from the parks and trails fund. The report shall determine if the restorations are meeting planned goals, any problems with the implementation of restorations, and, if necessary, recommendations on improving restorations. The report shall be focused on improving future restorations. Up to one-tenth of one percent of forecasted receipts from the parks and trails fund may be used for restoration evaluations under this section.

Outdoor Heritage Fund: M.S. 97A.056, Subd. 10.

The commissioner of natural resources and the Board of Water and Soil Resources must convene a technical evaluation panel comprised of five members, including one technical representative from the Board of Water and Soil Resources, one technical representative from the Department of Natural Resources, one technical expert from the University of Minnesota or the Minnesota State Colleges and Universities, and two representatives with expertise in the project being evaluated. The board and the commissioner may add a technical representative from a unit of federal or local government. The members of the technical evaluation panel may not be associated with the restoration or enhancement, may vary depending upon the projects being reviewed, and shall avoid any potential conflicts of interest. Each year, the board and the commissioner may assign a coordinator to identify habitat restoration or enhancement projects completed with outdoor heritage funding. The coordinator shall secure the plans for the projects specified and direct the technical evaluation panel to evaluate the restorations and enhancements relative to the law, current science, and the stated goals and standards in the project plan and, when applicable, to the Board of Water and Soil Resources' native vegetation establishment and enhancement guidelines. The coordinator shall summarize the findings of the panel and provide a report to the chair of the Lessard-Sams Outdoor Heritage Council and the chairs of the respective house of representatives and senate policy and finance committees with jurisdiction over natural resources and spending from the outdoor heritage fund. The report shall determine if the restorations and enhancements are meeting planned goals, any problems with the implementation of restorations and

enhancements, and, if necessary, recommendations on improving restorations and enhancements. The report shall be focused on improving future restorations and enhancements. At least one-tenth of one percent of forecasted receipts from the outdoor heritage fund must be used for restoration and enhancements evaluations under this section.

Clean Water Fund: M.S. 114D.50, Subd. 6.

The Board of Water and Soil Resources may convene a technical evaluation panel comprised of five members, including one technical representative from the Board of Water and Soil Resources, one technical representative from the Department of Natural Resources, one technical expert from the University of Minnesota or the Minnesota State Colleges and Universities, and two representatives with expertise related to the project being evaluated. The board may add a technical representative from a unit of federal or local government. The members of the technical evaluation panel may not be associated with the restoration, may vary depending upon the projects being reviewed, and shall avoid any potential conflicts of interest. Each year, the board may assign a coordinator to identify a sample of habitat restoration projects completed with clean water funding. The coordinator shall secure the restoration plans for the projects specified and direct the technical evaluation panel to evaluate the restorations relative to the law, current science, and the stated goals and standards in the restoration plan and, when applicable, to the Board of Water and Soil Resources' native vegetation establishment and enhancement guidelines. The coordinator shall summarize the findings of the panel and provide a report to the chairs of the respective house of representatives and senate policy and finance committees with jurisdiction over natural resources and spending from the clean water fund. The report shall determine if the restorations are meeting planned goals, any problems with the implementation of restorations, and, if necessary, recommendations on improving restorations. The report shall be focused on improving future restorations. Up to one-tenth of one percent of forecasted receipts from the clean water fund may be used for restoration evaluations under this section.

Evaluation Process

State law directs the DNR and BWSR to convene an expert panel to evaluate restorations completed with Clean Water Land and Legacy Funds. The evaluations include directly engaging project managers and are completed by third party experts to identify gaps and capture lessons learned from restorations. The agencies use this information to improve restorations throughout the state.

Program Model

The Restoration Evaluation Program was developed with the ultimate goal of improving restorations throughout the state. The diagram below outlines the inputs, activities, and outcomes of the program and our continued investment in improving restorations.



Roles and Responsibilities

Evaluation Panel

Statute directs the evaluation panel to:

- Evaluate restorations relative to the law, current science, and the stated goals and standards in the restoration plan
- Provide findings on the evaluations, determining whether restorations are meeting planned goals, identify problems with implementation of restorations and, provide recommendations on improving restorations

Members of the panel are unpaid experts chosen to fulfill statutory requirements and provide needed expertise in a variety of ecosystems and restoration techniques.

Program Staff

The program staff are responsible for coordinating site assessments, program administration and managing the work of the panel. They are directed in statute to:

- Identify restoration projects completed with Parks and Trails, Outdoor Heritage, and Clean Water Funds
- Secure restoration plans for selected projects
- Summarize the findings of the panel
- Provide reports to the legislature

The staff also promote and document continuous improvement in restorations. Staff work with the panel and agencies to identify and promote actions and provide guidance for implementing improved restorations. DNR and BWSR have assigned staff to ensure consistency in program implementation. The staff are currently housed in DNR's Ecological and Water Resources Division.

Site Assessors

The site assessors are responsible for conducting site assessments. Site assessors are selected based on knowledge of restoration practices and work closely with program staff in assessing project plans, conducting field evaluations, and participating in panel reviews. Site assessors include:

- State agency staff
- Local government staff
- Federal agency staff
- Private contractors

Services provided by assessors are negotiated through the use of contracts, State Interagency Agreements, or work assignments.

Project Managers

Project managers are expected to actively participate in the evaluation process. Project managers provide the necessary project background and attend field evaluations when possible to:

- Identify project work sites
- Provide project context
- Answer assessor questions

It is necessary to acknowledge the diversity of managing organizations and their scope and focus when evaluating projects.

Example project managers for the three Legacy Funds.

Clean Water Fund

- Soil and Water Conservation District manager or technician
- Watershed District staff
- Watershed Management Organization staff
- County Water Resources of Environmental Services staff
- City Water Resource staff

Outdoor Heritage Fund

- State agency staff (DNR, BWSR)
- Federal agency staff (USFWS)
- County conservation and land management staff
- Watershed District staff
- Nongovernmental wildlife organizations

Parks and Trails Fund

- MN DNR Parks and Trails Division, resource management staff
- Metro Regional Parks managers, including county park systems and Three Rivers Park District
- Greater Minnesota park managers

Evaluation Methods

Project Selection

Program staff update the pool of eligible restoration projects on an annual basis. For each fund projects are considered to be eligible if they are complete and contain restoration or enhancement work. Projects evaluated represent a variety of habitat types and geographic distributions of restorations in the state.

Projects are selected in relative proportion to each Fund's appropriation to restoration evaluations. Many grants and appropriations fund restoration activities at multiple project sites. A smaller subsample of project sites is typically evaluated.

Site Assessments

DNR, BWSR and the panel developed a simple and consistent process to facilitate evaluations. To the extent possible the evaluation process engages project managers in conducting site visits and communicating lessons learned. Facilitating an inclusive evaluation process with project managers increases the transfer of knowledge between field practitioners and agencies, ultimately improving restorations.

A site evaluation form was developed to provide project information and address evaluation requirements directed by law. This form describes site assessors' observations of project effectiveness, estimated outcomes based on current conditions and application of current science.

Field visits include inspecting the project's structural components and plant communities. Restored plant communities may take several years or even decades to mature. Evaluations are based on observations of the present and projected conditions relative to the project goals. Assessments of project sites do not represent an overall evaluation of the larger program or Fund.

Restoration science is continually evolving. Best practices are an area of ongoing discussion between practitioners, researchers, agencies and stakeholders. Site assessors and the panel evaluate projects based on methods commonly considered to be within the range of current science.

Legacy Fund Attributes and Requirements

Each of the Legacy Funds has a distinct focus on restoration and specific requirements for projects.

	Clean Water Fund	Outdoor Heritage Fund	Parks and Trails Fund
Fund Purpose	protect, enhance, and restore water quality in lakes, rivers, and streams and protect groundwater from degradation	restore, protect, and enhance wetlands, prairies, forests, and habitat for fish, game, and wildlife	support parks and trails of regional or statewide significance
Primary Restoration Goal	Restore water quality	Restore specific wildlife habitat types	Ecological restoration of specific habitat types
Guidance for project types and locations	Local water management plan, TMDL Implementation plans, or Watershed Restoration and Protection Strategies	Statewide or national wildlife habitat plans	State or Regional Park natural area management plans
Funding source for restoration projects	Competitive grants administered by BWSR	Appropriation to project manager; recommended by Outdoor Heritage Council, or Conservation Partners grants administered by MN DNR	MN DNR appropriation: resource management, or Met Council appropriation: County Regional Park System, Three Rivers Park District
Statutory Requirements	MS 114D.50 Subd. 4. (a) include measurable outcomes, as defined in section 3.303, subdivision 10, and a plan for measuring and evaluating the results. A project must be consistent with current science and incorporate state-of-the-art technology.	 Different appropriation years are subject to different requirements but all include: Prepare and retain an ecological restoration and management plan Use current conservation science to achieve the best restoration Establishment of diverse plant species Appropriations in 2009 and 2010 also included. Plant vegetation or sow seed only of ecotypes native to Minnesota. 	MS 85.53 Subd. 2 (a) include measurable outcomes, as defined in section 3.303, subdivision 10, and a plan for measuring and evaluating the results. A project or program must be consistent with current science and incorporate state-of-the-art technology

1) Ann Lake Shoreline Restoration

Project Background

Project Name: Snake River Shoreline Restoration
Project Site: Ann Lake Shoreline Restoration
Township/Range Section: Township 40N Range
25W Section 35
Project Manager / Affiliated Organization:
Kanabec SWCD
Fund: CWF Fiscal Year Funds: 2010
Project Start Date: 2010
Predominant Habitat type: Aquatic Habitat
Additional Habitat types: Forest

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

Stabilize an eroding lakeshore using field stone boulders. Install native seed, plant plugs (1,640), and shrubs (10) along the upper banks of the lakeshore.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

NRCS TSA-3 document & construction plan set (3 sheets)

3. What are the stated goals of the project? Per personal communication with current project manager, this project's goals are to prevent further shoreline erosion of the steep bank and establish diverse, native vegetation along the lakeshore.

4. What are the desired outcomes of achieving the stated goals of the project? Prevent toe erosion along the lakeshore and establish perennial, native vegetation that slows and filters overland runoff from the property.



- Were measures of restoration success identified in plans? No If yes, list specific measurements. Click here to enter text.
- Are plan Sets available? Yes Have project maps been created? Yes
 If yes, provide in "site maps" and list maps provided:
 Construction plan sheets & associated detail drawings. Installed planting list was not available.
- 7. Provide list of best management practices, standards, guidelines identified in plan set? See "Construction Notes" located on sheet 3 of construction plan set.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

- 8. Were alterations made to the plan during project implementation?
 - Yes,

According to the provided construction plan, installed rock extends 16 linear feet past the original extents of project.

9. In what ways did alterations change the proposed project outcome? The alterations listed above did not negatively impact the project outcome. The shoreline as it was constructed is stable with little erosion observed.

Site Assessment

Field Review Date: 9/16/2020

Field Visit Attendees: Mike Majeski (EOR), Wade Johnson (DNR), Josh Votruba (Kanabec SWCD), Mary Krueger (NRCS) Deanna Pomije (Kanabec SWCD)

10. Surrounding Landscape Characteristics:

Residential lots along a lakeshore, mixed pine/oak woodland

11. Site Characteristics:

a. Soil Series:

Rosholt-Chetek complex fine sandy loam (Source: Websoil Survey)

b. Topography:

Outwash plains

c. Hydrology:

Surface water

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Mixed pine/oak woodland along an elevated lakeshore. Dominant species include bush honeysuckle, Pennsylvania sedge, horsetail, and large-leaved aster. Invasive species cover: alsike clover (5%).

12. Is the plan based on current science? Yes

At the time (2010), rock toe of this design was a common practice for bank stabilization. The lower third of the bank was lined with field stone boulders with geotextile installed under the rock.

13. List indicators of project goals at this stage of project:

The lakeshore has been stabilized and native shoreline/woodland vegetation has become established.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, the installed rock achieved the goal to stabilize the eroding lakeshore and installed native vegetation was observed along the upper banks of the project. Very few invasive species were observed along the shoreline.

- **15.** Are corrections or modifications needed to achieving proposed goals? No issues observed.
- 16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Future management of the site would include occasional repositioning of field stone boulders and vegetation management through hand pulling of invasives. The steep slope along the shoreline makes site access a challenge if maintenance is ever needed. The rock used in the project was installed during the winter (over ice).

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Overhanging shoreline vegetation would improve aquatic habitat (including cover for fish) and is limited along the shoreline due to the extent of rock used during the project.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain. No

19. Additional comments on the restoration project.

According to the SWCD, the rock had to be imported when the lake was frozen. A dozer was used to push the rock under the eroded shoreline toe to complete the project.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

- **22.** *Provide explanation of reason(s) for determination.* The lakeshore is stable and no erosion was observed during the site visit. The upper banks were well vegetated and contained a diversity of native species.
- 23. Site Assessor(s) Conducting Review: Mike Majeski



Site Maps, Project Plans or Vegetation Tables

Figure 1-1 Construction plan set. Sheet 1 Proposed Layout.



Figure 1-2 Construction plan set. Sheet 2 Plan and Location Map.



Figure 1-3 Construction plan set. Sheet 3 Typical Sections and Details.

Table 1-1 Vegetation observed during the project meander survey. *0-1%, 1-5%, 5-25%, 25-50%, 50-75%, 75-100%**N=native, I=introduced/nonnative.

Scientific Name	Common Name	Cover Range*	Species Planted/Seeded	Species Status**
Carex pensylvanica	Pennsylvania sedge	5-25%	Unknown	N
Diervilla lonicera	Bush honeysuckle	5-25%	Unknown	N
Geranium maculatum	Wild geranium	1-5%	Unknown	N
Parthenocissus quinquefolia	Virginia creeper	1-5%	No	Ν
Trifolium hybridum	Alsike clover	1-5%	No	1
Agastache foeniculum	Glue giant hyssop	1-5%	Unknown	N
Aquilegia canadensis	Columbine	1-5%	Yes	N
Solidago flexicaulis	Zigzag goldenrod	1-5%	Unknown	N
Matteuccia struthiopteris	Ostrich fern	1-5%	Unknown	Ν
Euthamia graminifolia	Grass-leaved goldenrod	1-5%	Unknown	N
Carex lacustris	Lake sedge	1-5%	Unknown	N
Cornus sericea	Red-osier dogwood	1-5%	Unknown	Ν
Maianthemum canadense	Canada mayflower	1-5%	Unknown	Ν
Thalictrum spp.	Meadow rue spp.	1-5%	Unknown	N
Impatiens capensis	Spotted touch-me- not	1-5%	Unknown	Ν
Vitis riparia	Wild grape	1-5%	No	Ν
Amphicarpaea bracteata	Hog peanut	1-5%	Unknown	N
Equisetum spp.	Horsetail spp.	5-25%	No	N
Acer rubrum	Red maple	1-5%	No	N
Apocynum androsaemifolium	Spreading dogbane	1-5%	Unknown	N
Elymus hystrix	Bottlebrush grass	1-5%	Yes	N
Amelanchier spp.	Serviceberry spp.	1-5%	Unknown	N
Acer saccharinum	Silver maple	1-5%	No	N
Tilia americana	American basswood	1-5%	No	N
Pinus strobus	White pine	1-5%	No	N
Symphyotrichum laeve	Smooth blue aster	1-5%	Unknown	Ν
Ulmus americana	American elm	1-5%	No	N
Veronicastrum virginicum	Culver's root	1-5%	Unknown	N
Eurybia macrophylla	Large-leaved aster	5-25%	Yes	N
Quercus rubra	Red oak	1-5%	No	N
Antennaria spp.	Pussytoes	1-5%	Unknown	N
Rudbeckia hirta	Black-eyed Susan	1-5%	Unknown	N
Betula papyrifera	Paper birch	1-5%	No	N

Site Photographs



Photo 1-1 Schroeder shoreline stabilization, photo taken during site visit 09/16/2020.



Photo 1-2 Schroeder shoreline stabilization, photo taken during site visit 09/16/2020.



Photo 1-3 Close-up image of the Schroeder shoreline upper bank vegetation. Photo taken during site visit 09/16/2020.



Photo 1-4 Rock to vegetation transition zone, Schroeder shoreline. Photo taken during site visit 09/16/2020.

2) Green Lake Shoreline Restoration 1

Project Background Project Name: Green Lake Shoreline Restoration 1 Project Site: Green Lake, Isanti County Township/Range Section: Township 36 Range 25 Section 287 Project Manager / Affiliated Organization: Tiffany Determan – Isanti Co SWCD Fund: CWF Fiscal Year Funds: 2015

Project Start Date: 2016

Predominant Habitat type: Aquatic Habitat

Additional Habitat types: Wetland

Project Status: Post Establishment Phase



Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

Treatment of invasive species. Increase in size of existing lake buffer. Creating of tiered rain garden and rerouting of runoff from driveway for treatment (not evaluated here). Stabilization of shores with water-tolerant shrubs and sedges. Treatment of aquatic area with aquatic-safe glyphosate herbicide.

- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?
 - Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features, Isanti SWCD.
- 3. What are the stated goals of the project? Restoration and stabilization of 0.08 acres of lakeshore on Green Lake using revegetation of native wetland shrubs.
- 4. What are the desired outcomes of achieving the stated goals of the project? Stabilize erosion of lake shore in proximity of existing home, and provide water quality benefit to Green Lake.

5. Were measures of restoration success identified in plans? No If yes, list specific measurements.

No quantifiable restoration measures were described in the plans. Observation of the protected shore for continued or new erosion could be used as a measure of success.

- 6. Are plan Sets available? Yes Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:
 - Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features, Isanti SWCD.
- 7. Provide list of best management practices, standards, guidelines identified in plan set?
 - Existing Class I riprap for stabilization of shoreline.
 - Vegetation of beach area with water-tolerant perennials.
 - Treatment of driveway runoff with multi-tiered rain garden.
 - Treatment of aquatic area with glyphosate herbicide.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation? No

Click here to enter text.

 In what ways did alterations change the proposed project outcome? Click here to enter text.

Site Assessment

Field Review Date: 9/17/2020

Field Visit Attendees: Seth Bossert - Wenck, Wade Johnson - MN DNR, Tiffany Determan - Isanti SWCD

10. Surrounding Landscape Characteristics:

The site is surrounded by cultivated land to the North and to the West. Green Lake at the project location is surrounded by vegetated slopes and forested areas. Average buffer width is roughly 250 ft.

- 11. Site Characteristics:
 - a. Soil Series:

Rough broken land, Zimmerman material (ZL).

b. Topography:

Average lakeshore slope of 12% grade.

c. Hydrology:

Poorly drained.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

See Table 2-1.

12. Is the plan based on current science? Yes

The project utilized accepted practices to address a long-term erosion and nutrient issues along a developed shoreline. Provision of a vegetated buffer and pretreatment in the form of a rain garden is industry standard to adequately address this issue.

13. List indicators of project goals at this stage of project:

Banks within project area are well-vegetated and show minimal signs of erosion. Drainage from house and driveway appears to be correctly routed through the rain garden.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, with maintenance as listed in Table 2-1 below.

- **15.** Are corrections or modifications needed to achieving proposed goals? Project goals are met.
- 16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

The long-term maintenance for this project will be provided by the landowners as agreed upon in the operation and maintenance plan for the Dancik Green Lakeshore Restoration—developed with the Isanti SWCD. Aquatic vegetation was proposed, but was, however, not observed onsite. This is not currently causing outstanding issues. There are no future steps planned or proposed by the project managers.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No, but the project does not provide much additional habitat.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. Project has been observed to meet its proposed outcomes since completion and is anticipated to continue to do so.

19. Additional comments on the restoration project.

This project was a partnership between the Isanti County Soil and Water Conservation District, and the landowners. The project was constructed using the funds awarded in the grant, supplemented with funding, materials, and in-kind work from the landowners.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

The outcome of a stabilized shoreline to reduce direct sediment erosion input has been achieved. Additionally, this project provides some support to the larger outcome of providing water quality benefit to Green Lake through filtration of upland runoff, though on a limited scale.

23. Site Assessor(s) Conducting Review:

Seth Bossert, Wenck

Site Maps, Project Plans or Vegetation Tables



Figure 2-1 A map of the lakeshore restoration project sites around Green Lake. This site is number 4 on the north side of the lake.



Figure 2-2 Isanti SWCD Partnership design for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features sheet 6 of 13, general plans, planting instructions, and quantities.

Table 2-1 Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features sheet 10 of 13, operations and maintenance guidelines, including maintenance procedures and schedules.

Task	Frequency Year 1	Frequency Year 2	Frequency Year 3	Equiptment Needed
Watering Ensure 1" of water per week, either through rainfall, irrigation, or soil moisture In low lying areas.	Weekly	During drought stress	During drought stress	Water supply; hose and sprinkler, or soaker hose
Weeding All vegetation that was not planted as part of the project should be removed.	Every 2-3 weeks	Monthly	2-4 times peryear as needed.	
Replace Vegetation Replant similar species, preferably native species of localecotype, in the event that originalvegetation expires.	If needed	If needed	If needed	Trowel,plants
Refresh Mulch Maintain 2-3" of mulch coveringover planted areas, with priority on areas without dense plantcover.	If needed	If needed	Approxima tely every 3 rd year.	Rake, mulch
Re-secure erosion controlmaterials In the event that erosion controlblankets, biologs or other materials become unsecured, they should be re-secured with staking or burying similar to the original installation.	If needed	If needed	If needed	Variable
Erosion In the event that the lakeshore ofother areas experience erosion, Contact the Isanti SWCD for guidance.	If needed	If needed	If needed	Variable

 Table 2-2 Vegetation observed during the project meander survey September 17, 2020.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Bidens vulgata	common beggarticks	5-10%	Not Planted	Native
Carex pensylvanica	Pennsylvania sedge	5-10%	Planted	Native
Coronilla varia	crownvetch	5-10%	Not Planted	Invasive
Echinacea purpurea	purple coneflower	5-10%	Planted	Native
Echinochloa crus-galli	barnyard grass	5-10%	Not Planted	nonnative
Equisetum arvense	field horsetail	1-5%	Not Planted	Native
Eutrochium maculatum	Spotted Joe pye weed	10-25%	Planted	Native
Heuchera richardsonii	alumroot	5-10%	Planted	Native
Impatiens capensis	Spotted touch-me-not (Jewelweed)	1-5%	Not Planted	Native
Iris versicolor	Blue Flag Iris	10-25%	Planted	Native
Liatris pychnostachya	Praire Blazing Star	5-10%	Planted	Native
Lupinus perennis	wild blue lupine	1-5%	Planted	Native
Matteuccia struthiopteris var. pensylvanica	ostrich fern	1-5%	Planted	Native
Polygonum spp.	smartweed	1-5%	Not Planted	Native
Pycnanthemum virginianum	Virginia mountain mint	1-5%	Not Planted	Native
Schizachyrium scoparium	little bluestem	5-10%	Planted	Native
Setaria pumila subsp. pumila	yellow foxtail	5-10%	Not Planted	Invasive
Solidago rigida	stiff goldenrod	1-5%	Planted	Native
Spartina pectinata	prairie cordgrass	5-10%	Planted	Native
Symphyotrichum ericoides	Heath aster	1-5%	Not Planted	Native
Ulmus pumila	Siberian elm	1-5%	Not Planted	Invasive
Vitis riparia	wild grape	1-5%	Not Planted	Native
Aronia melanocarpa	black chokeberry	1-5%	Planted	Native
Cornus sericea (stolonifera)	Red-osier Dogwood	1-5%	Planted	Native
Quercus ellipsoidalis	northern pin oak	1-5%	Planted	Native

Site Photographs



Photo 2-1 East facing view of the vegetated bank and riprap with accumulations of dried algae. Photo taken by Seth Bossert during site visit September 17, 2020.



Photo 2-2 Northwest facing view of the vegetated bank and riprap with accumulations of dried algae. Photo taken during site visit September 17, 2020.

3) Green Lake Shoreline Restoration 2

Project Background

Project Name: Green Lake Shoreline Restoration 2

Project Site: Green Lake, Isanti County

Township/Range Section: Township 36 Range 25 Section 27

Project Manager / Affiliated Organization: Tiffany Determan – Isanti SWCD

Fund: CWF Fiscal Year Funds: 2015

Project Start Date: 2016

Predominant Habitat type: Aquatic Habitat

Additional Habitat types: Wetland , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

- What are the specific project components and treatments?
 Installation of class I riprap and geotextile along shoreline to stabilize repaired washout. Extension of
- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

drain tile into stabilized washout area. Revegetation of shore with water-tolerant shrubs and sedges.

- Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features, Isanti SWCD.
- 3. What are the stated goals of the project? Restoration and stabilization of 0.03 acres of lakeshore on Green Lake using revegetation of native wetland shrubs and installation of riprap.
- 4. What are the desired outcomes of achieving the stated goals of the project? Stabilize erosion of lake shore in proximity of existing home, and provide water quality benefit to Green Lake.
- 5. Were measures of restoration success identified in plans? No If yes, list specific measurements.

No quantifiable restoration measures were described in the plans. Observation of the protected shore for continued or new erosion could be used as a measure of success.



6. Are plan Sets available? Yes Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:

- Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features, Isanti SWCD.
- 7. Provide list of best management practices, standards, guidelines identified in plan set?
 - Installation of Class I riprap and geotextile fabric for stabilization of shoreline.
 - Vegetation of beach area with water-tolerant perennials.
 - Treatment of aquatic area with glyphosate herbicide.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation?

Yes

Placement of aquatic vegetation was included in the approved plans, but was not observed on site. Additionally, not all species included in the planting plan for the bank were present.

9. In what ways did alterations change the proposed project outcome?

This was not observed to be currently affecting the function of the lakeshore restoration, but should be monitored.

Site Assessment

Field Review Date: 9/17/2020

Field Visit Attendees: Seth Bossert - Wenck, Wade Johnson - MN DNR, Tiffany Determan - Isanti SWCD

10. Surrounding Landscape Characteristics:

The site is surrounded by cultivated land to the North and to the West. Green Lake at the project location is surrounded by vegetated slopes and forested areas. Average buffer width is roughly 250 ft.

11. Site Characteristics:

a. Soil Series:

Rough broken land, Zimmerman material (ZL).

b. Topography:

Average lakeshore slope of 7% grade.

c. Hydrology:

Poorly drained.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

See Table 3-1.

12. Is the plan based on current science? Yes

The project utilized accepted practices to address a long-term erosion and nutrient issue. Provision of a vegetated buffer is industry standard to adequately address this issue.

13. List indicators of project goals at this stage of project:

Banks within project area are well-vegetated and show minimal signs of erosion.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, with maintenance as listed in Table 3-1 below.

- **15.** Are corrections or modifications needed to achieving proposed goals? Project goals are met.
- 16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

The long-term maintenance for this project will be provided by the landowners as agreed upon in the operation and maintenance plan for the Chilson Green Lakeshore Restoration—developed with the Isanti SWCD. Aquatic vegetation was proposed, but was, however, not observed onsite. This is not currently causing outstanding issues, but should be monitored.

There are no future steps planned or proposed by the project managers.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No, but the project does not provide much additional habitat.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. Project has been observed to meet its proposed outcomes since completion and is anticipated to continue to do so.

19. Additional comments on the restoration project.

This project was a partnership between the Isanti County Soil and Water Conservation District, and the landowners. The project was constructed using the funds awarded in the grant, supplemented with funding, materials, and in-kind work from the landowners.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

The outcome of a stabilized shoreline to reduce direct sediment erosion input has been achieved. Additionally, this project provides some support to the larger outcome of providing water quality benefit to Green Lake through filtration of upland runoff, though on a limited scale.

23. Site Assessor(s) Conducting Review:

Seth Bossert (Wenck)

Site Maps, Project Plans or Vegetation Tables



Figure 3-1 A map of the lakeshore restoration project sites around Green Lake. This project site is shown as number 6.



Figure 3-2 Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features sheet 6 of 9, general plans, planting instructions, and quantities.

Table 3-1 Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features sheet 10 of 13, operations and maintenance guidelines, including maintenance procedures and schedules.

Task	Frequency Year 1	Frequency Year 2	Frequency Year 3	Equiptment Needed
Watering Ensure 1" of water per week, either through rainfall, irrigation, or soil moisture In low lying areas.	Weekly	During drought stress	During drought stress	Water supply; hose and sprinkler, or soaker hose
Weeding All vegetation that was not planted as part of the project should be removed.	Every 2-3 weeks	Monthly	2-4 times peryear as needed.	
Replace Vegetation Replant similar species, preferably native species of localecotype, in the event that originalvegetation expires.	If needed	If needed	lf needed	Trowel,plants
Refresh Mulch Maintain 2-3" of mulch coveringover planted areas, with priority on areas without dense plantcover.	If needed	If needed	Approxima tely every 3 rd year.	Rake, mulch
Re-secure erosion controlmaterials In the event that erosion controlblankets, biologs or other materials become unsecured, they should be re-secured with staking or burying similar to the original installation.	If needed	If needed	lf needed	Variable
Erosion In the event that the lakeshore ofother areas experience erosion, Contact the Isanti SWCD for guidance.	If needed	If needed	lf needed	Variable
Table 3-2 Vegetation observed during the project meander survey September 17, 2020.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Bidens sp.	Beggarticks	1-5%	Not Planted	
Carex pensylvanica	Pennsylvania Sedge	1-5%	Planted	Native
Carex vulpinoidea	Fox Sedge	1-5%	Planted	Native
Echinacea purpurea	Purple Coneflower	10-25%	Planted	Non-native
Echinochloa spp.	Barnyard Grass	5-10%	Not Planted	Non-native
Eupatorium perfoliatum	Common Boneset	5-10%	Planted	Native
Glechoma hederacea	Creeping Charlie	5-10%	Not Planted	Non-native
Heuchera richardsonii	Alumroot	1-5%	Planted	Native
Impatiens capensis	Spotted touch-me- not (Jewelweed)	1-5%	Not Planted	Native
Iris versicolor	Blue Flag Iris	5-10%	Planted	Native
Liatris pychnostachya	Prairie Blazing Star	5-10%	Planted	Native
Matteuccia struthiopteris	Ostrich Fern	1-5%		Nativo
var. pensylvanica			Planted	INALIVE
Monarda fistulosa	Wild Bergamot		Planted	Native
Oenothera biennis	Common Evening Primrose	1-5%	Not Planted	Native
Polygonum amphibium	Swamp Smartweed	5-10%	Planted	Native
Rudbeckia hirta	Black Eyed Susan	10-25%	Planted	Native
Solidago rigida	Stiff Goldenrod	10-25%	Planted	Native
Sorghastrum nutans	Indian Grass	10-25%	Planted	Native
Spartina pectinata	Prairie Cordgrass	5-10%	Planted	Native
Urtica dioica subsp. Gracilis	Stinging Nettle	5-10%	Not Planted	Native
Cornus sericea (stolonifera)	Red-osier Dogwood	1-5%	Planted	Native
Viburnum trilobum var.	Dwarf Cranberry bush Viburnum	1-5%	Planted	Native var.

Site Photographs



Photo 3-1 View of eastern shoreline, with vegetated bank and accumulations of dried algae on riprap present. Photo taken by Seth Bossert during site visit September 17, 2020.



Photo 3-2 View of bank above shoreline, vegetated with grass. Photo taken by Seth Bossert during site visit September 17, 2020.

4) Green Lake Shoreline Restoration 3

Project Background

Project Name: Green Lake Shoreline Restoration 3
Project Site: Green Lake, Isanti County
Township/Range Section: Township 36 Range 25
Section 28
Project Manager / Affiliated Organization: Tiffany
Determan – Isanti SWCD
Fund: CWF Fiscal Year Funds: 2015
Project Start Date: 2016
Predominant Habitat type: Aquatic Habitat
Additional Habitat types: Wetland
Project Status: Post Establishment Phase



Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

Revegetation of shore with water-tolerant shrubs and sedges. Treatment of aquatic area with aquaticsafe glyphosate herbicide.

- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?
 - Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features, Isanti SWCD.
- 3. What are the stated goals of the project? Restoration and stabilization of 0.02 acres of lakeshore on Green Lake using revegetation of native wetland shrubs.
- 4. What are the desired outcomes of achieving the stated goals of the project? Stabilize erosion of lake shore in proximity of existing home, and provide water quality benefit to Green Lake.
- 5. Were measures of restoration success identified in plans? No If yes, list specific measurements.

No quantifiable restoration measures were described in the plans. Observation of the protected shore for continued or new erosion could be used as a measure of success.

6. Are plan Sets available? Yes Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:

- Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features, Isanti SWCD.
- 7. Provide list of best management practices, standards, guidelines identified in plan set?
 - Existing Class I riprap for stabilization of shoreline.
 - Vegetation of beach area with water-tolerant perennials.
 - Treatment of aquatic area with glyphosate herbicide.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation?

Yes

Planting of aquatic vegetation was proposed in the approved plans, however, this was not observed on site.

9. In what ways did alterations change the proposed project outcome?

This change was not observed to currently be affecting the function of the bank restoration, however, this should be monitored.

Site Assessment

Field Review Date: 9/17/2020

Field Visit Attendees: Seth Bossert - Wenck, Wade Johnson - MN DNR, Tiffany Determan - Isanti SWCD

10. Surrounding Landscape Characteristics:

The site is surrounded by cultivated land to the North and to the West. Green Lake at the project location is surrounded by vegetated slopes and forested areas. Average buffer width is roughly 250 ft.

11. Site Characteristics:

a. Soil Series:

Rough broken land, Zimmerman material (ZL).

b. Topography:

Average lakeshore slope of 5% grade.

c. Hydrology:

Poorly drained.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

See Table 4-1.

12. Is the plan based on current science? Yes

The project attempts to address a long-term erosion and nutrient issue. Provision of a vegetated buffer is industry standard to adequately address this issue.

13. List indicators of project goals at this stage of project:

Banks within project area are well-vegetated and show minimal signs of erosion. Drainage from and driveway appears to be correctly routed through the vegetated areas.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, with maintenance as listed in Table 4-1 below.

- **15.** Are corrections or modifications needed to achieving proposed goals? Project goals are met.
- 16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

The long-term maintenance for this project will be provided by the landowners as agreed upon in the operation and maintenance plan for the Chilson Green Lakeshore Restoration—developed with the Isanti SWCD. Aquatic vegetation was proposed, but was, however, not observed onsite. This is not currently causing outstanding issues.

There are no future steps planned or proposed by the project managers.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No, but the project does not provide much additional habitat.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. Project has been observed to meet its proposed outcomes since completion and is anticipated to continue to do so.

19. Additional comments on the restoration project.

This project was a partnership between the Isanti County Soil and Water Conservation District, and the landowners. The project was constructed using the funds awarded in the grant, supplemented with funding, materials, and in-kind work from the landowners.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. Confidence of outcome determination: High.

22. Provide explanation of reason(s) for determination.

The outcome of a stabilized shoreline to reduce direct sediment erosion input has been achieved. Additionally, this project provides some support to the larger outcome of providing water quality benefit to Green Lake through filtration of upland runoff, though on a limited scale.

23. Site Assessor(s) Conducting Review:

Seth Bossert, Wenck

Site Maps, Project Plans or Vegetation Tables



Figure 4-1 A map of the lakeshore restoration project sites around Green Lake. The project site is number 6 on the north side of the lake



Figure 4-2 Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features sheet 6 of 9, general plans, planting instructions, and quantities.

Table 4-1 Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, ErosionControl, and Landscaping Features sheet 7 of 9, operations and maintenance guidelines, including maintenanceprocedures and schedules.

Task	Frequency Year 1	Frequency Year 2	Frequency Year 3	Equiptment Needed
Watering Ensure 1" of water per week, either through rainfall, irrigation, or soil moisture In low lying areas.	Weekly	During drought stress	During drought stress	Water supply; hose and sprinkler, or soaker hose
Weeding All vegetation that was not planted as part of the project should be removed.	Every 2-3 weeks	Monthly	2-4 times peryear as needed.	
Replace Vegetation Replant similar species, preferably native species of localecotype, in the event that originalvegetation expires.	If needed	If needed	If needed	Trowel,plants
Refresh Mulch Maintain 2-3" of mulch coveringover planted areas, with priority on areas without dense plantcover.	If needed	If needed	Approxima tely every 3 rd year.	Rake, mulch
Re-secure erosion controlmaterials In the event that erosion controlblankets, biologs or other materials become unsecured, they should be re-secured with staking or burying similar to the original installation.	If needed	If needed	If needed	Variable
Erosion In the event that the lakeshore ofother areas experience erosion, Contact the Isanti SWCD for guidance.	If needed	If needed	If needed	Variable

 Table 4-2 Vegetation observed during the project meander survey September 17, 2020.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Asclepias syriaca	common milkweed	5-10%	Planted	Native
Carex vulpinoidea	fox sedge	5-10%	Planted	Native
Chelone obliqua	purple turtlehead	5-10%	Planted	Native
Echinacea purpurea	purple coneflower	5-10%	Planted	Native
Iris versicolor	Blue Flag Iris	5-10%	Planted	Native
Leucanthemum vulgare	ox-eye daisy	1-5%	Not Planted	Invasive
Phlox divaricata	blue phlox	5-10%	Planted	Native
Polemonium reptans	Jacob's-ladder	5-10%	Planted	Native
Rudbeckia hirta	Black Eyed Susan	5-10%	Planted	Native
Schizachyrium scoparium	little bluestem	5-10%	Planted	Native
Solidago rigida	stiff goldenrod	5-10%	Planted	Native
Spartina pectinata	prairie cordgrass	1-5%	Planted	Native
Sporobolus heterolepis	prairie dropseed	5-10%	Planted	Native

Site Photographs



Photo 4-1 A view of the vegetated bank on the project site above the shoreline. Photo taken by Seth Bossert during site visit September 17, 2020.



Photo 4-2 Well maintained forbs and grasses in the shoreline planting. Photo taken during site visit September 17, 2020.

5) Green Lake Shoreline Restoration 4

Project Background

Project Name: Green Shoreline Restoration 4
Project Site: Green Lake, Isanti County
Township/Range Section: Township 36 Range 25
Section 28
Project Manager / Affiliated Organization: Tiffany
Determan – Isanti SWCD
Fund: CWF Fiscal Year Funds: 2015
Project Start Date: September 2016
Predominant Habitat type: Aquatic Habitat
Additional Habitat types: Wetland , Choose an

Project Status: Post Establishment Phase

item.



Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

Removal of sand and geotextile fabric from the western beach area and installation of water-tolerant shrubs and sedges to provide treatment of runoff and shore stabilization. Fill and revegetation of gully erosion around drain tile, and extension of drain tile down slope. Treatment of aquatic area with aquatic-safe glyphosate herbicide.

- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?
 - Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features, Isanti SWCD.
- What are the stated goals of the project?
 Restoration and stabilization of 0.13 acres of lakeshore on Green Lake using revegetation of native wetland shrubs.
- What are the desired outcomes of achieving the stated goals of the project?
 Stabilize erosion of lake shore in proximity of existing home, and provide water quality benefit to Green Lake.

5. Were measures of restoration success identified in plans? No If yes, list specific measurements.

No quantifiable restoration measures were described in the plans. Observation of the protected shore for continued or new erosion could be used as a measure of success.

- 6. Are plan Sets available? Yes Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:
 - Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features, Isanti SWCD.
- 7. Provide list of best management practices, standards, guidelines identified in plan set?
 - Existing Class I riprap for stabilization of shoreline.
 - Vegetation of beach area with water-tolerant perennials.
 - Stabilization of drain tile area with erosion fabric and vegetation.
 - Treatment of aquatic area with glyphosate herbicide.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation? No

No alterations were made.

9. In what ways did alterations change the proposed project outcome? N/A

Site Assessment

Field Review Date: 9/17/2020

Field Visit Attendees: Seth Bossert - Wenck, Wade Johnson - MN DNR, Tiffany Determan - Isanti SWCD

10. Surrounding Landscape Characteristics:

The site is surrounded by cultivated land to the North and to the West. Green Lake at the project location is surrounded by vegetated slopes and forested areas. Average buffer width is roughly 250 ft.

- 11. Site Characteristics:
 - a. Soil Series:

Rough broken land, Zimmerman material (ZL).

b. Topography:

Average lake shore slope of 7.4% grade.

c. Hydrology:

Poorly drained.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

See Table 5-1.

12. Is the plan based on current science? Yes

The project attempts to address a long-term erosion and nutrient issue. Provision of a vegetated buffer is industry standard to adequately address this issue.

13. List indicators of project goals at this stage of project:

Banks within project area are well-vegetated and show minimal signs of erosion.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, with maintenance as listed in Table 5-1 below.

- **15.** Are corrections or modifications needed to achieving proposed goals? Project goals are met.
- 16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

The long-term maintenance for this project will be provided by the landowners as agreed upon in the operation and maintenance plan for the Chilson Green Lakeshore Restoration—developed with the Isanti SWCD. Several undesirable species were observed in the vegetation along the banks. This was not observed to be currently causing any outstanding issues.

There are no future steps planned or proposed by the project managers.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No, but the project does not provide much additional habitat.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. Project has been observed to meet its proposed outcomes since completion and is anticipated to continue to do so.

19. Additional comments on the restoration project.

This project was a partnership between the Isanti County Soil and Water Conservation District, and the landowners. The project was constructed using the funds awarded in the grant, supplemented with funding, materials, and in-kind work from the landowners.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

The outcome of a stabilized shoreline to reduce direct sediment erosion input has been achieved. Additionally, this project provides some support to the larger outcome of providing water quality benefit to Green Lake through filtration of upland runoff, though on a limited scale.

23. Site Assessor(s) Conducting Review:

Seth Bossert - Wenck

Site Maps, Project Plans or Vegetation Tables



Figure 5-1 A map of the lakeshore restoration project sites around Green Lake. The project site is number 7 on the north west side of the lake.



Figure 5-2 Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features sheet 6 of 9, general plans, planting instructions, and quantities.

Table 5-1 Isanti SWCD Partnership for the Construction, Operation and Maintenance of Stormwater, Erosion Control, and Landscaping Features sheet 7 of 9, operations and maintenance guidelines, including maintenance procedures and schedules.

Task	Frequency Year 1	Frequency Year 2	Frequency Year 3	Equiptment Needed
Watering Ensure 1" of water per week, either through rainfall, irrigation, or soil moisture In low lying areas.	Weekly	During drought stress	During drought stress	Water supply; hose and sprinkler, or soaker hose
Weeding All vegetation that was not planted as part of the project should be removed.	Every 2-3 weeks	Monthly	2-4 times peryear as needed.	
Replace Vegetation Replant similar species, preferably native species of localecotype, in the event that originalvegetation expires.	If needed	If needed	If needed	Trowel,plants
Refresh Mulch Maintain 2-3" of mulch coveringover planted areas, with priority on areas without dense plantcover.	If needed	If needed	Approxima tely every 3 rd year.	Rake, mulch
Re-secure erosion controlmaterials In the event that erosion controlblankets, biologs or other materials become unsecured, they should be re-secured with staking or burying similar to the original installation.	If needed	If needed	If needed	Variable
Erosion In the event that the lakeshore ofother areas experience erosion, Contact the Isanti SWCD for guidance.	If needed	If needed	If needed	Variable

Table 5-2 Vegetation observed during the project meander survey September 17, 2020.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Acalypha rhomboidea	Three Seeded Mercury	1-5%	Not Planted	Non-native
Achillea millefolium	Common Yarrow	1-5%	Not Planted	Native
Asarum canadense	Wild Ginger	1-5%	Planted	Native
Asclepias incarnata	Swamp Milkweed	5-10%	Planted	Native
Bidens vulgata	Common Beggarticks	5-10%	Not Planted	Native
Carex vulpinoidea	Fox Sedge	10-25%	Planted	Native
Cypernus esulentus	Yellow Nutsedge	1-5%	Not Planted	Non-native
Echinochloca Crus-Galli	Barnyard Grass	25-50%	Not Planted	Native
Eupatorium perfoliatum	Common Boneset	5-10%	Planted	Native
Eutrochium maculatum	Spotted Joe pye weed	5-10%	Planted	Native
Heuchera richardsonii	Alumroot	1-5%	Planted	Native
Impatiens capensis	Spotted touch-me-not (Jewelweed)	5-10%	Not Planted	Native
Iris versicolor	Blue Flag Iris	10-25%	Planted	Native
Juncus tenuis	Path Rush	5-10%	Not Planted	Native
Liatris pychnostachya	Praire Blazing Star	5-10%	Planted	Native
Lobilia cardinalis	Cardinal Flower	10-25%	Planted	Native
Polygonatum biflorum	Giant Solomon's Seal	5-10%	Planted	Native
Polygonum amphibium	Swamp Smartweed	1-5%	Not Planted	Native
Solidago rigida	Stiff Goldenrod	5-10%	Planted	Native
Spartina pectinata	Prairie Cordgrass	1-5%	Planted	Native
Symphyotrichum ericoides	Heath Aster	10-25%	Not Planted	Native
Verbena hastata	Blue Vervain	5-10%	Not Planted	Native
Viola sororia	Common Blue Violet	1-5%	Not Planted	Native
Aronia melanocarpa	Black Chokeberry	5-10%	Planted	Native
Salix spp.	Willow	1-5%	Not Planted	Native

Site Photographs



Photo 5-1 View of western beach with riprap and vegetation installed. Photo taken during site visit September 17, 2021.



Photo 5-2 View of eastern beach. Shoreline is vegetated, with no riprap is visible. Dried algae is visible collected on the shore. Photo taken by Seth Bossert during site visit September 17, 2021.



Photo 5-3 View of vegetation on shore, with gaps in cover visible. Photo taken during site visit September 17, 2021.

6) Groundhouse River Stabilization Brunswick Township

Project Background

Project Name: Groundhouse River Stabilization Brunswick Township

Project Site: Brunswick Township Streambank Restoration

Township/Range Section: Township 38N Range 24W Section 1

Project Manager / Affiliated Organization: Kanabec SWCD

Fund: CWF Fiscal Year Funds: 2010

Project Start Date: 2010

Predominant Habitat type: Aquatic Habitat

Additional Habitat types:

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

Stabilize the Groundhouse riverbank along 153rd Avenue using field stone boulders. Install native seed and cover crop/erosion control along stabilized riverbank.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

NRCS TSA-3 document & construction plan set (3 sheets)

- 3. What are the stated goals of the project? Prevent riverbank erosion adjacent to the road shoulder and establish native vegetation along the riverbank.
- 4. What are the desired outcomes of achieving the stated goals of the project? Reduce sediment and nutrient inputs into the Snake River and tributary Groundhouse River. Prevent further bank erosion and establish perennial, native vegetation that withstands frequent flooding.
- 5. Were measures of restoration success identified in plans? No If yes, list specific measurements.
- 6. Are plan Sets available? Yes Have project maps been created? Yes



If yes, provide in "site maps" and list maps provided: Construction plan sheets & associated detail drawings.

7. Provide list of best management practices, standards, guidelines identified in plan set? See "Construction Notes" located on sheet 2 of construction plan set.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

- 8. Were alterations made to the plan during project implementation?
 - Yes

According to the provided construction plan, a very small portion of the upper riverbank was not constructed/graded (small, red polygon). It is unclear what the intention of this area was on the plan, as there is not a call-out detail on the construction plan set.

9. In what ways did alterations change the proposed project outcome? Unknown, but it is likely that the omission of the small area of the upper bank will not affect the project outcome. The riverbank is stable and well-vegetated.

Site Assessment

Field Review Date: 9/16/2020

Field Visit Attendees: Mike Majeski (EOR), Wade Johnson (DNR), Josh Votruba (Kanabec SWCD), Mary Krueger (NRCS) Deanna Pomije (Kanabec SWCD)

10. Surrounding Landscape Characteristics:

Floodplain forest

11. Site Characteristics:

a. Soil Series:

Graycalm-Grayling complex & Pomroy loamy fine sand (Websoil Soil)

b. Topography:

Depressions on outwash plains, low floodplain forest

c. Hydrology:

Surface water

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Floodplain forest along a gravel road. Dominant species include Virginia wild rye, prairie cordgrass, and lake sedge. Invasive species cover: reed canary grass (5-75%, depending on location on the riverbank).

12. Is the plan based on current science? Yes

At that time (2010), rock toe was a common practice for bank stabilization, especially to stabilize slopes near infrastructure. The lower third of the entire riverbank is comprised of field stone rock. The upper banks were regraded and seeded with native vegetation.

13. List indicators of project goals at this stage of project:

Stabilized toe of the riverbank and diverse native vegetation occur above the field stone.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, the installed rock achieved the goal to stabilize the eroding riverbank and the native vegetation seeded along the upper banks has become well-established. No recent erosion was observed within the project site.

- **15.** Are corrections or modifications needed to achieving proposed goals? No
- 16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

No management plan identified. Site access is very good as the project is adjacent to a gravel road. Vegetation management is needed to reduce the reed canary grass population.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Yes. Either rootwads or large boulders could have been placed along/ within the rock toe that would provide increased overhead cover and potential scour pools. However, the rock as installed is stable and does provide small niches for invertebrates and small animals.

- **18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.** No
- 19. Additional comments on the restoration project.

According to the SWCD, the project site floods frequently which likely impacts the type of vegetation that can become established. Lake sedge seems to be growing well in this area.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

- **22.** *Provide explanation of reason(s) for determination.* Considering the frequency and duration of flood events observed by SWCD staff, the project as implemented is achieving the stated goals. There were no signs of recent erosion along the toe and the riverbanks are well-vegetated. The only issue with the site is the dominance of reed canary grass along the upstream half of the riverbank.
- 23. Site Assessor(s) Conducting Review:

Mike Majeski, EOR

Site Maps, Project Plans or Vegetation Tables



Figure 6-1 Construction plan set. Sheet 1 Plan and Location Map – As Builts.



Figure 6-2 Construction plan set. Sheet 2 Typical Sections and Details – As Builts.



Figure 6-3 Construction plan set. Sheet 3 Plan and Location Map.

 Table 6-1. Vegetation observed during the project meander survey.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Acer saccharinum	Silver maple	1-5%	No	Native
Fraxinus pennsylvanica	Green ash (saplings)	1-5%	No	Native
Spiraea alba	Meadowsweet	1-5%	No	Native
Cornus sericea	Red-osier dogwood	1-5%	No	Native
Rosa blanda	Smooth wild rose	1-5%	No	Native
Calamagrostis canadensis	Canada bluejoint	1-5%	Yes	Native
Carex lacustris	Lake sedge	50-75%	No	Native
Carex scoparia	Pointed broom sedge	1-5%	No	Native
Elymus virginicus	Virginia wild rye	5-25%	Yes	Native
Leersia oryzoides	Rice cutgrass	1-5%	No	Native
Phalaris arundinacea	Reed canary grass	5-25%	No	Non-Native
Setaria spp.	Foxtail spp.	1-5%	No	Non-Native
Spartina pectinata	Prairie cordgrass	5-25%	Yes	Native
Alisma triviale	Northern water plantain	1-5%	Yes	Native
Ambrosia spp.	Ragweed spp.	1-5%	No	Native
Asclepias incarnata	Swamp milkweed	1-5%	Yes	Native
Bidens frondosa	Devil's beggarticks	1-5%	No	Native
Equisetum spp.	Horsetail spp.	1-5%	No	Native
Onoclea sensibilis	Sensitive fern	1-5%	No	Native
Parthenocissus	Virginia gragnar	1 50/	No	Native
quinquefolia	virginia creeper	1-570		
Persicaria spp.	Smartweed spp.	1-5%	No	Native
Pilea spp.	Clearweed spp.	5-25%	No	Native
Sagittaria spp.	Arrowhead spp.	1-5%	Yes	Native
Vernonia fasciculata	Ironweed	1-5%	Yes	Native

Site Photographs



Photo 6-1 Brunswick township riverbank stabilization, photo taken during site visit 09/16/2020.



Photo 6-2 Brunswick township riverbank stabilization, photo taken during site visit 09/16/2020.



Photo 6-4. Brunswick township riverbank stabilization, photo taken during site visit 09/16/2020.



Photo 6-5. Brunswick township riverbank stabilization. Close-up image of field stone boulder toe with lake sedge growing between the rocks. A green frog was sitting on one of the exposed rocks. Photo taken during site visit 09/16/2020.

7) Long Lake Shoreline Restoration 1

Project Background

Project Name:Long Lake Shore RehabilitationProject Site:Long Lake Shoreline Restoration 1Township/Range Section:Township 34 Range 24WSection 5Section 5Project Manager / Affiliated Organization:IsantiSWCDIsantiFund:CWF Fiscal Year Funds:Project Start Date:May 2016Predominant Habitat type:Aquatic HabitatAdditional Habitat types:Project Status:Project Status:Post Establishment Phase



Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

From the design/installation contractor Hayland Woods document: "On approximately 100' of shore on the point, remove concrete debris, pull out rocks far enough to install Bio-D SuperLog and cocoanut blanket against the failing lakebank, and pull rock back up to Bio-logs. Plant with 2 rows of emergent plugs. Patch an 8' hole adjacent to the lake bank with willow wattle. Plant 5 Tamarack trees, 30 bareroot Red Osier shrubs, and 900 emergent and wet meadow sedges and flowers into and behind the bio-logs and willow wattle, and in the wet meadow area. 750 square feet. Maintain an opening adjacent to the dock and an 8' access path"

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Hayland Woods shoreline assessment document & associated quote.

- 3. What are the stated goals of the project?Restore lakeshore native vegetation & stabilize lakeshore toe from erosion.
- What are the desired outcomes of achieving the stated goals of the project?Prevent further lakeshore erosion and improve the lakeshore buffer with native vegetation.

- Were measures of restoration success identified in plans? No If yes, list specific measurements. Click here to enter text.
- Are plan Sets available? No Have project maps been created? Yes
 If yes, provide in "site maps" and list maps provided:
 Hand sketch of lakeshore restoration plan.
- 7. Provide list of best management practices, standards, guidelines identified in plan set? None provided

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

- Were alterations made to the plan during project implementation? No Click here to enter text.
- 9. In what ways did alterations change the proposed project outcome? $N/{\rm A}$

Site Assessment

Field Review Date: 9/10/2020

Field Visit Attendees: Mike Majeski (EOR), Wade Johnson (DNR), Tiffany Determan (SWCD)

10. Surrounding Landscape Characteristics:

Residential lakeshore/ lawns with mixed deciduous trees

11. Site Characteristics:

a. Soil Series:

Isanti mucky loamy fine sand (Is map unit symbol from Web Soil Survey)

b. Topography:

Depressions on outwash plains, low gradient lakeshore

c. Hydrology:

Surface water

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Wet mesic lakeshore. Dominant species include blue lobelia, sneezeweed, and spotted Joe-pye weed. Invasive species cover: reed canary grass (<5%).

12. Is the plan based on current science? Yes

Bioengineering using native vegetation & installation of Bio-D Super logs for toe protection.

13. List indicators of project goals at this stage of project:

Well established and diverse native vegetation.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, the bio-rolls and established lakeshore vegetation have stabilized the lakeshore, no erosion was observed.

- **15.** Are corrections or modifications needed to achieving proposed goals? No
- 16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

No management plan identified. The site may require occasional maintenance through removal of invasive species.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No, the project increased plant diversity and the lakeshore buffer width.

- **18.** Are follow-up assessments by the Restoration Evaluation Program needed? Explain. No
- 19. Additional comments on the restoration project.

Good establishment of diverse native shoreline vegetation.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes.

Confidence of outcome determination:

High.

22. Provide explanation of reason(s) for determination.

The lakeshore toe showed no signs of erosion since the project was completed in 2016. Outstanding density and diversity of native lakeshore vegetation is providing important nearshore and pollinator habitat.

23. Site Assessor(s) Conducting Review:

Mike Majeski

Site Maps, Project Plans or Vegetation Tables



Figure 7-1 Site sketch of project site provided by Isanti SWCD.

Table 7-1 List of species planted. Updated February 2015. Hayland Woods Native Nursery. Two hundred and thirty eight potted plants and 684 plugs were planted.

Scientific Name	Common Name	Potted Plants	Plugs
Acer rubrum	Red Maple #2 pot	1	0
Acorus calamus	Sweet Flag (or Burreed)	36	0
Agastache foeniculum	Fragrant Giant Hyssop	0	12
Anemone canadensis	Canada Anemone	0	6
Asclepias incarnata	Swamp Milkweed	0	36
Betula pumila	Bog Birch #2 pot	2	0
Carex comosa	Bottlebrush Sedge	0	36
Carex crinita	Caterpillar Sedge	0	36
Carex hystericina	Porcupine Sedge	0	36
Carex lacustris	lake Sedge	36	0
Carex sco pa ria	Pointed Broom Sedge	0	36
Carex stipata	Common Fox Sedge	0	36
Carex vulpinoidea	Brown Fox Sedge	0	36
Chelone glabra	Turtlehead	0	6
Cornus sericea	Red Osier Dogwood	30	0
Doellingeria umbellata	Flat Topped Aster	0	12
Eupatorium maculatum	Joe Pye Weed	0	12
Eupatorium perfoliatum	Boneset	0	12
Hypericum pyramidatum	Great St John's Wort	0	12
Iris versicolor	Blue Flag	36	36
Juncus effusus	Common Rush	0	36
Juncus tenius	Path Rush	0	36
Larix laricina	Tamarack #2 pot	2	0
Lobelia siphilitica	Great Blue Lobelia	0	36
Lysimachia ciliata	Fringed Loosestrife	0	36
Matteuccia struthiopteris	Ostrich Fern	0	6
Mimulus ringens	Monkey-Flower	0	36
Monarda fistulosa	Wild Bergamot	0	12
Onoclea sensibilis	Sensitive Fern	0	6
Physostegia virginiana	Obedient Plant	0	12
Pontederia cordata	Pickerel Weed	12	0
Pychnanthemum	Mountain Mint	0	36
virginianum		12	
Sagittaria latifolia	Broad Leaved Arrownead	12	0
Schoenoplectus pungens	Three Squared Bulrush	36	0
Scirpus atrovirens	Dark Green Bulrush	0	36
Spiraea alba	Neadowsweet	36	0
verbena hastata	Blue Vervain	0	36
Zizea aurea	Golden Alexanders	0	36

 Table 7-2 Vegetation observed during the project meander survey.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Helenium autumnale	Sneezeweed	10%	Yes	Native
Eutrochium	Spotted Joe-pye	400/	Yes	Native
maculatum	weed	10%		
Doellingeria umbellata	Flat-topped aster	1-5%	Yes	Native
Eupatorium perfoliatum	Common boneset	1-5%r	Yes	Native
Solidago canadensis	Canada goldenrod	1-5%	No	Native
Verbena hastata	Blue vervain	1-5%	Yes	Native
Carex lacustris	Lake sedge	1-5%	Yes	Native
Lobelia siphilitica	Blue lobelia	10%	Yes	Native
Larix laricina	Tamarack	1-5%	Yes	Native
Asclepias incarnata	Swamp milkweed	1-5%	Yes	Native
Scirpus atrovirens	Dark green bulrush	1-5%	Yes	Native
Cornus sericea	Red-osier dogwood	1-5%	Yes	Native
Phalaris arundinacea	Reed canary grass	1-5%	No	Non-Native
Spartina pectinata	Prairie cordgrass	1-5%	No	Native
Pycnanthemum virginianum	Mountain mint	1-5%	Yes	Native
Urtica dioica	Stinging nettle	1-5%	No	Native
Impatiens capensis	Spotted touch-me- not	1-5%	No	Native
Iris virginica	Blue flag	1-5%	Yes	Native
Leersia oryzoides	Rice cutgrass	1-5%	No	Native
Acer saccharinum	Silver maple	1-5%	No	Native
Spiraea alba	Meadowsweet	1-5%	Yes	Native
Physostegia virginiana	Obedient plant	1-5%	Yes	Native
Fraxinus pennsylvanica	Green ash	1-5%	No	Native
Anemone canadensis	Canada anemone	1-5%	Yes	Native
Onoclea sensibilis	Sensitive fern	1-5%	Yes	Native
Calamagrostis canadensis	Canada bluejoint	1-5%	Yes	Native
Hypericum ascyron	Great St. John's wort	1-5%	Yes	Native
Carex stricta	Tussock sedge	5-10%	No	Native
Lathyrus venosus	Veiny pea	1-5%	No	Native
Symphyotrichum	Purple-stemmed	4 50/	No	Native
puniceum	aster	1-5%		
Cyperus spp.	Flatsedge spp.	1-5%	No	Native
Schoenoplectus pungens	Three-squared bulrush	1-5%	Yes	Native
Site Photographs



Photo 7-1 Madson shoreline restoration, photo taken during site visit 09/10/2020.



Photo 7-2 Madson shoreline vegetation, photo taken during site visit 09/10/2020.



Photo 7-3 Madson shoreline vegetation, photo taken during site visit 09/10/2020.



Photo 7-4 Madson shoreline vegetation, photo taken during site visit 09/10/2020.

8) Long Lake Shoreline Restoration 2

Project Background Project Name: Long Lake Shore Rehabilitation Project Site: Long Lake Shoreline Restoration 2 Township/Range Section: Township 34 Range 24W Section 5 Project Manager / Affiliated Organization: Isanti SWCD Fund: CWF Fiscal Year Funds: 2015 Project Start Date: May 2016 County: Isanti Predominant Habitat type: Aquatic Habitat Primary Activity: Lake Shore Restoration Additional Habitat types: Aquatic, Choose an item. Project Size: 90 LF Project Status: Post Establishment Phase Project Completed: 2016

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

From Hayland Woods document: "Spray Envoy to remove Reed Canary Grass and lawn grass and maintain existing native species. Install willow wattle on 90' of shoreline. Plant a 2' deep emergent buffer and a 4' deep wet meadow buffer along 70' of shore. Plant a 3' deep emergent buffer along the 20' access area using very low plants."

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Hayland Woods shoreline assessment document & associated quote.

- 3. What are the stated goals of the project? Restore lakeshore native vegetation & stabilize lakeshore soils at the OHWL.
- What are the desired outcomes of achieving the stated goals of the project?Prevent further lakeshore erosion and improve the lakeshore buffer with native vegetation.
- 5. Were measures of restoration success identified in plans? No
 If yes, list specific measurements.
 Click here to enter text.

- 6. *Are plan Sets available?* No *Have project maps been created?* Yes *If yes, provide in "site maps" and list maps provided:* Hand sketch of lakeshore restoration plan.
- 7. Provide list of best management practices, standards, guidelines identified in plan set? None provided

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation? No

Click here to enter text.

9. In what ways did alterations change the proposed project outcome? N/A

Site Assessment

Field Review Date: 9/10/2020

Field Visit Attendees: Mike Majeski (EOR), Wade Johnson (DNR), Tiffany Determan (SWCD)

10. Surrounding Landscape Characteristics:

Residential lakeshore/ lawns with mixed deciduous trees

11. Site Characteristics:

a. Soil Series:

Isanti mucky loamy fine sand (Is map unit symbol from Web Soil Survey)

b. Topography:

Depressions on outwash plains, low gradient lakeshore

c. Hydrology:

Surface water

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Wet mesic lakeshore. Dominant species include sneezeweed, sandbar willow, spotted Joe-pye weed, and Canada goldenrod. Invasive species cover: reed canary grass (<5%) and creeping charlie (1-5%).

- 12. Is the plan based on current science? Yes
 - Bioengineering using native vegetation and willow wattles are accepted practices for this application.

13. List indicators of project goals at this stage of project:

Well established and diverse native vegetation.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, the wattles and established lakeshore vegetation have stabilized the lakeshore, no erosion was observed.

15. Are corrections or modifications needed to achieving proposed goals?

No

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

No management plan identified. The site may require occasional maintenance through removal of invasive species.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No, the project increased plant diversity of the lakeshore buffer width.

- **18.** Are follow-up assessments by the Restoration Evaluation Program needed? Explain. No
- 19. Additional comments on the restoration project.

Project has established dominant cover of native shoreline vegetation within the project area, great late-season pollinator habitat. Many bumblebees present at the time of the site visit and one ruby-throated hummingbird was seen.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

The lakeshore toe showed no signs of erosion since the project was completed in 2016. Good density and diversity of native lakeshore vegetation, even though the lakeshore buffer width is fairly narrow.

23. Site Assessor(s) Conducting Review:

Mike Majeski

Site Maps, Project Plans or Vegetation Tables



Figure 8-1 Site sketch provided by Isanti SWCD

Table 8-1 List of species planted. Updated February 2015. HaylandWoods Nursery. Four hundered and three plants wereplanted.

Scientific Name	Common Name	Number Planted
Acorus calamus	Sweet Flag	24
Asdepias incarnata	Swamp Milkweed	12
Carex comosa	Bottlebrush Sedge	12
Carex lacustris	Lake Sedge	24
Carex lanuginosa/pellita	Woolly Sedge	54
Cornus sericea	Red Osier Dogwood	7
Eleocharis ovata 1'	Ovate Spikerush	72
Eupatorium maculatum	Joe Pye Weed	12
Eupatorium perfoliatum	Boneset	6
Iris versicolor	Blue Flag	30
Juncus effusus	Common Rush	36
Liatris cylindracea	Dwarf Blazing Star	12
Lobelia siphilitica	Great Blue Lobelia	12
Mimulus ringens	Monkey-Flower	12
Monarda fistulosa	Wild Bergamot	6
Phlox pilosa	Prairie Phlox	6
Pychnanthemum virginianum	Mountain Mint	6
Sagittaria latifolia	Broad Leaved Arrowhead	12
Spiraea alba	Meadowsweet	30
Symphyotrichum puniceum	Red Stemmed Aster	6
Verbena hastata	Blue Vervain	12

 Table 8-2.
 Vegetation observed during the project meander survey.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Helenium autumnale	Sneezeweed	25%	No	Native
Eutrochium maculatum	Spotted Joe-pye weed	10%	Yes	Native
Symphyotrichum novae-angliae	New England aster	1-5%	No	Native
Eupatorium perfoliatum	Common boneset	1-5%	Yes	Native
Solidago canadensis	Canada goldenrod	10%	No	Native
Verbena hastata	Blue vervain	1-5%	Yes	Native
Carex lacustris	Lake sedge	1-5%	Yes	Native
Lobelia siphilitica	Blue lobelia	1-5%	Yes	Native
Asclepias incarnata	Swamp milkweed	1-5%	Yes	Native
Scirpus atrovirens	Dark green bulrush	1-5%	No	Native
Phalaris arundinacea	Reed canary grass	1-5%	No	Non-Native
Pycnanthemum virginianum	Mountain mint	1-5%	Yes	Native
Urtica dioica	Stinging nettle	1-5%	No	Native
Impatiens capensis	Spotted touch-me- not	1-5%	No	Native
Iris virginica	Blue flag	1-5%	Yes	Native
Salix interior	Sandbar willow	10%	No	Native
Glechoma hederacea	Creeping charlie	1-5%	No	Non-Native
Persicaria spp.	Smartweed spp.	1-5%	No	Native
Lysimachia ciliata	Fringed loosestrife	1-5%	No	Native
Fraxinus pennsylvanica	Green ash	1-5%	No	Native
Asclepias syriaca	Common milkweed	1-5%	No	Native
Lobelia cardinalis	Cardinal flower	1-5%	Yes	Native
Bidens frondosa	Devil's beggarticks	1-5%	No	Native

Site Photographs



Photo 8-1 Preekett shoreline restoration, photo taken during site visit 09/10/2020.



Photo 8-2 Preekett shoreline vegetation, photo taken during site visit 09/10/2020.

9) Long Lake Shoreline Restoration 3

Project Background

Project Name: Long Lake Shore Rehabilitation
Project Site: Long Lake Shoreline Restoration 3
Township/Range Section: Township 34 Range 24W
Section 5
Project Manager / Affiliated Organization: Isanti SWCD
Fund: CWF Fiscal Year Funds: 2015
Project Start Date: May 2016
Predominant Habitat type: Aquatic Habitat
Additional Habitat types: Aquatic , Choose an item.
Project Status: Post Establishment Phase



Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

From design/installation contractor Hayland Woods document: "Spray out Reed Canary and lawn grass, plant a 5' deep buffer along 150' of shoreline, leaving a path to the dock. Keep plants shorter in front of the cabin."

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Hayland Woods shoreline assessment document & associated quote.

- 3. What are the stated goals of the project? Infiltrate turfgrass runoff & nutrients, restore lakeshore native vegetation, increase the width of the lakeshore buffer & install willow wattles to stabilize the lakeshore toe.
- What are the desired outcomes of achieving the stated goals of the project?Improve the buffer width and diversity of native lakeshore vegetation, stabilize the lakeshore toe.
- 5. Were measures of restoration success identified in plans? No If yes, list specific measurements.

Click here to enter text.

- Are plan Sets available? No Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:
 Hand sketch of lakeshore restoration plan.
- 7. Provide list of best management practices, standards, guidelines identified in plan set? None provided

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation? No

Click here to enter text.

9. In what ways did alterations change the proposed project outcome? $N/{\rm A}$

Site Assessment

Field Review Date: 9/10/2020

Field Visit Attendees: Mike Majeski (EOR), Wade Johnson (DNR), Tiffany Determan (Isanti SWCD)

10. Surrounding Landscape Characteristics:

Residential lakeshore/ lawns with mixed deciduous trees

11. Site Characteristics:

a. Soil Series:

Isanti mucky loamy fine sand (Is map unit symbol from Web Soil Survey)

b. Topography:

Depressions on outwash plains, low gradient lakeshore

c. Hydrology:

Surface water

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Wet mesic lakeshore. Dominant species include spotted touch-me-not and rice cutgrass. Invasive species cover: reed canary grass (15%), bittersweet nightshade (5%), creeping charlie (5%), perennial sowthistle (1%), and amur maple (1%).

12. Is the plan based on current science? Yes

Bioengineering using native vegetation and willow wattles are accepted practices for this application.

13. List indicators of project goals at this stage of project:

Well established lakeshore vegetation.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, the wattles and established lakeshore vegetation have stabilized the lakeshore, no erosion was observed. The existing rock toe was incorporated into the shoreline restoration as evident by the exposed rock along the edge of the water.

15. Are corrections or modifications needed to achieving proposed goals?

No, but this site is in need of invasive species management due to dense stands of reed canary grass and patches of bittersweet nightshade, perennial sowthistle, and creeping charlie.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

No management plan identified. The site may require occasional maintenance through removal of invasive species. This property has good access to the lakeshore so maintenance should not be a problem.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No, the project increased the plant diversity and width of the lakeshore buffer.

- **18.** Are follow-up assessments by the Restoration Evaluation Program needed? Explain. No
- 19. Additional comments on the restoration project.

This project established significant perennial lakeshore vegetation to replace mowed turf grass. The buffer width will certainly help slow & infiltrate runoff from the adjacent lawn. Vegetation maintenance is recommended to reduce or eliminate existing invasive species.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes.

Confidence of outcome determination:

High.

22. Provide explanation of reason(s) for determination.

The lakeshore toe showed no signs of erosion since the project was completed in 2016. Good density and diversity of native lakeshore vegetation, but invasive species cover was over 15% and will need management to limit further spread along the shoreline.

23. Site Assessor(s) Conducting Review: Mike Majeski

Site Maps, Project Plans or Vegetation Tables



Figure 9-1 Site sketch provided by Isanti SWCD.

 Table 9-1 List of species planted. Seven hundered and fourteen plants were planted.

Scientific Name	Common Name	Number Planted
Asclepias incarnata	Swamp Milkweed	36
Carex comosa	Bottlebrush Sedge	36
Carex crinita	Caterpillar Sedge	36
Carex hystericina	Porcupine Sedge	36
Carex lanuginosa/pellita	Woolly Sedge	36
Carex scoparia 2 '	Pointed Broom Sedge	36
Carex stipata	Common Fox Sedge	36
Carex vulpinoidea	Brown Fox Sedge	36
Chelone glabra	Turtlehead POTS	6
Doellingeria umbellata	Flat Topped Aster	12
Eupatorium maculatum	Joe Pye Weed	12
Eupatorium perfoliatum	Boneset	12
Euthamia graminifolia	Grass-Leaved Goldenrod	18
Hypericum pyramidatum	Great St John's Wort	18
Iris versicolor	Blue Flag	36
Juncus effusus	Common Rush	72
Lobelia siphilitica	Great Blue Lobelia	36
Lysimachia ciliata	Fringed Loosestrife	36
Matteuccia struthiopteris	Ostrich Fern	6
Mimulus ringens	Monkey-Flo wer	36
Onoclea sensibilis	Sensitive Fern	6
Physostegia virginiana	Obedient Plant	12
Pychnanthemum virginianum	Mountain Mint	18
Rudbeckia hirta	Black Eyed Susan	18
Spiraea tomentosa	Steeplebush	36
Symphyotrichum puniceum	Red Stemmed Aster	12
Thalictrum dayscarpum	Tall Meadow Rue	12
Verbena hastata	Blue Vervain	12
Zizea aurea	Golden Alexanders	18

 Table 9-2.
 Vegetation observed during the project meander survey.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Leersia oryzoides	Rice cutgrass	15%	No	Native
Helenium autumnale	Sneezeweed	1-5%	No	Native
Eutrochium maculatum	Spotted Joe-pye weed	1-5%	Yes	Native
Symphyotrichum novae-angliae	New England aster	1-5%	No	Native
Eupatorium perfoliatum	Common boneset	1-5%	Yes	Native
Solidago canadensis	Canada goldenrod	1-5%	No	Native
Verbena hastata	Blue vervain	1-5%	Yes	Native
Carex stricta	Tussock sedge	1-5%	No	Native
Lobelia siphilitica	Blue lobelia	1-5%	Yes	Native
Phalaris arundinacea	Reed canary grass	15%	No	Non-Native
Urtica dioica	Stinging nettle	1-5%	No	Native
Impatiens capensis	Spotted touch-me-not	20%	No	Native
Iris virginica	Blue flag	1-5%	Yes	Native
Glechoma hederacea	Creeping charlie	1-5%	No	Non-Native
Solanum dulcamara	Bittersweet nightshade	1-5%	No	Non-Native
Carex comosa	Bottlebrush sedge	1-5%	Yes	Native
Juncus effusus	Common rush	1-5%	Yes	Native
Carex vulpinoidea	Fox sedge	1-5%	Yes	Native
Persicaria sagittata	Arrow-leaved tear thumb	1-5%	No	Native
Betula nigra	River birch	1-5%	Unknown	Native
Acer ginnala	Amur maple	1-5%	No	Non-Native
Eurybia macrophylla	Large-leaved aster	1-5%	No	Native
Equisetum spp.	Horsetail spp.	1-5%	No	Native
Symphyotrichum puniceum	Purple-stemmed aster	1-5%	Yes	Native
Rumex spp.	Dock spp.	1%	No	Native
Sonchus arvensis	Perennial sowthistle	1%	No	Non-Native
Euthamia graminifolia	Grass-leaved goldenrod	1%	Yes	Native

Site Photographs



Photo 9-1 Nelson shoreline restoration, photo taken during site visit 09/10/2020.



Photo 9-2 Nelson shoreline vegetation, photo taken during site visit 09/10/2020.

10) Reitz Lake East Side Treatment Retrofit

Project Background

Project Name:Reitz Lake Restoration ProjectProject Site:Reitz Lake East Side Treatment RetrofitTownship/Range Section:Township 116 N Range24W Section 20Project Manager / Affiliated Organization:Project Manager / Affiliated Organization:GregAamodt – Carver WMO, Carver SWCDFund: CWF Fiscal Year Funds:Project Start Date:Fall 2012 (grading), July 2013(floating mats & plant plugs)County: CaPredominant Habitat type:WetlandAdditional Habitat types:Aquatic , Choose an item.Project Status:Post Establishment Phase



Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

- 1. What are the specific project components and treatments?
 - Excavate an approximate 0.6-acre flow-through treatment pond within an existing ditched wetland.
 - Install a 12' windmill aeration system to aerate pond water.
 - Install 8 vegetated floating mats using select native species. The combined surface area of the mats was 1,216 square feet (0.028 acres).
- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Hydromethods, LLC Construction Plan, Reitz Lake Restoration document from Carver WMO.

3. What are the stated goals of the project?

The primary goal is to reduce phosphorus loading to Reitz Lake. From the Reitz Lake Restoration document: "Our initial goal for this area was to hold back some water and restore some of the wetland, but after some more vigorous survey work the area was determined to be too flat and even minimal increases (~1) in water depth would cause upstream impacts. Once that was determined we worked with our consulting pool to come up with a viable option to treat the area. As a result, we will construct a wet pond that is equipped with an iron-sand filter and/or a floating treatment wetland." In the end, a floating treatment wetland was implemented.

4. What are the desired outcomes of achieving the stated goals of the project?

The desired outcome of all the implemented projects around Reitz Lake, including this project, was to improve the water quality & clarity of Reitz Lake. The TMDL Implementation Plan indicates a 84% reduction of phosphorus is required to meet the state lake standard for phosphorus concentration. A specific phosphorus reduction goal for this project was not provided.

5. Were measures of restoration success identified in plans? No

If yes, list specific measurements.

Click here to enter text.

6. Are plan Sets available? Yes Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:

Hydromethods, LLC Construction Plan Set (see Figures 10-1 through 10-4)

7. Provide list of best management practices, standards, guidelines identified in plan set?

From construction plan set "CONSTRUCTION NOTES":

1. Contractor is responsible for obtaining final grades as shown on plan; the pond normal water level shall be an expansion of the ditch normal water level.

2. The pond excavation shall begin away from the ditch with undisturbed soil left at ditch embankment to minimize the exposure of the ditch water to the disturbed soil. Ditch embankment to be disturbed last.

3. Ditch bypass shall be maintained at the end of each day, though temporary blockage is allowed daily as needed for construction, weather permitting.

4. Spoil material shall be piled and spread in the general area indicated, as directed by property owner.

5. Graded areas to be seeded (pond embankment) must contain a minimum of 8" of topsoil replaced.

6. Dewatering, if necessary, shall be done in a manner to not release sediment-laden water downstream, or cause downstream erosion.

Water from dewatering shall be treated in a holding area or sediment filtration sack prior to release (contact Carver County SWCD prior to dewatering).

7. All "approved equal" substitutions must be approved by the engineer before installation; no price adjustments shall be made to bid items if substitutions are not approved.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation?

Yes

The windmill location was moved to the highest elevation point near the property boundary and the diffuser was located upstream of the installed floating mats as shown in the record drawing (Figure 10-5). The diffuser was installed in a bucket with a concrete bottom to keep it out of pond sediment. In addition, less riprap was used for the stabilized ditch inlet.

9. In what ways did alterations change the proposed project outcome?

It is not known if the alterations described above affected the project outcome.

Site Assessment

Field Review Date: 10/13/2020

Field Visit Attendees: Wade Johnson (MNDNR), Seth Ristow (Carver County), Mike Majeski (EOR)

10. Surrounding Landscape Characteristics:

The project site is part of a large wetland/ditch complex that is part of a 1,900 acre drainage area. The wetland complex is surrounded by agricultural land that according to the Carver WMO is "heavily tiled and has minimal buffers."

11. Site Characteristics:

a. Soil Series:

Muskego and Houghton soils, 0 to 1 percent slopes (muck & silt loam)

b. Topography:

Depressions, site-specific topography is very flat (less than 1% slope)

c. Hydrology:

Surface water

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

The excavated pond is surrounded by a Type 2 wetland dominated by Canada bluejoint and woolgrass. Reed canary grass occurs throughout the wetland complex but is in low density, generally less than 15%.

12. Is the plan based on current science? Portions

Excavated ponds within ditched systems are implemented to reduce sediment, nutrients, and attenuate stormwater flow. Floating islands and aeration systems have been used to remove dissolved nutrients from the water column. Their efficacy in this application is uncertain.

13. List indicators of project goals at this stage of project:

The excavated pond is capturing suspended sediment from the ditch system and is likely removing nutrients and particulates; however, there is no monitoring data to determine actual quantities.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

The excavated pond is functioning well based on observations of accumulated sediment within the facility. The aeration system was not functional during the site visit as the windmill was missing an air hose and the diffuser was out of the water. The floating mats were in poor condition and contained low species density & diversity. The overall effectiveness of the floating mats seemed minimal based on the size of the treatment area in relation to the overall size of the floating mats.

15. Are corrections or modifications needed to achieving proposed goals?

Yes, the floating mats were in poor condition and contained a low density of vegetation. It appeared the only species successfully planted within the mats was blue flag iris. The mats were free-floating in the pond and were no longer tethered to the pond bottom. One mat had washed ashore and had grown into the shoreline of the pond. The goal to reduce dissolved nutrients from the facility using the floating mats was largely unsuccessful. The mats were denuded of vegetation except for clumps of blue flag iris. According to Carver WMO staff, about 50% of the planted pots were flooded out and needed to be replaced about 2-3 years ago. The newly planted pots were either flooded out again or subjected to herbivory by local fauna.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

According to the Hydromethods, LLC project summary document, long-term maintenance of the facility includes annual removal of vegetation from the floating mats via hand cutting. The practice of hand-cutting of vegetation is possible but would be difficult to achieve due to challenging site access and the width of the floating mats. Also, the removal of cut vegetation would be difficult to accomplish without onsite disposal options. The project plan does not identify where the cut vegetation should be placed.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Yes, but only in terms of vegetation establishment of the floating mats. If the mats were completely vegetated, the mats would mimic floating bog habitat and possibly provide nesting opportunities for waterbirds.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No, follow up assessments are not warranted by the Restoration Evaluation Program. However, followup maintenance by project managers is warranted to repair the aeration system and determine a plan for the floating mats. The air supply line from the windmill to the diffuser was missing and needs to be replaced. Based on the successful establishment of blue flag iris on the floating mats, it is recommended the mats be replanted with additional blue flag plugs or other species that are not prone to herbivory by aquatic mammals such as muskrats & minks.

19. Additional comments on the restoration project.

An indirect benefit of the excavated pond is that it provides slack water habitat that is readily colonized by duckweed. Approximately 70% of the pond surface was covered by duckweed species (primarily lesser duckweed). The duckweed plants are certainly removing dissolved nutrients from the water, possibly more than what the floating mats would remove if they were fully vegetated. The project manager may want to reconsider the use of funds to repair the floating mats and instead dedicate resources to develop a maintenance plan to remove duckweed on an annual or biennial basis as a means of dissolved nutrient removal from the system.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Minimally achieved the stated goals.

21. The project will:

Minimally meet proposed outcomes. *Confidence of outcome determination:* Medium.

22. Provide explanation of reason(s) for determination.

It is difficult to determine the success of this project without analyzing pre- and post-project water quality monitoring data, which have not have been collected for this specific site. The excavated pond is removing suspended sediment and possibly particulate phosphorus from the ditch system, but quantifying nutrient loading & removal efficiency is not possible from a visual assessment.

23. Site Assessor(s) Conducting Review:

Mike Majeski, EOR

Site Maps, Project Plans or Vegetation Tables



Figure 10-1 Construction plan set (Sheet 1).



Figure 10-2 Construction plan set (Sheet 2).



	LEGEND
	FLOATING WETLAND
8889	EROSION CONTROL BLANKET, CAT. 1
	SILT FENCE
_	HAUL ROUTE
+	FLOW DIRECTION

PROJECT SCHEDULE:

- Project grading and permanent (or temporary, if needed) seeding shall be completed by end of fall, 2012. Temporary sediment control devices to be removed after vegetation
- is established.
- Floating vegetated mats to be installed with plants in spring 2013 and completed by May 15, unless extension granted.
 Remove any remaining sediment control devices prior to submit
- NPDES permit NOT.
- Aeration system to be installed in spring 2013 and completed by May 30, 2013.

- CONSTRUCTION NOTES: 1. Contractor is responsible for obtaining final grades as shown on plan; the pond normal water level shall be an expansion of the ditch normal water level.
- The pond excavation shall begin away from the ditch with undisturbed soil left at ditch embankment to minimize the exposure of the ditch water to the disturbed soil. Ditch embankment to be disturbed last.
- Ditch bypass shall be maintained at the end of each day, though temporary blockage is allowed daily as needed for construction,
- verafter permitting. Spoil material shall be piled and spread in the general area indicated, as directed by property owner. Graded areas to be seeded (pond embankment) must contain a
- minimum of 8" of topsoil replaced. 6. Dewatering, if necessary, shall be done in a manner to not release
- sediment-laden water downstream, or cause downstream erosion. Water from dewatering shall be treated in a holding area or sediment filtration sack prior to release (contact Carver County SWCD prior to dewatering).
- All "approved equal" substitutions must be approved by the engineer before installation; no price adjustments shall be made to bid items if substitutions are not approved. Bid accordingly.

EROSION & SEDIMENT CONTROL NOTES:

- Install silt fence prior to site disturbance.
 Turf restoration shall be installed within 7 days of completion of
- grading operations. Restoration to be completed fall, 2012.
- 4. Turf restoration seed and mulch shall be applied at the application rates listed in the Mn/DOT Seeding Manual, 2007. Seeding areas shall be maintained by the contractor for a period of 30 days. 5.
- Temporary sediment control devices to be removed after vegetation is 100% established, and prior to submittal of NPDES Permit NOT.

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o:763.210.5713 f:763.219.1273	γ	scdle	Food	ORCHE: NED			DAVID M. POGGI	ис. на 44573	POND & FLOATING TREATMENT WETLAND LAYOUT	4

Figure 10-3 Construction plan set (Sheet 3).

RESPONSIBLE PARTIES & SITE DESCRIPTION

RESPONSIBLE PARTIES:

OWNER: Carver County Water Management Organization Contact: Greg Aamodt Phone: 952.361.1804

SWPPP PREPARER: Hydromethods, LLC

Contact: Dave Poggi, PE Phone: 763.210.5713

CONTRACTOR:

Main Contact: Phone:

Responsible Inspector: _____Phone: _____

SITE DESCRIPTION:

This project includes site grading work for the construction of a stormwater treatment pond in Carver County, MN (Lat. 44.836586, Long. -93.737819). The site work will include the excavation of approximately 5,000 CY of material for disposal elsewhere on-site. The contractor shall sign the MPCA NPDES Construction Stormwater Permit application as "Operator" and be the responsible party.

Disturbed Area: 1.0 acres

Pre-Construction Impervious Area: 0.0 acres

Post-Construction Impervious Area: 0.0 acres

Newly Created Impervious Area: 0.0 acres

Permanent Stormwater Treatment Required (If >1 acre): No

STORMWATER MANAGEMENT:

Permanent stormwater management measures are not required (see above); however, the project goal is to install a stormwater treatment pond (see Sheet 3 for drainage patterns).

Reitz Lake is nutrient impaired and within 1 mile of the project site.

SOILS MAP



CONSTRUCTION EROSION & SEDIMENT CONTROL NOTES

ALL CONSTRUCTION ACTIVITIES MUST MEET THE REQUIREMENTS OF THE MPCA'S GENERAL STORMWATER PERMIT FOR CONSTRUCTION ACTIVITY (MNR100001). All sheets of this planset are hereby referenced as part of this SWPPP; any related pages shall be revised as appropriate for changing site conditions.

EROSION & SEDIMENT CONTROL

1) The contractor shall use phased construction whenever practical to minimize disturbed area at any one time.

2) All exposed soil areas must be stabilized as soon as possible to limit soil erosion but in no case later than 7 days after the construction activity in that portion of the site has temporarily or permanently ceased.

 The following shall be installed within <u>24 hours</u> of connection to surface water (installation):

a) Energy dissipation (riprap) at all outlet aprons

 b) Stabilization of temporary or permanent drainage swales within 200' of priverty boundary or connection to surface water (e.g., storm sewer inlet)

4) The contractor shall be responsible to control sediment-laden surface water from leaving site. All mobilized sediment that has left the construction zone shall be collected by the contractor and properly disposed of at no additional cost to the owner.

5) Any fines levied due to inadequate erosion or sediment control practices, sediment discharging from the site, shall be the responsibility of the contractor.

CONSTRUCTION IMPLEMENTATION SCHEDULE & PHASING

 Install silt fence and any necessary channel sediment controls.
 Remove trees.
 Remove trees.
 Begin grading of pond away from channel area (do not disturb adjacent to channel) to minimize potential for sediment transport from the site. Finish grading and install riprap.
 I place ension control blankst and sead/mulch per timelines above.
 Install vegetated mats and aeration equipment, if applicable.
 Install ratio at the same same same same complete.
 Submit Notice of Termination (NOT) to MPCA within 30 days.

DEWATERING & BASIN DRAINING

Dewatering water must be discharged to a temporary or permanent sediment basin when possible; if not possible, appropriate BMPs must be used to prevent sediment-laden water from discharging downstream.

Use appropriate energy dissipation measures on all discharges to prevent erosion at discharge outlet.

INSPECTIONS & MAINTENANCE

1) The contractor must routinely inspect the construction site once every 7 days during construction, and within 24 hrs of receiving more than ½" of rain in 24 hrs.

2) All inspections must be recorded and retained onsite with the SWPPP.

3) Silt fence must be maintained when accumulated sediment reaches $\frac{1}{3}$ of the device height, or if device becomes ineffective.

4) Temporary sediment basins, if applicable, shall be cleaned when sediment depth reaches ½ of original storage volume; complete within 72 hrs of discovery.

5) Non-functional BMPs must be repaired or replaced within 24 hrs of discovery.

POLLUTION PREVENTION

 All solid waste generated at the site must be disposed of in accordance with all applicable federal and state regulations.

 All hazardous materials must be properly stored/contained to prevent spills or leaks; materials must be properly disposed of per applicable regulations.

3) Vehicle or equipment washing must be confined to a defined area (minimum of 100' from pond or drainage ditch); runoff containing any hazardous materials must be collected and properly disposed of. Defined area must be delineated with heavy-duty sift fence (incidental); no engine degreasing is allowed on-site.

4) The contractor is solely responsible for monitoring air pollution and ensuring that it does not exceed levels set by any agency or LGU. This includes dust created by work performed at the site; air pollution and dust control measures are incidental to the contract. The engineer may require additional dust control measures to be implemented, as necessary.

FINAL STABILIZATION

1) The contractor must ensure final site stabilization meets the permit requirements, and submit the NOT within 30 days.

2) All temporary BMPs must be removed as part of final stabilization.

TRAINING REQUIREMENTS

The permittees must comply with the training requirements as outlined in Part III.A.2 of the Permit. The SWPPP inspector must be certified.

RECORD RETENTION

1) The SWPPP, all revisions to it, and inspection & maintenance records are the responsibility of the contractor and must remain at the site during construction.

2) The SWPPP, project permits, inspection/maintenance logs, stormwater maintenance agreements, and stormwater management design calculations must be retained for 3 years after submittal of permit NOT.

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Figure 10-4 Construction plan set (Sheet 4).



RECORD DRAWING 7/2/2013

HYDROMETHODS, LLC	2	23		DENSES ONP	RE	BY	DATE	DESCRIPTION		STREET, STREET, ST. BEGST WA FRENDER	2012 REITZ LAKE EAST SIDE TREATMENT RETROFIT	94227
1551 Livingston Avenue, Suite 104		0	100	DOWN DAP	1 2	DMP 00 DMP 10	1/24/12 1/04/12	REVERSI NOTES & ERCHAN CONTROL REVERSI FOND LOCATION FER VETLAND-RELATED REQUEST	Dall?	→n 09/21/2012	CARVER COUNTY WATER MANAGEMENT ORGANIZATION	3
o:763.210.5713 f:763.219.1273	γ	Scale	Feet	OWNER HED	3	DMP 11	/15/12	REVERSI FOND LOCATION FOR VETLAND REVEN	DAVID M. POSCI	ut m. 44573	POND & FLOATING TREATMENT WETLAND LAYOUT	4

2

Figure 10-5 Constriction as-built record drawing.

LEGEND ••••• FLOATING WETLAND EROSION CONTROL BLANKET, CAT. 1 202 SILT FENCE HAUL ROUTE FLOW DIRECTION

PROJECT SCHEDULE:

- Project grading and permanent (or temporary, if needed) seeding shall be completed by end of fall, 2012.
- Floating vegetated mats to be installed with plants in spring 2013 2. and completed by May 15.
- Remove any remaining sediment control devices prior to submitting 3 NPDES permit NOT.
- 4. Aeration system to be installed in spring 2013 and completed by May 30, 2013.

- CONSTRUCTION NOTES: 1. Existing contours are approximated LIDAR data; proposed grades are to be relative to existing. Contractor is responsible for obtaining final relative grades as shown on plan; the pond normal water level shall be an expansion of the ditch normal water level.
- 2. The pond excavation shall begin away from the ditch with undisturbed soil left at ditch embankment to minimize the exposure of the ditch water to the disturbed soil. Ditch embankment to be disturbed last.
- All pond berm graded areas to be quality compacted. Ditch flow or bypass shall be maintained at the end of each day, 4. though temporary blockage is allowed daily as needed for construction, weather permitting.
- The top of riprap elevation shall be equal to the bottom of the ditch 5. elevation to ensure no additional ditch backwater.
- Spoil material shall be piled and spread in the general area 6. indicated, as directed by property owner.
- 7. Salvage and replace minimum of 8" topsoil (CV) in areas to be seeded.
- Dewatering, if necessary, shall be done in a manner to not release 8. sediment-laden water downstream, or cause downstream erosion. Water from dewatering shall be treated in a holding area or sediment filtration sack prior to release (contact Carver County SWCD prior to dewatering). All "approved equal" substitutions must be approved by the engineer
- 9. before installation; no price adjustments shall be made to bid items if substitutions are not approved. Bid accordingly.

EROSION & SEDIMENT CONTROL NOTES:

- Install silt fence prior to site disturbance. 1.
- 2 Seed and blanket pond embankment slope above NWL as shown, (native seed mix 310 and blanket, category 1). Seed and mulch remaining disturbed areas (seed mix 250 and
- 3. mulch, type 1)
- 4. Turf restoration shall be installed within 7 days of completion of grading operations. Restoration to be completed fall, 2012.
- 6. Turf restoration seed and mulch shall be applied at the application rates listed in the Mn/DOT Seeding Manual, 2007. Seeding areas shall be maintained by the contractor for a period of
- 7. 30 days.
- 8. Temporary sediment control devices to be removed after vegetation is 100% established, and prior to submittal of NPDES Permit NOT.

Table 10-1 Vegetation observed around the excavated pond and floating mats.Four species of wetland obligate plantswere originally installed on the floating mats.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Scirpus cyperinus	Woolgrass	25-50%	No	Native
Calamagrostis canadensis	Canada bluejoint	10-25%	No	Native
Phalaris arundinacea	Reed canary grass	25-50%	No	Non-Native
Iris versicolor	Northern blue flag		Yes (floating mat)	Native
Sparganium eurycarpum	Giant bur-reed	1-5%	Yes (floating mat)	Native
Acorus americanus	Sweet-flag	1-5%	Yes (floating mat)	Native
Schoenoplectus tabernaemontani	Soft-stem bulrush	1-5%	Yes (floating mat)	Native
Eleocharis spp.	Spike rush spp.	1-5%	No	Native
Lemna minor	Lesser duckweed	70% of pond surface	No	Native

Site Photographs



Photo 10-1 Excavated pond, floating mats, and windmill aerator in the background (note the dense population of lesser duckweed on the water surface). Photo taken during site visit on 10/13/2020.



Photo 10-2 Close-up of a floating mat showing denuded/ failed vegetation and clumps of northern blue flag. Photo taken during site visit on 10/13/2020.



Photo 10-3 Close-up of a floating mat that washed ashore in the excavated pond. The floating mat has become integrated into the shoreline vegetation of the pond. Photo taken during site visit on 10/13/20.

11) Reitz Lake Shoreline Restoration Revisit

Legacy Fund Restoration Evaluations See Appendix C for Project Background and Initial **Project Evaluation** Project Name: Reitz Lake Shoreline Restoration Project Manager / Affiliated Organization: Mike Wanous- Carver SWCD, Greg Aamodt - Carver Fund: CWF Fiscal Year Funds: 2011 County: Carver Primary Activity: Lake Shore Restoration Project Size: Approximately 4,500 sq. ft. including the original rain garden buffer & gully Project Completed: 2012

Revisit Site Assessment

Field Review Date: 10/13/2020

WMO

Field Visit Attendees: Wade Johnson (MNDNR), Seth Ristow (Carver Co), Mike Majeski (EOR)

1. What are the stated goals of the project?

Reduce nutrient loading to Reitz Lake by conducting the following:

- Stabilize an eroded gully that discharges directly into Reitz Lake. •
- Increase native herbaceous vegetation along the gully bottom and side slopes. ٠
- Filter stormwater from the gully using a rain garden/ native planting buffer near the lake ٠ shoreline.
- 2. What are the desired outcomes of achieving the stated goals of the project? Increase native ground cover and stabilize soils along an eroded gully, reduce sediment & nutrient loading to Reitz Lake, and improve shoreline habitat.

3. Please note any substantive changes to the site characteristics since last site assessment.

The property was sold a few years ago and has a new owner. Changes to the site since the initial site evaluation include removal of the rain garden/ native planting buffer, regrading of the lawn area that drains to the upper gully, and re-direction of downspouts away from the gully.

4. Is the plan based on current science? Yes

According to the previous site evaluation, there are currently no opportunities within the upper watershed to address stormwater runoff through the gully. Removing invasive species and installing deep rooted native vegetation within the gully follows current science for reducing/limiting soil erosion. A rock grade control check was installed in the gully to capture sediment and slow runoff. The rain garden/ native planting buffer originally installed for the project has been removed by the landowner and was replaced by turfgrass. The landowner was unaware of the project when he purchased the property.

5. List indicators of project goals at this stage of the project.

Well established vegetation along the gully bottom and side slopes, no erosion was observed within the gully. The rock grade control check appeared stable and functional without any signs of undercutting or settling.

6. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?

The installation of native vegetation has stabilized the gully soils; however, the removal of the rain garden/ native planting buffer at the bottom end of the gully has reduced the potential for capturing stormwater nutrients and has decreased pollinator & lakeshore habitat. The landowner has re-graded the upper drainage swale and modified a retaining wall to slow & dissipate stormwater runoff at the top of the gully. The landowner also relocated downspouts to reduce the volume of water that reaches the gully. In addition, project managers noted that runoff from the road way has since been diverted to remain on the roadway ditch. These efforts have reduced the volume of concentrated runoff through the gully.

7. Are corrections or modifications needed to meet proposed outcomes?

The removal of the rain garden/ native planting buffer is in direct conflict with the project goal to reduce nutrient loading to Reitz Lake. It is recommended the native planting buffer be replanted; however, the landowner has a strong desire for shorter vegetation along the shoreline.

8. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

The current landowner was not aware that a restoration project had occurred on the property (until recently) and subsequently removed the native vegetation in the rain garden/ native planting buffer shortly after the home was purchased. Notification or disclosure statements of state-funded projects on private parcels need to be included during the sale of a parcel / residence.

9. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

The removal of native vegetation from the rain garden/ native planting buffer certainly reduced pollinator & near-shore lake habitat. It also reduced the capacity to remove nutrients and slow runoff from the gully outlet.

10. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

The project site in its current state is stable and the landowner does not plan to remove vegetation in the gully. However, follow up is needed to determine the course of action regarding the removal of the rain garden/ native planting buffer. If a new rain garden is proposed, it is recommended native short grass & forb species be planted as a compromise with the landowner's desire for "managed" vegetation.

11. Additional comments on the restoration project.

Good diversity of native woodland species along the gully including numerous tree saplings comprised of sugar maple, American basswood, red oak, green ash, and black cherry. The herbaceous layer is dense but may be shaded out over time by the flush of tree saplings beginning to grow along the gully slopes.

Revisit Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

12. The project has:

Achieved the stated goals.

13. The project will: Meet proposed outcomes.
Confidence of outcome determination: Medium.

14. Provide explanation of reason(s) for determination.

The gully showed no signs of erosion since the project was completed, and the landowner's efforts to divert localized runoff around the house has reduced stormwater volume and nutrient load through the gully. The native woodland vegetation is providing important pollinator habitat, but the removal of the rain garden/ native planting buffer has reduced overall habitat of the project site since it was replaced by turfgrass.

15. Site Assessor(s) Conducting Review:

Mike Majeski, EOR

Appendix A: Revisit Site maps, Project plans or Vegetation tables



Figure 11-1 Basic project overview map and sketch showing the location of the rain garden/ native planting buffer, grade control structure, and gully.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Acer saccharum	Sugar maple	10%	Unknown	Native
Tilia americana	American basswood	1-5%	Unknown	Native
Vitis riparia	Wild grape	1-5%	Unknown	Native
Quercus rubra	Red oak	1-5%	Unknown	Native
Quercus macrocarpa	Bur oak	1-5%	Unknown	Native
Fraxinus pennsylvanica	Green ash	1-5%	Unknown	Native
Prunus serotina	Black cherry	1-5%	Unknown	Native
Acer negundo	Box elder	1-5%	No	Native
Cornus alternifolia	Pagoda dogwood	1-5%	Unknown	Native
Rhamnus cathartica	Common buckthorn	1-5%	No	Non-Native
Zanthoxylum americanum	Prickly ash	1-5%	No	Native
Ulmus americana	American elm	1-5%	Unknown	Native
Lonicera tatarica	Tatarian honeysuckle	1-5%	No	Non-Native
Ribes missouriense	Missouri gooseberry	1-5%	Unknown	Native
Parthenocissus quinquefolia	Virginia creeper	1-5%	Unknown	Native
Phalaris arundinacea	Reed canary grass	5-25%	No	Non-Native
Apocynum sibiricum	Clasping dogbane	1-5%	Unknown	Native
Asclepias syriaca	Common milkweed	1-5%	Unknown	Native
Rudbeckia hirta	Black-eyed Susan	1-5%	Unknown	Native
Cirsium arvense	Canada thistle	10%	No	Non-Native
Solidago flexicaulis	Zigzag goldenrod	1-5%	Unknown	Native
Cornus sericea	Red-osier dogwood	1-5%	Unknown	Native
Elymus hystrix	Bottlebrush grass	1-5%	Unknown	Native
Alliaria petiolata	Garlic mustard	1-5%	No	Non-Native
Vinca minor	Periwinkle	1-5%	No	Non-Native
Hosta spp.	Hosta spp.	1-5%	No	Non-Native
Sambucus racemosa	Red-berried elder	1-5%	Unknown	Native
Veronicastrum virginicum	Culver's root	1-5%	Unknown	Native
Hesperis matronalis	Dame's rocket	1-5%	No	Non-Native
Hemerocallis fulva	Day lily	10%	No	Non-Native
Thalictrum dioicum	Early meadow rue	1-5%	Unknown	Native
Solanum ptychanthum	Black nightshade	1-5%	Unknown	Native
Circaea lutetiana	Enchanter's nightshade	1-5%	Unknown	Native
Polygonatum biflorum	Smooth Solomon's seal	1-5%	Unknown	Native
Ageratina altissima	White snakeroot	1-5%	Unknown	Native

Table 11-1 Vegetation observed during the project meander survey.

Appendix B: Revisit Site Photographs



Photo 11-1 Upslope end of restored gully at 8715 Reitz Lake Road, photo taken during site visit 10/13/2020.



Photo 11-2 Downslope end of restored gully at 8715 Reitz Lake Road. Note the mowed native plantings upslope of the rock toe and turf grass in the foreground that was previously planted in native vegetation (rain garden/ buffer). Photo taken during site visit 10/13/2020.



Photo 11-3 Mid-point along wooded gully showing established vegetation, photo taken during site visit 10/13/2020.



Photo 11-4 Site photo from July 2013 showing the location of the rain garden/ native planting buffer that has since been removed and replaced by turfgrass.


Photo 11-5 Reitz Lake shoreline with turfgrass that replaced a rain garden/ native planting buffer originally installed at the top of the bank. Refer to Figure 11-5 above for comparison. Photo taken during site visit 10/13/2020.





Minnesota Department of Natural Resources Minnesota Board of Water and Soil Resources

Appendix C: Initial Project Evaluation

*Fields in original evaluation form may vary. Information was translated to newest version as applicable.

Project Background

Project Name: 3 - 8715 Reitz Lake Rd, Shoreline restoration (Shoreline restoration / Gully erosion)

Project Location: Carver

Township/Range Section: Township 116N (Laketown Township) Range 24 Section 19, 20

Project Manager / Affiliated Organization: Greg Aamodt, 952-361-1804, gaamodt@co.carver.mn.us; (Will Forbrod,

Fund: CWF Fiscal Year Funds: 2011

Project Start Date: 2012

Predominant Habitat type: Aquatic Habitat

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

16. What are the specific project components and treatments? Question not present on initial evaluation

17. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Carver SWCD: "Reitz Lake Restoration Evaluation .docx" 07/17/2012; MN Native Landscapes (contracted installer) "Restoration Guidelines" 05/10/2012

18. What are the stated goals of the project?

"To improve Reitz Lake's water quality by reducing the nutrient load entering the lake by installing a water retention/filtration structure on the north side of the lake, enhancing/restoring a wetland on the east side and installing four Shoreline restorations."

- **19.** What are the desired outcomes of achieving the stated goals of the project? Question not present on initial evaluation
- 20. Were measures of restoration success identified in plans? Choose an item.
 - If yes, list specific measurements.

Question not present on initial evaluation

- 21. Are plan Sets available? Choose an item. Have project maps been created? Choose an item.If yes, provide in Appendix A and list Maps provided:Question not present on initial evaluation
- 22. Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?

This project is trying to address a long term erosion issue, it would preferred to address this issue farther up into the watershed rather than on the slope above the lake it empties into and the adjacent shoreline area, however there currently are no opportunities to address this issue farther up in the watershed.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

23. Were alterations made to the plan during project implementation?

No

Click here to enter text.

24. *In what ways did alterations change the proposed project outcome?* Question not present on initial evaluation

Site Assessment

Field Review Date: 7/23/2013

Field Visit Attendees: John Hiebert - MN DNR, Wade Johnson - MN DNR

25. Surrounding Landscape Characteristics:

See below

26. Site Characteristics:

a. Soils:

Lester-Kilkenny Clay loams

b. Topography:

Steeply sloped shoreline with gully erosion

c. Hydrology:

Runoff from over 4 acres is concentrated through a gully and is exacerbating the shoreline erosion problems

d. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

Adjacent to gully on the slope down to the lake there is a mix of native and non-native forbs, grasses and trees and horticultural plants such as Day Lillies/hostas. The area itself has now become well vegetated post installation. The area between the gully and the lake is a flat and vegetated with turf grass, with a well vegetated rain garden installed between the end of the gully and the shoreline. The shoreline at the waters edge has been rip-rapped and has no vegetation present in it but in the aquatic zone in front of the rip-rap there are some clumps of reed canary grass and further off shore there are a few clumps of water lilies and bulrush present.

e. Vegetation B: Meander Search Species List (as appropriate for site)

No plant list provided in original site assessment

27. Is the plan based on current science? Yes

This project is trying to address a long term erosion issue, it would preferred to address this issue farther up into the watershed rather than on the slope above the lake it empties into and the adjacent shoreline area, however there currently are no opportunities to address this issue farther up in the watershed.

28. List indicators of project goals at this stage of project:

Site prep /herbicide invasives control was completed successfully to reduce invasive competition during planting establishment. Trees were removed adjacent to the gully to improve light penetration and increase plant growth but this may not have been necessary with the large number of shade tolerant native species that could have grown without removing the trees. The native vegetation was planted in the rain garden and was growing well, less natives were present on the hill adjacent to the gully and this had a lot of daylilies and hosta present which do not have deep roots. Ideally more deep-rooted natives should be established on the slope

29. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

The projects addressing the gully erosion site and the 3 other shoreline restoration sites are part of the process to improve water quality for Reitz Lake. However there are a variety of other larger issues within the watershed that may be the primary cause of the water quality issues in Reitz Lake and if these watershed issues are not addressed than these shoreline projects will not be enough to make a significant change in the water quality of Reitz Lake.

30. Are corrections or modifications needed to achieve proposed goals?

I would like to see more native vegetation planted along the shoreline beyond the rain garden site, specifically in the area between the slope and the lake. I would also like to see some vines and shrubs planted in the rip-rap itself, things such as live staked willows/dogwood and Virginia creeper to increase filtration of water before it enters the lake. I was also concerned about some of the tree removal on the slope, which was done to increase sunlight to allow more vegetation to grow on the slope. There are plenty of native shrubs such as Downy Arrowhead, chokecherry, wild black current, red berried elder leatherwood, Red Osier and Pagoda Dogwood, and native plants that would grow in shade such as: Large leaf Aster, Virginia Waterleaf, Zigzag golden rod, Pennsylvania sedge, Sprengel's sedge, white snake root, wild ginger and Woodland Phlox. I am concerned that removing trees in the ravine may actually somewhat destabilize the slope and only serve to improve site lines for the home. I would encourage more deep rooted native plants and shrub species to be planted on the gully slope; daylilies and hosta present do not have deep roots to hold the soil as opposed to many native alternatives.

31. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Their maintenance plan states that all practices that are installed will be tracked and followed by County and Soil and Water staff. Yearly inspections and maintenance of the structures will be based on the NRCS technical standards and any corrective actions needed will be documented and followed up on. Additionally, landowners taking part in any of the programs will sign a form outlining that the practice will be maintained for a minimum of 10 years. They will probably need more than yearly visits to assess the site especially during the first years during establishment and the landowner needs to be part of assessing and maintaining the site. Again I would stress planting more shade tolerant native plants and shrubs on the slope of the hill to further stabilize the site and the planting in the areas around the rain garden and within the rip-rap.

32. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Main concern was with the tree removal to increase plant growth. I would recommend not removing any more native trees.

33. Are follow-up assessments needed? Explain.

This project has just been installed and follow-up visits will be necessary to assess if the rock checks and rain garden are sufficient to slow down water enough to reduce erosion. It will be also important to see if the native vegetation in the rain garden and along the slope in the understory has been able to stay established with the high velocity of water present.

34. Additional comments on the restoration project.

Question not answered

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

35. The project has:

Choose an item. **Confidence of outcome determination:** Choose an item.

36. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* Medium.

37. Provide explanation of reason(s) for determination.

The goal is to improve the water quality of Reitz Lake by reducing sediment and nutrient loads to the lake and while this individual project may succeed at reducing sediment and nutrient loads on this site, it may not be enough to have a significant impact on water quality of the lake.

38. Site Assessor(s) Conducting Review: John Hiebert

Site Photographs



Photo 11-6 Gully cleared for site prep, July 2012



Photo 11-7 Vegetation established, July 2013



Photo 11-8 Top of gully, July 2013.



Photo 11-9 In gully, erosion control blanket, planted with plugs. Foreground rock check / subsurface inlet to raingarden (photo July 2013).



Photo 11-10 Rain garden/ buffer planting above rip rap.

12) Snake River Gully Stabilization, Mora

Project Background

Project Name: Snake River Shoreline Restoration	View Now With Now		
<i>Project Site:</i> Snake River Gully Stabilization, City of Mora	Realizer Money Realizer Realizer		
Township/Range Section: Township 39N Range 24W Section 14	Cor Bander Con		
Project Manager / Affiliated Organization: Kanabec SWCD	The second secon		
Fund: CWF Fiscal Year Funds: 2010	Units Unit Andreas Banding Labore As Contra Talanti Paparan Para Canterna Ratana Andrea Nama Contra Units		
Project Start Date: 2010	Roth Nadia plans Perch Freihan Statters Rever Minus Hauter		
Predominant Habitat type: Forest	<i>County:</i> Kanabec		
Additional Habitat types: Aquatic , Choose an item.	Primary Activity: Stream/River Restoration		
Project Status: Post Establishment Phase	Project Size: 390 LF		

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

Stabilize an eroding wooded ravine using field stone boulders to prevent further erosion that would discharge to the Snake River.

M

Install native seed (MNDOT 325 seed mix) and cover crop/erosion control along the ravine corridor.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

NRCS TSA-3 document & construction plan set (3 sheets)

- 3. What are the stated goals of the project? Per personal conversation with current managers, this project's goals were to prevent further degradation/erosion of the steep, wooded ravine through installation of field stone rock and establishment of diverse, native vegetation.
- 4. What are the desired outcomes of achieving the stated goals of the project? Prevent further downcutting/ channel incision within the wooded ravine and establish perennial, native vegetation that withstands flashy storm flows from the developed watershed.
- 5. Were measures of restoration success identified in plans? No If yes, list specific measurements.

- Are plan Sets available? Yes Have project maps been created? Yes If yes, provide in "site maps" and list maps provided: Construction plan sheets & associated detail drawings.
- 7. Provide list of best management practices, standards, guidelines identified in plan set? See "Construction Notes" located on sheet 2 of construction plan set.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation?

Yes

According to the provided construction plan, the twin culverts in the middle of the project site were replaced with new culverts. In addition, the disturbed soils were stabilized with hydromulch instead of mulch or blanket.

9. In what ways did alterations change the proposed project outcome?

The alterations listed above did not negatively impact the project outcome. The rock as it was installed is mostly stable with minor toe erosion observed despite significant flooding events over the last several years.

Site Assessment

Field Review Date: 9/16/2020

Field Visit Attendees: Mike Majeski (EOR), Wade Johnson (DNR), Josh Votruba (Kanabec SWCD), Mary Krueger (NRCS, TSA 3) Deanna Pomije (Kanabec SWCD)

10. Surrounding Landscape Characteristics:

Mixed pine/oak hardwood forest. Residential and commercial development within the catchment area.

11. Site Characteristics:

a. Soil Series:

Pomroy loamy fine sand & Graycalm-grayling complex (Source: Websoil Survey)

b. Topography:

Moraines and drumlins

c. Hydrology:

Surface water

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Mixed pine/oak woodland along a steep, wooded ravine. Dominant species include spotted touch-menot, Pennsylvania sedge, and clearweed. Invasive species cover: amur maple (5%), garlic mustard (5%), common buckthorn (5%), and creeping charlie (5%). Planted seed was MNDOT 325 which is comparable to State Mix 34-262.

12. Is the plan based on current science? Yes

At the time (2010/2011), rock toe was a common practice for bank stabilization. The ravine was lined with field stone boulders with filter fabric installed under the rock. The sides of the ravine were regraded to a 2:1 slope and seeded with native species.

13. List indicators of project goals at this stage of project:

The ravine bed has been stabilized and native woodland vegetation has become established.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, the installed rock achieved the goal to stabilize the eroding ravine and native vegetation was observed along the entire project reach. There was evidence of rock displacement where exposed filter fabric occurs. Some less-desirable native vegetation has taken over in small patches along the ravine (spotted touch-me-not).

15. Are corrections or modifications needed to achieving proposed goals?

No, but as stated some field stone has been displaced and re-positioning of the installed rock may be needed where the filter fabric is exposed. Repositioning of the field stone boulders to create a better-defined low point in the center of the ravine would result in concentrated flow over the boulders and would limit erosion along the edges of the ravine.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

No management plan identified. Site access is difficult for the most part so maintenance may be challenging. Grade control structures may be needed for long-term stabilization of the ravine.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

The project does not detract from existing or potential habitat. Habitat potential is limited as the primary goal was to stabilize a dry ravine that receives stormwater runoff. The planting of native vegetation has increased the diversity of species along the ravine.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain. No

19. Additional comments on the restoration project.

According to the SWCD, the project site receives significant stormwater runoff which likely impacts the type of vegetation that can become established. Heavy shade occurs along the entire reach of the ravine.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* Medium.

- **22.** *Provide explanation of reason(s) for determination.* Considering the frequency and intensity of storm events observed by SWCD staff & the landowner, the project as implemented is achieving the stated goals. There were some indications of recent erosion along the toe where some boulders have been displaced. These areas may require grade stabilization or repositioning of boulders to prevent further erosion. If left unchecked, these exposed areas may begin to fail, and the ravine thalweg could bypass some of the installed boulders through lateral channel migration. The field stone boulders appeared to be installed almost level across the ravine. Ideally, the field stone boulders would have been installed further up the edges of the ravine with a better defined low point in the center of the ravine (as shown in the detail drawings-Sheet 2) to prevent erosion along the ravine toe.
- 23. Site Assessor(s) Conducting Review: Mike Majeski

Site Maps, Project Plans or Vegetation Tables



Figure 12-1 Construction plan set (Sheet 1).



Figure 12-2 Construction plan set (Sheet 2).



Figure 12-3 Construction plan set (Sheet 3).

Table 12-1 Vegetation observed during the project meander survey.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Acer ginnala	Amur maple	1-5%	No	Non-Native
Acer saccharum	Sugar maple	1-5%	No	Native
Pinus strobus	White pine	1-5%	No	Native
Fraxinus pennsylvanica	Green ash	1-5%	No	Native
Quercus rubra	Red oak	1-5%	No	Native
Rhamnus cathartica	Common buckthorn	1-5%	No	Non-Native
Sambucus racemosa	Red-berried elder	5-25%	No	Native
Carex pensylvanica	Pennsylvania sedge	5-25%	Yes	Native
Elymus hystrix	Bottlebrush grass	1-5%	No	Native
Glyceria spp.	Manna grass spp.	1-5%	Yes	Native
Scirpus atrovirens	Dark green bulrush	1-5%	Yes	Native
Spartina pectinata	Prairie cordgrass	1-5%	Yes	Native
Alliaria petiolata	Garlic mustard	1-5%	No	Non-Native
Anemone canadensis	Canada anemone	1-5%	Yes	Native
Arctium minus	Common burdock	1-5%	No	Non-Native
Athyrium Filix-femina	Lady fern	1-5%	No	Native
Bidens spp.	Beggarticks spp.	1-5%	No	Native
Eurybia macrophylla	Large-leaved aster	1-5%	No	Native
Desmodium canadense	Showy tick-trefoil	1-5%	Yes	Native
Glechoma hederacea	Creeping charlie	1-5%	No	Non-Native
Impatiens capensis	Spotted touch-me- not	25-50%	No	Native
Parthenocissus inserta	Woodbine	1-5%	No	Native
Persicaria spp.	Smartweed spp.	1-5%	No	Native
Persicaria sagittata	Arrow-leaved tear thumb	1-5%	No	Native
Pilea spp.	Clearweed spp.	5-25%	No	Native
Plantago spp.	Plantain spp.	1-5%	No	Non-Native
Rubus idaeus	Red raspberry	1-5%	No	Native
Solanum dulcamara	Bittersweet nightshade	1-5%	No	Non-Native
Taraxacum officinale	Common dandelion	1-5%	No	Non-Native
Thalictrum dioicum	Early meadow rue	1-5%	No	Native
Vernonia fasciculata	Ironweed	1-5%	Yes	Native
Vitis riparia	Wild grape	1-5%	No	Native

Site Photographs



Photo 12-1 Lowest reach of Mora ravine stabilization looking up channel. Photo taken during site visit 09/16/2020.



Photo 12-2 Mora ravine stabilization. Note the exposed filter fabric from the displaced field stone boulders. Photo taken during site visit 09/16/2020.



Photo 12-3 Mora ravine stabilization showing installed field stone boulders and surrounding vegetation. Photo taken during site visit 09/16/2020.



Photo 12-4 Mora ravine stabilization. Floodplain erosion was observed in areas where flows occurred above the installed boulders. Down woody debris has captured sediment along the toe. Photo taken during site visit 09/16/2020.



Photo 12-5 Mora ravine stabilization. This is the upstream end of the project site where field stone boulders were installed. A headcut occurs immediately upstream of the project site. Photo taken during site visit 09/16/2020.

13) Snake River Shoreline Stabilization Pine Co

Project Background

Project Name: Snake River Shoreline Restoration

Project Site: Snake River Shoreline Stabilization Pine Co.

Township/Range Section: Township 38N Range 22W Section 17

Project Manager / Affiliated Organization: Snake River Watershed Management Board. Managed by Pine SWCD

Fund: CWF Fiscal Year Funds: 2010

Project Start Date: February 2011

Predominant Habitat type: Aquatic Habitat

Additional Habitat types: Forest , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

From Technical Service Area 3 (TSA-3) document from project file:

1. The project area is currently an eroding shoreline on the Snake River that is going to receive an engineered rock toe and is lacking required vegetation to anchor and protect the soil above proposed rock.

2. Establishing native plantings in this area will provide a long term, ecologically sound landscape that is perfectly adapted to the existing soils. Deep rooted native plants will slow runoff, increase infiltration, and provide flexible stability to the river bank. The native planting will not require long term irrigation, black dirt or other soil amendments, and it will add a distinctive look to the site and attract desirable birds and butterflies.

3. The site will be seeded with native grass and wildflower seed, covered with an erosion control blanket and then planted with native shrubs and grass and flower seedlings every 12 inches. Live cuttings of Willow will also be installed into the rock.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

TSA-3 I6-976 Wagner Planting project document



TSA-3 construction plan set

- 3. What are the stated goals of the project?Anchor and protect soil above the proposed toe rock, establish native vegetation along the riverbank.
- **4.** What are the desired outcomes of achieving the stated goals of the project? Prevent further bank erosion and establish perennial, native vegetation.
- Were measures of restoration success identified in plans? No If yes, list specific measurements. Click here to enter text.
- Are plan Sets available? Yes Have project maps been created? Yes If yes, provide in "site maps" and list maps provided: Construction plan sheets & associated detail drawings.
- 7. Provide list of best management practices, standards, guidelines identified in plan set? See "Construction Notes" located on sheet 2 of construction plan set.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

- 8. Were alterations made to the plan during project implementation?
 - Yes

According to the provided construction plan, regrading of the upper slope was not completed and larger 12" rock was installed versus the specified 3" rock.

9. In what ways did alterations change the proposed project outcome? The alterations described above did not affect the project outcome. The riverbank is stable and vegetated.

Site Assessment

Field Review Date: 9/16/2020

Field Visit Attendees: Mike Majeski (EOR), Wade Johnson (DNR), Jill Carlier (Pine SWCD)

10. Surrounding Landscape Characteristics:

Low density residential area. Mixed deciduous hardwood forest

11. Site Characteristics:

a. Soil Series:

Sandy Loam (no soil data available from the Websoil Survey website)

b. Topography:

Depressions on outwash plains, very steep riverbank at the project site

c. Hydrology:

Surface water

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Floodplain forest & adjacent mixed deciduous hardwood forest. Dominant species include large-leaved aster, Pennsylvania sedge, and serviceberry spp. Invasive species cover: common dandelion (<5%).

12. Is the plan based on current science? Yes

At that time (2011), rock toe was a common practice for bank stabilization. The lower third of the entire riverbank is comprised of field stone rock. The upper banks were not regraded, but native plants were installed along the upper banks. Over the last 9 years, the upper banks have slowly self-healed but some undercutting along the top of the bank is still present. Undercutting on the top of bank appear to predate the project and has not continued since the project was installed.

13. List indicators of project goals at this stage of project:

Stabilized toe of bank and diverse native vegetation above the field stone.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, the installed rock achieved the goal to stabilize the eroding riverbank and the installed native vegetation has helped stabilize and heal the eroded upper banks.

- **15.** Are corrections or modifications needed to achieving proposed goals? No
- 16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

No management plan identified. The very steep bank (1:1 upper slope) would be challenging to traverse if maintenance is ever needed. Vegetation management would be best completed by hand as few invasive species occur at this site.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Yes, the boulders extend well above baseflow stage and limits the spread of vegetative cover on the lower banks. Other toe stabilization practices would likely provide more near-stream habitat and vegetation growth along the lower banks, but the rock is stable. No detailed seeding/planting list was provided so it was unknown which species were installed as part of the project. The provided bid sheet indicates native grass & forb seed mixes were planned along with 1,215 plant plugs and 12 shrubs.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No

19. Additional comments on the restoration project.

A landowner just upstream installed large diameter bio logs to stabilize the riverbank toe and the bio logs appeared to be functioning very well. They did not appear to use any rock along their shoreline.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

- **22.** *Provide explanation of reason(s) for determination.* Considering the very steep riverbank and sandy soils, the project as implemented is achieving the stated goals. There were no signs of recent erosion along the bank and a nice diversity of native vegetation exists along the upper banks.
- 23. Site Assessor(s) Conducting Review:

Mike Majeski

Site Maps, Project Plans or Vegetation Tables



Figure 13-1 Construction plan set (Sheet 1).



Figure 13-2 Construction plan set (Sheet 2).

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Quercus rubra	Red oak (saplings)	5-25%	No	Native
Ostrya virginiana	Ironwood	1-5%	No	Native
Amelanchier spp.	Serviceberry spp.	5-25%	Unknown	Native
Viburnum rafinesquianum	Downy arrow-wood	1-5%	Unknown	Native
Carex pensylvanica	Pennsylvania sedge	5-25%	Unknown	Native
Bromus ciliatus	Fringed brome	0-1%	Unknown	Native
Glyceria spp.	Manna grass spp.	1-5%	Unknown	Native
Eurybia macrophylla	Large-leaved aster	5-25%	Yes	Native
Amphicarpaea bracteata	Hog peanut	1-5%	Unknown	Native
Antennaria spp.	Pussytoes spp.	1-5%	Unknown	Native
Apocynum cannabinum	Indian hemp	1-5%	Unknown	Native
Aralia nudicaulis	Wild sarsaparilla	1-5%	Unknown	Native
Echinocystis lobata	Wild cucumber	1-5%	No	Native
Galium spp.	Bedstraw spp.	1-5%	Unknown	Native
Parthenocissus inserta	Woodbine	1-5%	No	Native
Prenanthes alba	White rattlesnake- root	0-1%	Unknown	Native
Rubus idaeus	Red raspberry	1-5%	Unknown	Native
Solidago flexicaulis	Zigzag goldenrod	1-5%	Unknown	Native
Symphyotrichum puniceum	Purple-stemmed aster	1-5%	Unknown	Native
Taraxacum officinale	Common dandelion	1-5%	No	Non-Native
Thalictrum dasycarpum	Tall meadowrue	1-5%	Unknown	Native
Athyrium Filix- femina	Lady fern	1-5%	Unknown	Native
Equisetum spp.	Horsetail spp.	1-5%	No	Native

Table 13-1 Vegetation observed during the project meander survey.

Site Photographs



Photo 13-1 Top of slope above riverbank stabilization. Photo taken during site visit 09/16/2020.



Photo 13-2 Upper slope vegetation, photo taken during site visit 09/16/2020.



Photo 13-3 Upstream end of stabilized shoreline that transitions to a natural riverbank. Photo taken 09/16/2020.



Photo 13-4 Close up image of transition zone between field stone boulders and upper slope vegetation. Photo taken 09/16/2020.

14) Beltrami Island State Forest Enhancement 1

Project Background

Project Name: Beltrami #1R

Project Site: Beltrami Island State Forest

Township/Range Section: Township 158N Range 36W Section 8

Project Manager / Affiliated Organization: Pete Dieser, American Bird Conservancy

Fund: OHF Fiscal Year Funds: 2013

Project Start Date: 1/1/2014

Predominant Habitat type: Forest

Additional Habitat types: Forest , Choose an item.

Project Status: Post Establishment Phase



Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

What are the specific project components and treatments?
 Brush and small tree mowing utilizing skidsteer w/Davco brush mower attachment.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Records retained by American Bird Conservancy. Information regarding project also retained by MN DNR Red Lake WMA staff at Norris Camp office. Records also retained by American Bird Conservancy Including:

- Project Site Location (shapefiles)
- Desired Outcomes
- Site Description
- Project Area
- Contractor
- Equipment Used
- Pre-treatment Conditions
- Post-treatment Conditions (including photos)
- Project notes

3. What are the stated goals of the project?

Create early successional habitat comprised of herbaceous and young woody regrowth

4. What are the desired outcomes of achieving the stated goals of the project?

Create high quality early successional nesting and brood rearing habitat to benefit golden-winged warbler, American woodcock and associated early successional deciduous forest habitat species, such as ruffed grouse, rose-breasted grosbeak, veery and black-billed cuckoo, and other species that rely on early successional habitat.

Were measures of restoration success identified in plans? Yes If yes, list specific measurements. Acres managed/forestry mowed.

- 6. Are plan Sets available? No Have project maps been created? Yes
 If yes, provide in "site maps" and list maps provided:
 No plan set developed as construction activities were not required/involved. Maps developed by American Bird Conservancy.
- 7. Provide list of best management practices, standards, guidelines identified in plan set? Not applicable, no construction plan set created

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation?

Yes

Original plan was to utilize contractor with equipment such as a forestry mower. Difficulty in finding contractors for this work resulted in utilizing MN DNR staff and equipment (skidsteer and Davco mower) for work.

9. In what ways did alterations change the proposed project outcome?

Outcomes of work substantially the same as what was anticipated if a contractor with a forestry mower had been utilized in that mowing height was approximately 6-12 inches in height and the extent of areas reachable by mower.

Site Assessment

Field Review Date: 8/19/2020

Field Visit Attendees: Peter Dieser, American Bird Conservancy (ABC); Charlie Tucker, MN DNR Red Lake WMA; Gina Quiram, MN DNR; Paul Bockenstedt, Stantec

10. Surrounding Landscape Characteristics:

This site is located in the N. Minnesota & Ontario Peatlands subsection of the Laurentian Mixed Forest Province as defined by the MN DNR Ecological Classification System.

11. Site Characteristics:

a. Soil Series:

Soils in this area are characterized by a sandy-loamy to fibric haplaquent, psammequent or borofibrist. Neighborhood soil series include Cormont, Grygla, and Borofibrist.

b. Topography:

Slope/relief range average 0-10% within the project site. The vast majority of areas observed were actually 0-2% slope.

c. Hydrology:

At the project site, relatively little vertical relief in the landscape results in the interspersion of wet meadow, shrub carr, and upland shrubland/woodland/forest. The water table is reported to be at or near the surface for extended periods, particularly during wetter than average periods.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Plant community is comprised of scattered mature quaking aspen and balsam poplar interspersed by forestry mowed areas that include resprouting woody vegetation, grasses, sedges, forbs and ferns. The plant species richness is good with many species having an affinity for mesic to dry-mesic sites, including tall anemone, fly honeysuckle, and others. Although there were some invasive plant species on the forest road on the north side of the site, none were observed within managed areas during the field visit. See attached plant list for cover by species.

12. Is the plan based on current science? Yes

The species project is intended to benefit are known to utilize the habitat composition and structure that resulted from vegetation management work.

13. List indicators of project goals at this stage of project:

There is good structural arrangement of habitat, including variations in habitat that include herbaceous vegetation and young, woody plants. Desirable habitat at ground level at this site continues to include herbaceous cover (including graminoids) as a significant component.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes

15. Are corrections or modifications needed to achieve proposed goals?

No

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Accepted practice for long-term management of early-successional (woody regrowth and herbaceous) habitat requires periodic mowing and/or fire. The main limiting factor cited by ABC staff was that the remoteness of this area made it very difficult travel location for project oversight and also very challenging or impossible to engage contractors to complete habitat projects. ABC indicated that this project would not have been possible without the assistance and engagement of Gretchen Mehmel, Charlie Tucker and other MN DNR staff. The long-term challenge for maintaining early successional habitats such as the ones in this project is the need to periodically re-mow or burn approximately every 6-10 years. Limited staff and equipment resources are perhaps the greatest single challenge to regularly rejuvenating areas managed as part of this project.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No. Work completed is achieving the desired structure for species of wildlife with an affinity for early successional habitats.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. Work has achieved goal and it is understood that the habitat will solely fill back in with taller brush and trees if left unmanaged.

19. Additional comments on the restoration project.

Challenges in locating a contractor to complete this project resulted in the need to utalize MN DNR staff and equipment to complete this work. Project manager indicated that although hiring a contractor would have been preferred, having the flexibility in this unusual case to engage MN DNR to complete the work was vital to completing the project.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Exceeded the stated goals.

21. The project will:

Likely exceed proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

Subjective evaluations and observations by natural resources professionals indicates that managed areas are indeed attracting species of wildlife, particularly birds identified as target species, that depend on early successional habitats comprised of herbaceous vegetation and young woody growth. This specific project location also benefits both ruffed and sharptail grouse as the habitat lies along a transitional border between forest and grassland. As well, there is an ongoing collaborative region-wide research effort taking place that will quantify the effects of treatment on bird communities – while the research has not been published yet, it will be an important contribution and is a good example of a value-added benefit of this project

23. Site Assessor(s) Conducting Review: Paul Bockenstedt, Stantec

Site Maps, Project Plans or Vegetation Tables



Figure 14-1 Project areas at aspen forest edge to maintain woody structural diversity for nesting habitat (2013 True Color).



Figure 14-2 Post-treatment aerial photo of areas completed in Spring 2017 to create feathered edge and structural diversity at mature aspen forest edge (Google Earth 2020).
Table 14-1 Meander vegetation survey results for Beltrami Island State Forest Site #1. *0-1%, 1-5%, 5-25%, 25-50%, 50-75%, 75-100%**N=native, I=introduced/nonnative.

Scientific Name	cientific Name Common Name	Cover	Species
Scientific Nume		Range*	Status**
Populus tremuloides	Quaking aspen	5-25%	N
Populus balsamifera	Balm of Gilead	5-25%	N
Corylus cornuta	Beaked hazel	5-25%	N
Prunus virginiana	Chokecherry	1-5%	N
Amelanchier cf. arborea	Common serviceberry	0-1%	N
Salix bebbiana	Bebb's willow	1-5%	N
Salix discolor	Pussy willow	1-5%	N
Rubus idaeus var. strigosus	Red raspberry	5-25%	N
Rosa cf. arkansana	Prairie rose	1-5%	N
Diervilla lonicera	Fly honeysuckle	5-25%	N
Ribes cf. cynosbati	Prickly gooseberry	0-1%	N
Bromus kalmii	Kalm's brome	0-1%	N
Bromus ciliatas	Fringed brome	1-5%	N
Muhlenbergia racemosa	Upland timothy	0-1%	N
Carex cf. brevior	Shortbeak sedge	0-1%	N
Carex pensylvanica	Pennsylvania sedge	5-25%	N
Aralia nudicaulis	Wild sarsaparilla	5-25%	N
Pteridium aquilinum	Bracken fern	5-25%	N
Symphyotrichum cordifolium	Common blue wood aster	1-5%	N
Solidago gigantea	Giant goldenrod	0-1%	N
Lathyrus venosus	Veiny pea	1-5%	N
Apocynum cannabinum	Indian hemp	0-1%	N
Solidago nemoralis	Oldfield goldenrod	0-1%	N
Achillea millefolium	Yarrow	0-1%	N
Geum aleppicum	Yellow avens	0-1%	N
Anemone virginiana	Tall anemone	0-1%	N
Lathyrus ochroleucus	Pale vetchling	0-1%	N
Maianthemum canadense	Canada mayflower	1-5%	N
Solidago canadensis	Canada goldenrod	0-1%	Ν
Fragaria virginiana	Wild strawberry	0-1%	Ν
Epilobium cf. coloratum	Willow-herb	1-5%	N

Site Photographs



Photo 14-1 View of area that was mowed with tractor and rotary cutter in foreground and herbaceous-dominated opening in background (8.17.20).



Photo 14-2 Area illustrating rotary cutting in the foreground and resulting aspen resprouts, with adjacent quaking aspen trees and unmowed beaked hazel (8.17.20).



Photo 14-3 Area that was cut with a Davco mower exhibiting good regrowth of herbaceous cover, including bracken fern. The area on the right-hand side of the photo is where cutting was accomplished under more mature aspen in an attempt to soften edge effect (8.17.20).

Project Manager Summary

Project Site Location: Beltrami Island State Forest

Outdoor Heritage Fund Parcel Identification: Beltrami Island State Forest #1R

County: Beltrami

Year Completed: Spring 2017

Desired Outcomes: The main objective of this project was to utilize science-based best management practices to create high quality early successional nesting and brood rearing habitat adjacent to a deciduous forest edge for golden-winged warbler, American woodcock and associated early successional deciduous forest habitat species, such as ruffed grouse, rose-breasted grosbeak, veery and black-billed cuckoo.

The final objective was to help the Department of Natural Resources Area Wildlife Office located at Norris Camp access funding for habitat projects, which is challenging to utilize within their management geography. The remoteness of this location made it very difficult to attract potential contractors to complete early successional habitat projects and also made it very challenging for partners such as ABC to provide project management assistance, especially during the winter months. However, due to these same circumstances, Norris Camp has unique access to equipment and staff necessary to complete these habitat treatments in-house given budget resources to operate equipment. As such, a small pool of project funds was made available to Norris Camp through the Statewide Integrated Financial Tools (SWIFT) system via an ABC Outdoor Heritage Fund grant amendment that allowed Norris Camp to complete habitat projects, including this project, using Young Forest Conservation grant funds.

Site Description: This site is located in the Beltrami Island State Forest in the N. Minnesota & Ontario Peatlands subsection of the Laurentian Mixed Forest Province as defined by the MN DNR Ecological Classification System. Upland soils in this area are characterized by a sandy-loamy to sandy haplaquent or psammequent. Neighborhood soil series include Cormont, Grygla, and Borofibrist. Slope/relief range average only of 0-10% within the project sites.

Due to the presence of upland soils and dry conditions, project sites were completed in spring 2017. Sites were accessed using existing forest roads and logging trails. No wetlands or streams were crossed in order to access this project site. A cultural resources review was completed and no potential impacts were noted.

Project Area(s): 9.98 acres

Contractor: MN DNR Norris Camp Staff

Equipment Used: Skidsteer w/Davco brushmower attachment

Pre-treatment Conditions: This project is composed of a series of small project sites adjacent to a mature forest edge dominated by aspen. Project sites total approximately 10 acres within an approximately 40 acre tract. Project sites range from 0.35 acres to 3.82 acres in size and are deliberately located within close proximity of each other. Sites contained a mix of alder, hazel, balm of gilead and aspen from 1-3" within a surrounding forest mosaic of mature aspen. Tree age and density increases with proximity to the forest edge.

Post-treatment Conditions:



Post-treatment habitat conditions included the cutting/thinning of the dense shrub cover and dispersed aspen and balm of gilead regeneration to create a feathered edge and gradual transition to the mature aspen forest. This included cutting into the forest understory under canopy without damaging the mature forest overstory to ensure a gradual transition. An additional benefit was that the resultant aspen regeneration has been vigorous and has extended farther out into the adjacent open areas on some sites.

Project Notes: The Red Lake Wildlife Management Area and the Beltrami Island State Forest as well as those lands within the Beltrami Island Land Utilization Project provide a very large and vital watershed and unique land base of contiguous forest, brushlands and peatlands, making this a highly desirable region to complete collaborative habitat projects. The main limiting factor was that the remoteness of this area made it very difficult travel location for project oversight and also very challenging or impossible to engage contractors to complete habitat projects. It must be stated that these projects could not have been completed without the tremendous efforts of the staff at Norris Camp, including Gretchen Mehmel and Charlie Tucker. Project sites throughout their management region could not have been completed without their collaboration in every phase of project planning and implementation.

Despite these challenges, ABC was able to allocate project funding to allow the DNR Wildlife Management Office at Norris Camp to utilize Minnesota Outdoor Heritage Funds to pay for the use of a DNR owned D4 dozer, skidsteer, and tractor with brush mowing attachments to complete young forest habitat projects within their management geography.

15) Beltrami Island State Forest Enhancement 2

Project Background

Project Name:

American Bird Conservancy Young Forest Conservation (ML 2013) Phase I

Project Site: Beltrami Island State Forest; Beltrami #2R

Township/Range Section: Township 159N Range 36W Section 17

Project Manager / Affiliated Organization: Pete Dieser, American Bird Conservancy

Fund: OHF Fiscal Year Funds: 2013

Project Start Date: 1/1/2014

Predominant Habitat type: Forest

Additional Habitat types: Forest , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

- What are the specific project components and treatments?
 Brush and small tree mowing utilizing agricultural tractor-mounted rotary cutter.
- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Records retained by American Bird Conservancy. Information regarding project also retained by MN DNR Red Lake WMA staff at Norris Camp office.

Records are also retained by American Bird Conservancy, Including:

- Project Site Location (GIS shapefiles)
- Desired Outcomes
- Site Description
- Project Area
- Contractor
- Equipment Used
- Pre-treatment Conditions
- Post-treatment Conditions (including photos)



• Project notes

3. What are the stated goals of the project?

Create early successional habitat comprised of herbaceous and young woody regrowth.

4. What are the desired outcomes of achieving the stated goals of the project?

Create high quality early successional nesting and brood rearing habitat to benefit goldenwinged warbler, American woodcock and associated early successional deciduous forest habitat species, such as ruffed grouse, rose-breasted grosbeak, veery and black-billed cuckoo, and other species that rely on early successional habitat.

- Were measures of restoration success identified in plans? Yes
 If yes, list specific measurements.
 Acres of brushland restored
- 6. Are plan Sets available? No Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:

No plan set developed as construction activities were not required/involved. Maps developed by American Bird Conservancy.

7. Provide list of best management practices, standards, guidelines identified in plan set?

Best Management Practices applied during field execution of the project included:

- Adhering to MN DNR Op Order 113 Invasive Species protocols
- Utilizing appropriate-sized equipment to accomplish mowing of woody growth
- Maintaining level of mowing equipment approximately 8-12 inches above soil surface to minimize risk of soil disturbance
- Conducting work during frozen ground conditions to minimize risk of rutting and soil compaction

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation?

Yes

Original plan was to utilize contractor with equipment such as a forestry mower. Contractors were not available to complete this work, which resulted in utilizing MN DNR staff and equipment (tractor/rotary cutter) for work.

9. In what ways did alterations change the proposed project outcome?

Outcomes of work were substantially the same as what was anticipated if a contractor with a forestry mower had been utilized, including the height of mowing, size of material that was mowed and the extent of areas mowed.

Site Assessment

Field Review Date: 8/17/2020

Field Visit Attendees: Peter Dieser, American Bird Conservancy (ABC); Charlie Tucker, MN DNR Red Lake WMA; Gina Quiram, MN DNR; Paul Bockenstedt, Stantec

10. Surrounding Landscape Characteristics:

This site is located in the N. Minnesota & Ontario Peatlands subsection of the Laurentian Mixed Forest Province as defined by the MN DNR Ecological Classification System.

11. Site Characteristics:

a. Soil Series:

Soils in this area are characterized by a sandy-loamy to fibric haplaquent, psammequent or borofibrist. Neighborhood soil series include Cormont, Grygla, and Borofibrist.

b. Topography:

Slope/relief range average 0-15% within the project site. The vast majority of areas observed were actually 0-2% slope.

c. Hydrology:

Relatively little vertical relief in the landscape results in the interspersion of wet meadow, shrub carr, and upland shrubland/woodland/forest. The water table is reported to be at or near the surface for extended periods, particularly during wetter than average periods.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Plant community is comprised of scattered mature quaking aspen and balsam poplar interspersed by forestry mowed areas that include resprouting woody vegetation, grasses, sedges, forbs and ferns. The plant species richness is good with many species having relatively low amounts of total cover and just a few that are generally dominant, including bluejoint grass, quaking aspen and willows. No invasive plant species were observed during the field visit. See attached plant list for cover by species.

12. Is the plan based on current science? Yes

The species project is intended to benefit are known to utilize the habitat composition and structure that resulted from vegetation management work.

13. List indicators of project goals at this stage of project:

There is good structural arrangement of habitat, including variations in habitat that include herbaceous vegetation and young, woody plants.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes

15. Are corrections or modifications needed to achieve proposed goals?

No

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Accepted practice for long-term management of early-successional (woody regrowth and herbaceous) habitat requires periodic mowing and/or fire. The main limiting factor cited by ABC staff was that the remoteness of this area made it very difficult travel location for project oversight and also very challenging or impossible to engage contractors to complete habitat projects. ABC indicated that this project would not have been possible without the assistance and engagement of Gretchen Mehmel, Charlie Tucker and other MN DNR staff. The long-term challenge for maintaining early successional habitats such as the ones in this project is the need to periodically re-mow or burn approximately every 6-10 years. Limited staff and equipment resources are perhaps the greatest single challenge to regularly rejuvenating areas managed as part of this project.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No. Activities conducted for this project are supportive of improving habitat for species of wildlife with an affinity for early successional habitats.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain. No

19. Additional comments on the restoration project.

Challenges in locating a contractor to complete this project resulted in the need to utilize MN DNR staff and equipment to complete this work. Project manager indicated that although hiring a contractor would have been preferred, having the flexibility in this unusual case to engage MN DNR to complete the work was vital to completing the project.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Exceeded the stated goals.

21. The project will:

Likely exceed proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

Subjective evaluations and observations by natural resources professionals indicates that managed areas are indeed attracting species of wildlife, particularly birds identified as target species, that depend on early successional habitats comprised of herbaceous vegetation and young woody growth. As well, there is an ongoing collaborative region-wide research effort taking place that will quantify the effects of treatment on bird communities – while the research has not been published yet, it will be an important contribution and is a good example of a value-added benefit of this project.

23. Site Assessor(s) Conducting Review:

Paul Bockenstedt

Site Maps and Vegetation Tables



Figure 15-1 Pretreatment aerial image of project site, dominated by dense brush and thin aspen regeneration from 1-3" DBH (2013 True Color).



Figure 15-2 Post-treatment aerial image of project site after was work completed in winter 2014, illustrating brush and aspen regeneration (Google Earth 2020).

 Table 15-1 Meander vegetation survey results for Beltrami Island State Forest Site #1.

Scientific Name	Common Name	Cover	Species
Populus tramulaidas	Quaking aspon	F 25%	Status
Populus tremuloides		5-25%	N
Spiraga alba	Maadowswaat	1 5%	N
Spirued dibu	Nerrowleaf blueberry	F 25%	N
	Narrowlear blueberry	5-25%	N
Corylus cornula	Beaked hazel	5-25%	N
Salix bebblana	Bebb S WIIIOW	5-25%	IN N
	Pussy Willow	5-25%	IN N
Ainus incana	Speckled alder	5-25%	IN
Amelanchier cf. arborea	Juneberry	1-5%	IN NI
Rubus flagellaris	Dewberry	5-25%	IN N
Ceanothus americanus	New Jersey tea	0-1%	N N
Rosa arkansana	Wild rose	1-5%	N
Cornus sericea	Red-osier dogwood	5-25%	N
Prunus virginiana	Chokecherry	1-5%	N
Viburnum trilobum	Highbush cranberry	1-5%	N
Fraxinus nigra	Black ash	1-5%	N
Scirpus cyperinus	Woolgrass	5-25%	N
Calamagrostis canadensis	Bluejoint grass	5-25%	N
Carex cf. intumescens	Bladder sedge	1-5%	N
Carex scoparia	Broom sedge	1-5%	N
Bromus ciliatus	Fringed brome	5-25%	N
Glyceria striata	Reed manna grass	1-5%	N
Carex cf. gracillima	Graceful sedge	1-5%	N
Carex cf. brevior	Short-beak sedge	1-5%	N
Carex buxbaumii	Buxbaum's sedge	1-5%	N
Pteridium aquilinum	Bracken fern	1-5%	N
Apocynum cannabinum	Indian hemp	1-5%	N
Doellingeria umbellata	Flat-topped white aster	1-5%	N
Eutrochium maculatum	Spotted Joe-pye weed	5-25%	N
Solidago gigantea	Giant goldenrod	1-5%	N
Petasites sagittatus	Arrowleaf sweet coltsfoot	0-1%	N
Equisetum arvense	Scouring rush	0-1%	N
Fragaria virginiana	Wild strawberry	1-5%	N
Symphyotrichum punecium	Red-stemmed aster	1-5%	N
Chelone glabra	Turtlehead	0-1%	N
Solidago uliginosa	Bog goldenrod	0-1%	N
Cirsium altissimum	Tall thistle	0-1%	N
Cystopteris fragilis	Fragile fern	0-1%	N
Iris versicolor	Blue flag iris	1-5%	N
Galium labradoricum	Labrador bedstraw	0-1%	N
Thelypteris palustris	Marsh fern	1-5%	Ν

Scientific Name	Common Name	Cover Range*	Species Status**
Solidago canadensis	Canada goldenrod	0-1%	N
Vicia americana	American vetch	0-1%	N
Euthamia graminifolia	Grass-leaved goldenrod	1-5%	N
Lycopus virginicus	Bugleweed	1-5%	N
Geum aleppicum	Yellow avens	0-1%	N
Symphyotrichum ontarionis	Calico aster	0-1%	N

*0-1%, 1-5%, 5-25%, 25-50%, 50-75%, 75-100%

**N=native, I=introduced/nonnative

Site Photographs



Photo 15-1 View from roadside on south side of project site with forestry mowed brush and small trees resprouting, with matrix of grasses, sedges, forbs and ferns (8.17.20).



Photo 15-2 Pete Drieser of American Bird Conservancy in wet meadow opening that is surrounded by brush that is resprouting after forestry mowing (8.17.20).



Photo 15-3 Large opening that was mowed with tractor and rotary cutter. The relatively slow regrowth of woody resprouts is helping sustain the benefits of the management (8.17.20).

Project Manager Summary

Project Site Location: Beltrami Island State Forest

Outdoor Heritage Fund Parcel Identification: Beltrami Island State Forest #2R

County: Lake of the Woods

Year Completed: 1/1/2014-3/15/2014 Winter Project Season

Desired Outcomes: The main objective of this project was to utilize science-based best management practices to create high quality early successional nesting and brood rearing habitat for golden-winged warbler, American woodcock and associated early successional deciduous forest habitat species, such as ruffed grouse, rose-breasted grosbeak, very and black-billed cuckoo.

In the past, this site had been an aspen harvest that resulted in poor regeneration due to wetness in subsequent years. As such, a higher percentage of woody vegetation was cut, including additional aspen in some areas to encourage the complimentary objective of promoting a more vigorous second flush of aspen regeneration, creating more woody structural diversity throughout the site.

The final objective was to help the Department of Natural Resources Area Wildlife Office located at Norris Camp access funding for habitat projects, which is challenging to utilize within their management geography. The remoteness of this location made it very difficult to attract potential contractors to complete early successional habitat projects and also made it very challenging for partners such as ABC to provide project management assistance, especially during the winter months. However, due to these same circumstances, Norris Camp has unique access to equipment and staff necessary to complete these habitat treatments in-house given budget resources to operate equipment. As such, a small pool of project funds was made available to Norris Camp through the Statewide Integrated Financial Tools (SWIFT) system via an ABC Outdoor Heritage Fund grant amendment that allowed Norris Camp to complete habitat projects, including this project, using Young Forest Conservation grant funds.

Site Description: This project site is located on federal Land Utilization Project (LUP) lands within the Beltrami Island State Forest. This land is owned by the US Fish and Wildlife Service and is leased to the state of MN to be managed for wildlife and ecosystem services. This particular project site is also located within a designated ruffed grouse management area.

This site is located in the N. Minnesota & Ontario Peatlands subsection of the Laurentian Mixed Forest Province as defined by the MN DNR Ecological Classification System. Soils in this area are characterized by a sandy-loamy to fibric haplaquent, psammequent or borofibrist. Neighborhood soil series include Cormont, Grygla, and Borofibrist. Slope/relief range average only of 0-15% within the project site.

Due to the presence of wetland soils, all projects were completed under frozen ground conditions. Sites were accessed using existing forest roads and hunter-walking trails. No wetlands or streams were

crossed in order to access this project site. A cultural resources review was completed and no potential impacts were noted.

Project Area: 61.54 acres

Contractor: MN DNR Norris Camp Staff

Equipment Used: Agricultural tractor w/brushmower attachment

Pre-treatment Conditions: This project site was dominated by dense alder, willow, and aspen from 1-3" DBH with a mix of additional aspen (5+" DBH) distributed singly or in patches. The site had very dense alder and willow growth throughout the majority of the site, with a mix of poorly regenerating aspen in some areas.

Post-treatment Conditions:



Photo 15-4 Top site immediately post treatment. Bottom

Post-treatment habitat conditions included the cutting/thinning of the dense shrub cover and dispersed aspen regeneration throughout the site. Cut woody material averaged approximately 1-3" with some

shrub clumps having a higher aggregate DBH at their base. Larger individuals of any tree species, and a component of bush cover were retained as residual woody structure. One large legacy patch was retained in the center of the site. Some cutting of brush spp. did take place under mature trees without damaging them, especially in the northern extent of the site and within the legacy patch to create a feathered edge. It is once again notable that this site was cut more thoroughly than some similar project sites with the intention of providing the aspen regeneration within the site an opportunity to flush more vigorously than in the past. A more vigorous flush also provided habitat benefits for golden-winged-warbler, American woodcock and ruffed grouse.

Project Notes: The Red Lake Wildlife Management Area and the Beltrami Island State Forest as well as those lands within the Beltrami Island Land Utilization Project provide a very large and vital watershed and unique land base of contiguous forest, brushlands and peatlands, making this a highly desirable region to complete collaborative habitat projects. The main limiting factor was that the remoteness of this area made it very difficult travel location for project oversight and also very challenging or impossible to engage contractors to complete habitat projects. It must be stated that these projects could not have been completed without the tremendous efforts of the staff at Norris Camp, including Gretchen Mehmel and Charlie Tucker. Project sites throughout their management region could not have been completed without their collaboration in every phase of project planning and implementation.

Despite these challenges, ABC was able to allocate project funding to allow the DNR Wildlife Management Office at Norris Camp to utilize Minnesota Outdoor Heritage Funds to pay for the use of a DNR owned D4 dozer, skidsteer, and tractor with brush mowing attachments to complete young forest habitat projects within their management geography.

16) Caribou WMA Prairie Grazing

Project Background

Project Name: Caribou Wildlife Management Area Prescribed Burn

Project Site: Caribou Wildlife Management Area

Township/Range Section: Township 163 Range 45 Section 9

Project Manager / Affiliated Organization: Kim Washburn / Minnesota Deer Hunters Association (grant recipient organization) Jason Wollin / MN DNR (current contact)

Fund: OHF - CPL Fiscal Year Funds: 2015

Project Start Date: May 2015

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Forest , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

Prescribed fire and prescribed grazing were used to maintain open grassland habitat for local elk and sharp-tailed grouse. A minor amount of woody brush removal work was completed to improve the ability of ground vegetation to carry fire during a prescribed burn.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

MN DNR develops an annual grazing plan to rotate cattle through the WMA. For each prescribed burn event, a burn plan is developed. Data are located at the MN DNR Karlstad Area office in Karstad, Minnesota.

3. What are the stated goals of the project?

Use prescribed fire and rotational cattle grazing to maintain open, native grassland habitat and reduce the abundance of wood vegetation.

4. What are the desired outcomes of achieving the stated goals of the project? The desired outcome is large block of open grassland with scattered patches of woody vegetation to provide habitat for elk, sharp-tailed grouse and other wildlife species of the Tallgrass Aspen Parkland ecosystem.

Were measures of restoration success identified in plans? YesYes If yes, list specific measurements. Reduce the abundance of woody vegetation within the WMA.

6. Are plan Sets available? NoNo Have project maps been created? YesYes If yes, provide in "site maps" and list maps provided: Caribou WMA NE pastures

2020 Caribou WMA grazing schedule

7. Provide list of best management practices, standards, guidelines identified in plan set?

Best Management Practices can be broken into the practices used for the prescribed fire and the rotational grazing.

Prescribed fire:

- Burning the WMA every 2 to 3 years to reduce woody vegetation.
- Use ignition equipment such as ATV-mounted torches, helicopter-mounted torches that allow for large swaths of prairie to be burned efficiently.

Rotational grazing

- Using paddocks to focus grazing effort in specific locations for specific durations and excluding cattle to allow for rest and recovery by the vegetation.
- Grazing at a relatively high density for a short duration (7 to 10 days by 180 cow/calf pairs) before rotating to a new paddock. Each paddock gets grazed once per season.
- Grazing during the growing season only (typically June 1 through September 15).
- Adjusting the grazing schedule and locations based on when and if a prescribed burn occurred in the spring or is planned for the following fall or spring.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation? No

No alterations were made.

9. In what ways did alterations change the proposed project outcome? Not applicable.

Site Assessment

Field Review Date: 10/14/2020

Field Visit Attendees: Jason Wollin, Gina Quiram – MN DNR and Mark Pranckus - Cardno

10. Surrounding Landscape Characteristics:

The project site is located in Caribou WMA. The surrounding landscape is primarily a mix of open native wet and mesic prairies, sedge meadows with aspen stands and brushland interspersed. The project site is 2,800 acres within the larger 13,000+ acre Caribou WMA boundary.

11. Site Characteristics:

a. Soil Series:

Percy loam, 0 to 1 percent slopes, boulder Haug muck, 0 to 1 percent slopes Percy mucky loam, 0 to 1 percent slopes Grygla loamy fine sand, dense till, 0 to 1 percent slopes Cathro muck, dense till, 0 to 1 percent slopes Mavie fine sandy loam, dense till, 0 to 1 percent slopes Garnes fine sandy loam, dense till, 0 to 2 percent slopes, very stony Kratka and Strathcona soils, dense till, 0 to 1 percent slopes Pelan sandy loam, dense till, 0 to 2 percent slopes Enstrom loamy fine sand, dense till, 0 to 2 percent slopes Percy loam, 0 to 1 percent slopes, very cobbly Strandquist loam, dense till, 0 to 1 percent slopes Strathcona fine sandy loam, dense till, 0 to 1 percent slopes Grimstad fine sandy loam, dense till, 0 to 2 percent slopes

b. Topography:

The topography was extremely flat with little variation on elevation across the landscape.

c. Hydrology:

Due to the combination of soils and topography, the site can be relatively wet during periods of precipitation or snowmelt because the ability for water to infiltrate or runoff is limited. Without precipitation, the site can become relatively dry.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

The plant community consists of high quality native grassland cover. There is a mix of wet and mesic prairies. There are patches of aspens clones and shrubby vegetation intermixed within the primary grassland cover. The ground layer is well-developed. Most herbaceous vegetation is less than 3 feet in height. Invasive species were minimal and less than 5% of the total cover with Canada thistle being the most common invasive species.

12. *Is the plan based on current science?* YesYes

The combination of prescribed burning and prescribed rotational grazing is one of the best management practices to maintain and enhance large tracts of open grassland because the two actions provide a surrogate for processes that happened on the landscape scale prior to development.

13. List indicators of project goals at this stage of project:

The area has abundant sharp-tailed grouse populations and is able to maintain a local elk herd. Both species require relatively large blocks of open grassland habitat to persist. Invasive species were minimal. Woody vegetation, both trees and shrubs, were in scattered patches throughout the landscape and had minimal impact on the ability of the project area to burn adequately. Visual negative impacts such as cattle trails, overgrazed plants, and erosion due cattle grazing were nearly absent or minimal.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes. MN DNR staff has dedicated consistent and appropriate management efforts through their partnership with The Nature Conservancy (TNC) to implement management actions such as burning and grazing the project area at a frequency, duration, and intensity level that maintains the ecological integrity over the course of multiple years.

15. Are corrections or modifications needed to achieving proposed goals? None at this time.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

All proposed and planned future steps are practical and reasonable for maintaining the open, grassland communities. Regularly burning and grazing will continue to promote this. There are limited opportunities to improve project goals and outcomes at the current moment. Future potential challenges and limitations include limited capacity to complete the work and/or not having access to TNC staff for completing management actions. TNC and MN DNR manage their lands together in a landscape-perspective. Removing this partnership would potentially make management more difficult and time-consuming.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. The site is progressing on a trajectory that indicates success. MN DNR and TNC are actively engaged in managing the site.

19. Additional comments on the restoration project.

• MN DNR staff collaborate with special interest groups like the Rocky Mountain Elk Foundation and Minnesota Deer Hunters Association. Financial resources to complete management actions such as spot invasive species control, woody brush removal, and prescribed burning are not limiting. Reduced staffing in the area has limited staff capacity to manage projects. Without increased staff capacity to manage projects, it is unlikely more projects can be implemented.

- The partnership with TNC is extremely important. The loss or decrease in this partnership would seriously threaten the integrity of the landscape and cause woody species to become more abundant.
- Due to the location of Caribou WMA in the far northwest corner of Minnesota, contracting out management activities to private vendors or the Conservation Corps of Minnesota and Iowa is difficult due to increased travel costs and lack of availability due to travel logistics.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

The landscape was dominated by a diverse, native grassland community. Previous management actions including prescribed burning and rotational grazing are providing the open habitat required for elk and sharp-tailed grouse.

23. Site Assessor(s) Conducting Review: Mark Pranckus, Cardno

Site Maps, Project Plans or Vegetation Tables



Figure 16-1 Aerial photograph of the 2,800 project site from 2017. The yellow line represents the meander survey path taken to assess the plant community. (Source: Google Earth, accessed October 27, 2020, <u>https://www.google.com/earth</u>).



Figure 16-2 Aerial photograph of the project site showing the prescribed burn unit and individual rotational grazing paddocks used each year. Paddocks are separated with permanent fencing. Each paddock is generally about approximately 320 acres. Map provided by MN DNR Karlstad Area office staff.



Caribou Grazing: Approximate Schedule 2020

Figure 16-3 Map indicating the landownership and grazing schedule for Caribou WMA and adjacent lands owned and managed by TNC. A similar map is generated for the area annually. Map provided by MN DNR Karlstad Area office staff.

Table 16-1 List of plant species observed on 10/14/20 during a meander survey through the project area.

Scientific Name	Common Name	Cover Range	Species Status
Anemone quinquefolia	wood anemone	1-5%	native
Asclepias incarnata	swamp milkweed	1-5%	native
Asclepias syriaca	common milkweed	1-5%	native
Betula pumila	bog birch	1-5%	native
Bromus inermis	smooth brome	1-5%	non-native
Bromus kalmii	arctic brome	1-5%	native
Calamagrostis canadensis	bluejoint	10-25%	native
Carex gracillima	graceful sedge	1-5%	native
Carex sartwellii	Sartwell's sedge	5-10%	native
Carex stricta	tussock sedge	5-10%	native
Cirsium arvense	canada thistle	1-5%	non-native
Cirsium muticum	swamp thistle	1-5%	native
Cornus sericea ssp. sericea	red osier	5-10%	native
Dasiphora fruticosa	shrubby cinquefoil	1-5%	native
Elymus repens	quackgrass	1-5%	non-native
Fragaria virginiana	wild strawberry	5-10%	native
Galium boreale	northern bedstraw	1-5%	native
Hesperostipa spartea	porcupinegrass	5-10%	native
Lathyrus palustris	marsh vetchling	1-5%	native
Maianthemum canadense	wild lily-of-the-valley	1-5%	native
Melilotus officinalis	yellow sweet clover	1-5%	non-native
Muhlenbergia richardsonis	mat muhly	5-10%	native
Parthenocissus quinquefolia	virginia creeper	1-5%	native
Populus tremuloides	quaking aspen	1-5%	native
Quercus macrocarpa	bur oak	1-5%	native
Rhamnus cathartica	common buckthorn	1-5%	non-native
Rosa arkansana	prairie wild rose	1-5%	native
Rosa woodsii	western wild rose	1-5%	native
Salix bebbiana	beaked willow	1-5%	native
Salix petiolaris	meadow willow	1-5%	native
Schizachyrium scoparium	little bluestem	5-10%	native
Solidago gigantea	late goldenrod	5-10%	native
Tanacetum vulgare	common tansy	1-5%	non-native
Taraxacum officinale	common dandelion	1-5%	non-native
Thalictrum dasycarpum	purple meadow rue	1-5%	native
Typha angustifolia	narrowleaf cattail	1-5%	non-native
Vicia sativa	common vetch	1-5%	non-native
Xanthium strumarium	cocklebur	1-5%	native
Zizia aurea	golden alexanders	1-5%	native

Site Photographs



Photo 16-1 Example of vegetation in project area. Cattle grazed in this area in July for approximately seven days. (Caribou Wildlife Management Area, photo taken during site visit 10/14/2020).



Photo 16-2 Example of the existing vegetation in the project area. Shrubs are scattered shrubs are present within the grassland cover. Aspen patches are scattered throughout the unit. (Caribou Wildlife Management Area, photo taken during site visit 10/14/2020).

17) Caribou WMA Prairie Invasives Treatment

Project Background

Project Name: Caribou Wildlife Management Area Invasive Species Treatment

Project Site: Caribou Wildlife Management Area

Township/Range Section: Township 163 Range 46 Section 1, 12

Project Manager / Affiliated Organization: Kim Washburn / Minnesota Deer Hunters Association (grant recipient organization) Jason Wollin / MN DNR (current contact)

Fund: OHF - CPL Fiscal Year Funds: 2015

Project Start Date: May 2015

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Forest , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

- 1. What are the specific project components and treatments? Invasive plant species mapping and spot spray treatments.
- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Limited information was available for review. A map of the treatment area was provided. Data are located at the MN DNR Karlstad Area office in Karstad, Minnesota.

- 3. What are the stated goals of the project? Treat invasive plant species, in particular bird's-foot trefoil, within an area of the Caribou Wildlife Management Area.
- 4. What are the desired outcomes of achieving the stated goals of the project? The desired outcome is to reduce the abundance of bird's-foot trefoil and limit the spread throughout Caribou Wildlife Management Area to preserve the ecological integrity of the native grassland communities to provide habitat for elk, sharp-tailed grouse and other wildlife species of the Tallgrass Aspen Parkland ecosystem.



- 5. Were measures of restoration success identified in plans? Yes
 If yes, list specific measurements.
 Reduce the abundance of bird's-foot trefoil and other invasive species within the WMA.
- Are plan Sets available? No Have project maps been created? Yes
 If yes, provide in "site maps" and list maps provided:
 2017 CCM CPL Treatment Map
- 7. Provide list of best management practices, standards, guidelines identified in plan set?

Mapping known areas of invasive plant species makes treatments more effective. Mobile GIS technology was incorporated into the data collection methodology making information transfer more efficient and able to be shared among project partners.

Selecting an herbicide (Milestone[™]) that is labeled for use on natural areas due to a formulation that can limit off-target damage to native vegetation while targeting undesirable invasive plant species. Using a selective herbicide over a broad spectrum herbicide is generally the best practice.

Conducting treatments over a period of years. Work began in 2015 and continued through 2017. Multiple year treatments allow for the seed bank to be addressed and target individuals or populations that were missed during previous applications.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation? No

No alterations were made.

 In what ways did alterations change the proposed project outcome? Not applicable.

Site Assessment

Field Review Date: 10/14/2020

Field Visit Attendees: Jason Wollin, Gina Quiram – MN DNR and Mark Pranckus - Cardno

10. Surrounding Landscape Characteristics:

The project site is located in Caribou WMA. The surrounding landscape is primarily a mix of open native wet and mesic prairies, sedge meadows with aspen stands and brushland interspersed. The project site is 640 acres within the larger 13,000+ acre Caribou WMA boundary.

11. Site Characteristics:

a. Soil Series:

Northwood muck, dense till, 0 to 1 percent slopes Percy loam, 0 to 1 percent slopes, bouldery Percy mucky loam, 0 to 1 percent slopes Pelan sandy loam, dense till, 0 to 2 percent slopes Haug muck, 0 to 1 percent slopes Kratka and Strathcona soils, dense till, 0 to 1 percent slopes Berner muck, dense till, 0 to 1 percent slopes Foxhome sandy loam, dense till, 0 to 2 percent slopes Mavie fine sandy loam, dense till, 0 to 1 percent slopes Strandquist loam, dense till, 0 to 1 percent slopes Garnes fine sandy loam, dense till, 0 to 2 percent slopes, very stony

b. Topography:

The topography was extremely flat with little variation on elevation across the landscape.

c. Hydrology:

Due to the combination of soils and topography, the site can be relatively wet during periods of precipitation or snowmelt because the ability for water to infiltrate or runoff is limited. Without precipitation, the site can become relatively dry.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

The plant community consists of high quality native grassland cover. There is a mix of wet and mesic prairies. There are patches of aspens clones and shrubby vegetation intermixed within the primary grassland cover. The ground layer is well-developed. Most herbaceous vegetation is less than 3 feet in height. Invasive species were minimal and less than 5% of the total cover with Canada thistle being the most common invasive species.

12. Is the plan based on current science? Yes

Mapping invasive species and using a very prescriptive, selective herbicide is one of the best practices for invasive species management. This unit is also burned on a relatively frequent basis (once every 3 to 5 years), which also maintains and enhances large tracts of open grassland.

13. List indicators of project goals at this stage of project:

Minimal invasive species cover was observed during the site visit and the native plant community appeared to be in high quality condition. The area has abundant sharp-tailed grouse populations and is able to maintain a local elk herd. Both species require relatively large blocks of open grassland habitat to persist.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes. MN DNR staff has dedicated consistent and appropriate management efforts through their partnership with The Nature Conservancy (TNC) to implement management actions such as herbicide treatments and prescribed burning at a frequency, duration, and intensity level that maintains the ecological integrity over the course of multiple years.

15. Are corrections or modifications needed to achieving proposed goals? None at this time.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

All proposed and planned future steps are practical and reasonable for maintaining the open, grassland communities. Regular monitoring and follow up applications will target invasive plant species before they have the opportunity to spread throughout the WMA. There are limited opportunities to improve project goals and outcomes at the current moment. Future potential challenges and limitations include continued invasive plant species pressure from adjacent private lands, limited capacity to complete the work and/or not having access to TNC staff for completing management actions. TNC and MN DNR manage their lands together in a landscape-perspective. Removing this partnership would potentially make management more difficult and time-consuming.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. The site is progressing on a trajectory that indicates success. MN DNR and TNC are actively engaged in managing the site.

19. Additional comments on the restoration project.

- MN DNR staff collaborate with interest groups like the Rocky Mountain Elk Foundation and Minnesota Deer Hunters Association. Financial resources to complete management actions such as spot invasive species control, woody brush removal, and prescribed burning are not limiting. Reduced staffing in the area has limited staff capacity to manage projects. Without increased staff capacity to manage projects, it is unlikely more projects can be implemented.
- The partnership with TNC is extremely important. The loss or decrease in this partnership would seriously threaten the integrity of the landscape and cause woody species to become more abundant.
- Due to the location of Caribou WMA in the far northwest corner of Minnesota, contracting out management activities to private vendors or the Conservation Corps of Minnesota and Iowa is difficult due to increased travel costs and lack of availability due to travel logistics.
- MN DNR staff has observed that Milestone[™] can be effective at controlling invasive plant vegetation for several years, however, additional treatments are needed in the future to maintain the benefits.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will: Meet proposed outcomes. Confidence of outcome determination:

High.

22. Provide explanation of reason(s) for determination.

The landscape was dominated by a diverse, native grassland community. Previous management actions including selective herbicide applications and prescribed burning are providing the open habitat required for elk and sharp-tailed grouse.

23. Site Assessor(s) Conducting Review:

Mark Pranckus, Cardno

Site Maps, Project Plans or Vegetation Tables



Figure 17-1 Aerial photograph of the 640 project site from 2017. The yellow line represents the meander survey path taken to assess the plant community. (Source: Google Earth, accessed October 27, 2020, <u>https://www.google.com/earth</u>).



Figure 17-2 Aerial photograph of the project site showing the herbicide treatment unit. Map provided by MN DNR Karlstad Area office staff.

 Table 17-1 List of plant species observed on 10/14/20 during a meander survey through the project area.

Scientific Name	Common Name	Cover Range	Species Status
Carex pellita	woolly sedge	5-10%	native
Carex stricta	tussock sedge	5-10%	native
Cornus sericea ssp. sericea	red osier	5-10%	native
Danthonia spicata	poverty oatgrass	1-5%	native
Deschampsia cespitosa	tufted hairgrass	1-5%	native
Doellingeria umbellata var. pubens	flat-top aster	1-5%	native
Elymus trachycaulus ssp. subsecundus	slender wheatgrass	1-5%	native
Fragaria virginiana	wild strawberry	1-5%	native
Galium boreale	northern bedstraw	1-5%	native
Galium triflorum	sweetscent bedstraw	1-5%	native
Lotus corniculatus	birds-foot trefoil	1-5%	non-native
Panicum virgatum	switchgrass	5-10%	native
Phalaris arundinacea	reed canarygrass	1-5%	native
Rubus pubescens	creeping blackberry	1-5%	native
Salix bebbiana	beaked willow	5-10%	native
Salix discolor	pussy willow	1-5%	native
Solidago canadensis var. canadensis	canada goldenrod	1-5%	native
Solidago gigantea	late goldenrod	1-5%	native
Spartina pectinata	prairie cordgrass	10-25%	native
Symphyotrichum lanceolatum var. hesperium	panicled aster	1-5%	native
Thalictrum dasycarpum	purple meadow rue	1-5%	native
Site Photographs



Photo 17-1 Example of vegetation in project area. (Caribou Wildlife Management Area, photo taken during site visit 10/14/2020).



Photo 17-2 Example of the existing vegetation in the project area. Shrubs are scattered shrubs are present within the grassland cover. Aspen patches are scattered throughout the unit. (Caribou Wildlife Management Area, photo taken during site visit 10/14/2020).

18) Caribou Falls Conifer Regeneration Revisit

Legacy Fund Restoration EvaluationsSee Appendix C for Project Background and Initial
Project EvaluationProject Name: Restoration of Critical Forest Habitat
in Northeast MNProject Site: Caribou Falls State WaysideProject Manager / Affiliated Organization: Chris
Dunham, The Nature ConservancyFund: OHF Fiscal Year Funds: 2010County: Lake
Primary Activity: Forest Restoration
Project Size: 60 Acres
Project Completed: 2012

Revisit Site Assessment

Field Review Date: 10/9/2020

Field Visit Attendees: Lucas Mueller, Wade Johnson

- What are the stated goals of the project?
 To improve upland forest habitat, reforest under-stocked stands, and increase productivity and diversity of commercially and ecologically important long-lived conifer forests in northeast Minnesota.
- 2. What are the desired outcomes of achieving the stated goals of the project? Increased diversity of tree species composition and stand stocking levels silviculturally appropriate to each site. Specifically, an increased presence of viable long-lived conifer species free of browse pressure and likely to recruit into the overstory.
- Please note any substantive changes to the site characteristics since last site assessment.
 Cedar trees have undergone a greater die-out than pine or spruce. Planted white pines appear to have a 70% success rate. Modifications were made to fencing onsite.

4. Is the plan based on current science? Yes

Forest management prescriptions were developed collaboratively between forestry, ecological, and wildlife experts participating in the Manitou and Sand Lake Seven Beavers Collaboratives using an Ecological Classification System to design treatments which resemble the natural succession of northern mixed mesic forests. All sites were checked against the State Natural Heritage Database for any rare/threatened features prior to any work being done, and those sites listed as heritage features present were further ground surveyed to ensure project work did not threaten the integrity of those species.

5. List indicators of project goals at this stage of the project.

Establishment of an adequate stocking of desirable long lived conifer species, reasonably free of browse pressure and competition for growing space. Sites have been established on a trajectory to be mature forests with diverse overstory species composition within 50 years.

The Caribou Falls Wayside site has excellent survival with fenced white pine, good survival with fenced cedar but less than pine, excellent survival with unfenced white spruce. 2012 budcap sweep revealed very poor survival of white pine and cedar outside of fences.

6. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?

Project design is appropriate to restoring a significant long term conifer component back into these systems that will provide improved wildlife habitat, water quality, and forest productivity. Ongoing regular maintenance of browse protection tubes/fencing will be necessary for at least several more years until trees are above deer/moose browse lines and free-to-grow from competition. Some pruning/thinning stand improvement activities may also be necessary to ensure the best recruitment into the overstory, and will require periodic monitoring of site conditions to determine optimal treatment schedule.

7. Are corrections or modifications needed to meet proposed outcomes?

White pines should be pruned, and empty cages should be replanted to account for die-offs.

8. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Long-term management accounted for in the project plan is reasonable and necessary until originally planted trees and replants are above browse lines.

9. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Project activities do not detract from existing habitat and restoration measures have created new forest habitat.

10. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. Density of mature and younger planted tree species on site indicates a trajectory toward desired mixed hardwood-conifer forest type. Ongoing monitoring and maintenance by MN DNR Parks and Trails is will support this.

11. Additional comments on the restoration project.

This project appears to have met its proposed outcomes, but should continue to be monitored for changes.

Revisit Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

12. The project has:

Achieved the stated goals.

13. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

14. Provide explanation of reason(s) for determination.

The site has achieved the outcome of increasing presence of long-lived conifer species free of browse pressure and likely to recruit into the overstory. Continued management of the area by MN DNR Parks as a natural area will support this outcome.

15. Site Assessor(s) Conducting Review:

Lucas Mueller, Wenck Associates

Appendix A: Revisit Site maps, Project plans or Vegetation tables



Figure 18-1 Map showing CPL project sites for forest restorations in St. Louis, Cook, and Lake Counties.



Figure 18-2 Map showing CPL project sites for forest restorations in Caribou Falls Wildlife Management Area.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Betula nanvrifera	Paper Birch	25-50%	Not Planted	Native
Dinus strobus	Fastern White Pine	5-15%	Planted	Native
Pinus strobus	White Spruce	5-15%	Planted	Native
Thuig agaidantalia	White Coder	J-1J/0	Planted	Native
	white Cedar	1-5%	Fianteu Nat Dianta d	Native
Acer spicatum	Mountain Maple	1-5%	Not Planted	Native
Corylus americana	Common Hazelnut	25-50%	Not Planted	Native
Diervilla lonicera	Bush Honeysuckle	25-50%	Not Planted	Native
Rubus parviflorus	Thimbleberry	5-25%	Not Planted	Native
Amelanchier	Mountain	4 50/	Not Planted	Native
bartramiana	Serviceberry	1-5%		
Cornus rugosa	Dogwood	1-5%	Not Planted	Native
Vaccinium sp.	Blueberry sp.	1-5%	Not Planted	Native
Rosa sp.	Rose sp.	1-5%	Not Planted	Native
Eurybia	Large Loof Actor		Not Planted	Native
macrophylla	Large Lear Aster	25-50%		
Apocynum	Spreading Dogbane	5-25%	Not Planted	Native
androsaemifolium	ob. coc9 - c9ccc			
Symphyotrichum	Sky Blue Aster	1_5%	Not Planted	Native
oolentangiense	Sky Dide Aster	1-370		
Pteridium aquilinum	Bracken Fern	5-25%	Not Planted	Native
Carex pensylvanica	Pennsylvania Sedge	5-25%	Not Planted	
Oenothera biennis	Common Evening Primrose	1-5%	Not Planted	Native
Elymus hystrix	Bottle Brush Grass	1-5%	Not Planted	Native
Elymus canadensis	Canada Wild Rye	1-5%	Not Planted	Native
Calamagrostis canadensis	Canada Bluejoint	1-5%	Not Planted	Native

Table 18-1 List of plants observed 10/09/2020 during a meander survey through the project area.

Appendix B: Revisit Site Photographs



Photo 18-1 Replanted pine trees and installed fencing at the Caribou Falls Wayside site.



Photo 18-2 A planted cedar tree and protective tree cage.





Minnesota Department of Natural Resources Minnesota Board of Water and Soil Resources

Appendix C: Initial Project Evaluation

*Fields in original evaluation form may vary. Information was translated to newest version as applicable.

Project Background

Project Name: Restoration of Critical Forest Habitat in Northeast MN

Project Location: Lake County

Township/Range Section: Various

Project Manager / Affiliated Organization: Doug Thompson, The Nature Conservancy

Fund: OHF Fiscal Year Funds: 2010

Project Start Date: 2008

Predominant Habitat type: Forest

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

16. What are the specific project components and treatments?

Planting of white spruce, white pine, and white cedar trees. Installation of tree tubes and construction of tree enclosures around white pine and cedar trees. Treatment with plantskydd deer repellent at the Hut Two Rd Finland site. Budcapping of trees.

17. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

The project is guided by the goals in the MN Forest Resources Council's Northeast and North Central Landscape Plans, DNR Subsection Forest Resource Management Plans, and County forest management plans. Individual site prescription worksheets are available from the local land managers.

18. What are the stated goals of the project?

To improve upland forest habitat, reforest under-stocked stands, and increase productivity and diversity of commercially and ecologically important long-lived conifer forests in northeast Minnesota.

19. What are the desired outcomes of achieving the stated goals of the project?

Increased diversity of tree species composition and stand stocking levels silviculturally appropriate to each site. Specifically, an increased presence of viable long-lived conifer species free of browse pressure and likely to recruit into the overstory.

20. Were measures of restoration success identified in plans? No

If yes, list specific measurements.

No quantifiable restoration measures were described in the plans. Observation of the restored forest for increased diversity of species and presence of long-lived conifer species could be used as a measure of success.

21. Are plan Sets available? No Have project maps been created? Yes If yes, provide in Appendix A and list Maps provided:

CPL 100-111: Restoration of Critical Forest Habitat in Northeast MN. Cook, Lake, and St. Louis Counties LSOHC Northern Forest Planning Section. November 2009.

22. Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?

Site prep and timber harvests adhered closely to best management practices described in the Minnesota Site-level Forest Management Guidelines, and planted/seeded tree species selection are appropriate to each site according to the MN DNR's Tree Suitability Index developed by the Ecological Classification Program. This plan is based on current science.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

23. Were alterations made to the plan during project implementation? No

No alterations were made during project implementation.

24. In what ways did alterations change the proposed project outcome? No alterations were made during project implementation.

Site Assessment

Field Review Date: 8/24/2012

Field Visit Attendees: Jeff Busse MN DNR, Wade Johnson MN DNR

25. Surrounding Landscape Characteristics:

Project sites are primarily upland northern mesic mixed forest communities (MHn45 and FDn43) at various successional growth stages and condition, and are surrounded by large intact tracts of forestland.

26. Site Characteristics:

f. Soils:

In general sites are situated on a scoured bedrock terrain with a shallow non-calcareous sandyloam, loamy, or fine-sandy drift often gravelly and occassionally stony.

g. Topography:

Moderately rolling landscape, with occassional steep rugged terrain.

h. Hydrology:

Droughty well drained upland forest community matrix intersperced with surface seeps and low vernal pool and streams throughout.

i. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

In general project sites consist of marginal forest stands of early-successional species (birch/aspen/balsam) in a transitional growth stage marked by significant mortality of low vigor, over-mature canopy trees. The dominant trees in many of these site are declining due to a variety of factors including: age, ice storm, snow-loading, and wind damage. These sites are mostly poorly stocked (15 to 60 sq ft BA), with heavy grass/shurb growth preventing adequate levels of natural regeneration of desirable tree species. See Table 18-1 below.

j. Vegetation B: Meander Search Species List (as appropriate for site)

Click here to enter text.

27. Is the plan based on current science? Yes

Forest management prescriptions were developed collaboratively between forestry, ecological, and wildlife experts participating in the Manitou and Sand Lake Seven Beavers Collaboratives using an Ecological Classification System to design treatments which resemble the natural succession of northern mixed mesic forests. All sites were checked against the State Natural Heritage Database for any rare/threatened features prior to any work being done, and those sites listed as heritage features present were further ground surveyed to ensure project work did not threaten the integrity of those species.

28. List indicators of project goals at this stage of project:

Establishment of an adequate stocking of desirable long-lived conifer species, reasonably free of browse pressure and competition for growing space. Sites have been established on a trajectory to be mature forests with diverse overstory species composition within 50 years.

Caribou Falls Wayside - excellent survival with fenced white pine, good survival with fenced cedar but less than pine, excellent survival with unfenced white spruce. 2012 budcap sweep revealed very poor survival of white pine and cedar outside of fences.

DNR land adjacent to Wolf Ridge - excellent white pine survival in tubes and in fences, good survival of cedar but less than pine.

Hut Two Rd Finland - excellent survival of white pine, cedar poor survival (should have used tree tubes), can get away with budcapping here as deer density much less than down on shore.

29. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Project design is appropriate to restoring a significant long term conifer component back into these systems that will provide improved wildlife habitat, water quality, and forest productivity. Ongoing

regular maintenance of browse protection tubes/fencing will be necessary for at least several more years until trees are above deer/moose browse lines and free-to-grow from competition. Some pruning/thinning stand improvement activities may also be necessary to ensure the best recruitment into the overstory, and will require periodic monitoring of site conditions to determine optimal treatment schedule.

30. Are corrections or modifications needed to achieve proposed goals?

The project is expected to achieve proposed goals without modification.

31. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Long-term management accounted for in the project plan is reasonable and necessary until trees are above browse lines.

32. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Project activities do not detract from existing habitat and restoration measures have created new forest habitat.

33. Are follow-up assessments needed? Explain.

Follow-up assessments are not required. Conifer restoration on these sites has been very successful. The seedling trees are well established, and on track to providing the future habitat benefits this project set out to accomplish.

34. Additional comments on the restoration project. None.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

35. The project has:

Achieved the stated goals. Confidence of outcome determination: High.

36. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

37. *Provide explanation of reason(s) for determination.*

A high level of confidence comes from the well established commitment of the multi-landowner land management collaboratives working to restore, maintain and enhance the broader landscapes of these project sites. The Manitou Landscape and Sand Lake Seven Beavers Collaboratives' support of these projects provides extra oversight and continuity that will help ensure continued monitoring and maintenance of these sites in the future, significantly improving the likelyhood of the project's success.

38. Site Assessor(s) Conducting Review:

Jeff Busse

Site maps, Project plans or Vegetation tables



Figure 18-3 Map showing CPL project sites for forest restorations in St. Louis, Cook, and Lake Counties.



Figure 18-4 Map showing CPL project sites for forest restorations in Caribou Falls Wildlife Management Area.

Site Photographs



Photo 18-3 A white Pine planted in a tree cage at Caribou Falls Wayside site.



Photo 18-4 A tree cage with geotextile ground cover at the Caribou Falls Wayside project site.

19) Crow Wing County Prairie Turkey Habitat Improvement

Project Background

Project Name: Crow Wing County Turkey Habitat Improvement

Project Sites: Crosslake #1-4, Fifty Lakes

Township/Range Section: Township 138N Range 27W Sections 4, 7, and 14

Project Manager / Affiliated Organization: Darren Mayers, Crow Wing SWCD (awarded), Melissa Barrick—Crow Wing SWCD District Manager (current contact)

Fund: OHF - CPL Fiscal Year Funds: 2014

Project Start Date: 1/6/15

Predominant Habitat type: Forest

Additional Habitat types: Prairie / Savana / Grassland , Choose an item.

Project Status: Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

The project aimed to restore 5 log landing sites on county property. These sites had slash piles which were burned. Following site clearing, which was done by heavy equipment, the soil was prepped by a drag pulled behind an ATV and seeded by National Wild Turkey Federation volunteers. In addition to native seeds, tillage radishes were included in the seeding to loosen the compacted soil.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Crow Wing Soil and Water Conservation District provided the CPL grant application, a document detailing the project goals, execution and mapped locations of the sites, and CPL accomplishment forms.



3. What are the stated goals of the project?

This project proposed to restore five existing forest openings located on CWC managed forest lands. The sites were used as log landings and thus had compacted soil with low quality vegetation. ATV's prepared soils for seeding of native grass and forbs, which had an emphasis on plants beneficial to pollinators. Native shrubs were planted on edge of forested opening to provide winter cover and forage for birds and wildlife.

4. What are the desired outcomes of achieving the stated goals of the project?

As stated in the grant application, desired outcomes are primarily to establish wildlife habitat, particularly brood habitat for turkey and ruffed grouse. Prior to management, the sites were dominated by of Timothy grass, and the project intends to replace this monoculture with a diverse mix that can provide resources for pollinators as well as habitat value for the species mentioned above.

- 5. Were measures of restoration success identified in plans? No If yes, list specific measurements. Click here to enter text.
- Are plan Sets available? Yes Have project maps been created? Yes
 If yes, provide in "site maps" and list maps provided:
 Included are maps of the landing sites visited.
- Provide list of best management practices, standards, guidelines identified in plan set? Slash removal through piling and burning.
 Soil preparation by ATV drag to loosen compacted soil.
 Broadcast seeding of native grasses and forbs.
 Establishment mowing and spot spraying during the first two growing seasons.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation? No

Click here to enter text.

9. In what ways did alterations change the proposed project outcome? Click here to enter text.

Site Assessment

Field Review Date: 8/6/2020

Field Visit Attendees: Gina Quiram—DNR Restoration Evaluations Specialist, David Schmitz—Great River Greening site assessor, Melissa Barrick—Crow Wing SWCD District Manager

10. Surrounding Landscape Characteristics:

The project areas are openings within managed forest land owned by the county, composed of mixed hardwoods with Sugar Maple, Aspen, Northern Red Oak, Basswood and Ash being the dominant tree species. Chokecherry, Sumac, Dogwoods, and Hazel typify the shrub layer. Tansy appears to be the most aggressive herbaceous invasive, as noted in the walk to the sites. Many small lakes and wetlands dot the landscape.

11. Site Characteristics:

a. Soil Series:

Sites are composed of the Eutrudepts-Graycalm-Rollins complex, pitted.

b. Topography:

Topogrophy of the area is generally flat to rolling.

c. Hydrology:

The project sites are all upland.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

During the site visit, Sites 1 and 2 were observed. Both sites showed a strong presence of the seeded species, particularly Little Bluestem, Black-eyed Susan, and Beebalm. Compared side by side, Site 1 a greater number of the seeded species were observed, and the cover of invasives—Tansy and thistles—was noticeably less. At Site 2, however, more diversity of natives not present in the seed mix was noted. At both sites there was up to 30% cover of raspberry, which can be expected to increase without appropriate maintenance. See Table 19-1. Native shrubs were also observed on the edges of the sites, although they did not appear to match the quantity originally planted. Approximately 30% of the planted shurbs have survived.

12. Is the plan based on current science? Yes

Burning of the brush piles followed by seeding and establishment mowing are consistent with current science. The project also introduced tillage radishes to loosen soil compaction. This has been shown to be a viable method to break up compacted agricultural fields, and has been implemented in natural areas as well, although results are not conclusive.

13. List indicators of project goals at this stage of project:

As indicated in the project documents, the site was primarily a Timothy grass monoculture before the project was undertaken. As can be seen in the vegetation survey, the prevalence of native vs. invasive species was not uniform between the two sites, with Site 1 being more representative of the seed mix, and Site 2 exhibiting more invasive species cover.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

The project plan did not provide details for how invasive species and undesirable species would be managed, nor what resources were available for maintenance. The abundance of tansy in the vicinity of the project sites would suggest that the species will pose a continual threat to the target plant community. Raspberry canes present on both sites would also require regular management in order for the site to maintain prairie vegetation.

15. Are corrections or modifications needed to achieving proposed goals? More aggressive maintenance will likely be needed to control tansy and brambles on the sites. Chemical and mechanical control would be the presumable techniques employed.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

It was not documented if follow up maintenance was conducted on the sites. Continued habitat benefits will require resource for maintenance to be identified.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No. Despite the challenges to maintaining the site, it maintains its structural character as an opening.

- **18.** Are follow-up assessments by the Restoration Evaluation Program needed? Explain. Yes, because it is unclear if maintenance resources will be available.
- 19. Additional comments on the restoration project.

Crow Wing SWCD acknowledged that it would approach future projects of this type with a stronger expectation that resources for maintenance would be required.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Minimally meet proposed outcomes. *Confidence of outcome determination:* Medium.

22. Provide explanation of reason(s) for determination.

Long term outcomes of the project will be dependent on management of invasive species, particularly tansy and thistles, as well as brambles and woody species.

23. Site Assessor(s) Conducting Review:

David Schmitz, Great River Greening

Site Maps, Project Plans or Vegetation Table



Crosslake

Figure 19-1 Yellow polygons indicate sites 1-3. Sites 1 and 2 were visited for the assessment



Crow Wing Logging Site Restoration Pollinator Habitat Mix

Date:	4/17/2014
Total Acres:	18.00
PLS lbs/acre:	10.00
Total PLS lbs:	180.00
Price/acre:	\$305.10
Total Price:	\$5,491.80

8740 77th Street NE Otsego, MN 55362

Seeds/sq ft: 6

~~ ~~	
60.63	

			% of	PLS		
	Scientific Name	Common Name	Mix	lbs/ac	Total PLS lbs	Bloom Season
Grasses:	Bouteloua curtipendula	Side-Oats Grama	25.00	2.50	45.00	
	Bouteloua gracilis	Blue Grama	7.00	0.70	12.60	
	Elymus canadensis	Canada Wild Rye	10.00	1.00	18.00	
	Elymus trachycaulus	Slender Wheat Grass	11.00	1.10	19.80	
	Panicum virgatum	Switchgrass	11.00	1.10	19.80	
	Schizachyrium scoparium	Little Bluestem	9.00	0.90	16.20	
	Sporobolus heterolepis	Prairie Dropseed	2.00	0.20	3.60	
Forbs:	Agastache foeniculum	Fragrant Giant Hyssop	0.75	0.08	1.35	Fall
	Aster oolentangiensis	Sky-Blue Aster	0.50	0.05	0.90	Fall
	Astragalus canadensis	Canada Milk Vetch	3.00	0.30	5.40	Summer
	Chamaecrista fasciculata	Partridge Pea	4.00	0.40	7.20	Fall
	Dalea candida	White Prairie Clover	3.00	0.30	5.40	Summer
	Dalea purpureum	Purple Prairie Clover	3.00	0.30	5.40	Summer
	Heliopsis helianthoides	Common Ox-Eye	2.00	0.20	3.60	Summer
	Liatris pycnostachya	Prairie Blazing Star	0.50	0.05	0.90	Summer
	Lupinus perennis	Wild Lupine	0.50	0.05	0.90	Spring
	Monarda fistulosa	Wild Bergamot	0.50	0.05	0.90	Summer
	Penstemon grandiflorus	Showy Penstemon	0.50	0.05	0.90	Spring
	Rudbeckia hirta	Black Eyed Susan	2.00	0.20	3.60	Summer
	Solidago rigida	Stiff Goldenrod	2.00	0.20	3.60	Fall
	Verbena hastata	Blue Vervain	1.75	0.18	3.15	Fall
	Zizia aurea	Golden Alexanders	1.00	0.10	1.80	Spring

Shipping and Sales Tax added to all applicable orders. Prices are good for 30 days.

Figure 19-2 Seed tag showing composition of seed mixed used on the sites. Approximately 65% of the species were observed on the site meanders,

Table 19-1 Plants observed at Site 1 are shown below. Notably, there are several native species that were not seeded, indicating that the site preparation stimulated the native seedbank. Meanders were approximately 25 minutes per site.

Scientific Name	Common Name	Site 1 Cover Range	Site 2 Cover Range	Species Planted/ Seeded	Species Status
Achillea millefolia	Yarrow	NP	1-5%	No	Native
Agastasche foeniculum	Blue Giant Hyssop	1-5%	NP	Yes	Native
Aguilegia Canadensis	Columbine	NP	1-5%	No	Native
Anaphalis margaritacea	Pearly Everlasting	NP	0-1%	No	Native
Andropogon gerardii	Big Bluestem	1-5%	NP	No	Native
Asclepias syriaca	Common Milkweed	NP	1-5%	No	Native
Astragalus Canadensis	Canada milk vetch	0-1%	NP	Yes	Native
Carex pensylvanica	Penn Sedge	1-5%	NP	No	Native
Carex sp.	Unknown sedge	1-5%	1-5%	No	Native
Centaurea stoebe	Spotted Knapweed	1-5%	NP	No	Invasive
Cirsium arvense	Candada Thistle	5-25%	5-25%	No	Invasive
Cirsium vulgare	Bull Thistle	0-1%	1-5%	No	Invasive
Dalea candida	White Prairie Clover	0-1%	0-1%	Yes	Native
Dalea purperea	Purple Prairie Clover	1-5%	NP	Yes	Native
Fragaria sp.	Wild Strawberry	1-5%	5-25%	No	Native
Helianthus helianthoides	False Sunflower	NP	1-5%	No	Native
Helianthus sp.	Sunflower species	1-5%	NP	No	Native
Helianthus tuberosa	Sunchoke	NP	1-5%	No	Native
Lupinus perennis	Lupine	1-5%	NP	Yes	Native
Monarda fistulosa	Beebalm	5-25%	5-25%	Yes	Native
Panicum virgatum	Switchgrass	1-5%%	1-5%	Yes	Native
Phluem pretense	Timothy	NP	1-5%	No	Non-native
Poa sp.	Bluegrass	NP	5-25%	No	Non-native
Potentilla sp.	Cinquefoil	NP	1-5%	No	Native
Prunella vulgaris	Self -heal	NP	1-5%	No	Native
Quercus rubra	Red Oak (seedling)	NP	0-1%	No	Native
Rubus sp.	Raspberry species	25-50%	25-50%	No	Native
Rudbeckia hirta	Black-eyed Susan	5-25%	NP	Yes	Native
Schizachyrium scoparium	Little Bluestem	1-5%	5-25%	Yes	Native
Seline latifolia	White Campion	NP	1-5%	No	Non-native
Solidago canadensis	Candada Goldenrod	5-25%	1-5%	No	Native
Solidago rigida	Stiff Goldenrod	NP	1-5%	Yes	Native
Sporobolus heterolepus	Prairie Dropseed	NP	1-5%	Yes	Native
Stachys hispida	Hedge Nettle	0-1%	0-1%	No	Native
Tanacetum vulgare	Tansy	5-25%	25-50%	No	Invasive
Trifolim pratense	Red Clover	1-5%	NP	No	Non-native
Vaccinium angustifolium	Blueberry	0-1%	NP	No	Native
Verbena hastate	Blue Vervain	1-5%	NP	Yes	Native
Zizia aurea	Golden Alexanders	NP	1-5%	Yes	Native

Site Photographs



Photo 19-1 Showing Site 1 and the funding sign, National Wild Turkey Federation sign. (photo taken during site visit 8/6/2020).



Photo 19-2 Site 1, pictured here, shows dense establishment of native grasses and blooming forbs, with pockets of Tansy visible as well. (photo taken during site visit 8/6/2020).



Photo 19-3 Photo showing site 2. Abundant floral resources are evident, although tansy is becoming dominant (photo taken during site visit 8/6/2020).



Photo 19-4 View across the opening at site 2. (photo taken during site visit 8/6/2020).



Photo 19-5 A tricolor bee, Bombus ternarius foraging on a tansy flower in site 2 (photo taken during site visit 8/6/2020).

20) DNR Forest, Wolf Ridge, Revisit

Legacy Fund Restoration Evaluations

See Appendix C for Project Background and Initial Project Evaluation

Project Name: Restoration of Critical Forest Habitat in Northeast MN – DNR Forest Adjacent to Wolf Ridge Revisit

Project Manager / Affiliated Organization: Chris Dunham / The Nature Conservancy

Fund: OHF Fiscal Year Funds: 2010



Revisit Site Assessment

Field Review Date: 10/9/2020

Field Visit Attendees: Chris Dunham – The Nature Conservancy, Lucas Mueller – Wenck Associates, Wade Johnson – MN DNR

1. What are the stated goals of the project?

To improve upland forest habitat, reforest under-stocked stands, and increase productivity and diversity of commercially and ecologically important long-lived conifer forests in northeast Minnesota.

- 2. What are the desired outcomes of achieving the stated goals of the project? Increased diversity of tree species composition and stand stocking levels silviculturally appropriate to each site. Specifically, an increased presence of viable long-lived conifer species free of browse pressure and likely to recruit into the overstory.
- 3. Please note any substantive changes to the site characteristics since last site assessment. Stands of pine and spruce have become stronger than those of cedar. Several brush outs have occurred since 2012, with the most recent in Summer 2020. Blister rust present and should be monitored on white pines.

4. Is the plan based on current science? Yes

Forest management prescriptions were developed collaboratively between forestry, ecological, and wildlife experts participating in the Manitou and Sand Lake Seven Beavers Collaboratives using an Ecological Classification System to design treatments which resemble the natural succession of northern mixed mesic forests. All sites were checked against the State Natural Heritage Database for any rare/threatened features prior to any work being done, and those sites listed as heritage features present were further ground surveyed to ensure project work did not threaten the integrity of those species.

5. List indicators of project goals at this stage of the project.

Establishment of an adequate stocking of desirable long-lived conifer species, reasonably free of browse pressure and competition for growing space. Sites have been established on a trajectory to be mature forests with diverse overstory species composition within 50 years.

The DNR land adjacent to Wolf Ridge has excellent white pine survival in tubes and in fences, and good survival of cedar, but less than pine.

6. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?

Project design is appropriate to restoring a significant long-term conifer component back into these systems that will provide improved wildlife habitat, water quality, and forest productivity. Ongoing regular maintenance of browse protection tubes/fencing will be necessary for at least several more years until trees are above deer/moose browse lines and free-to-grow from competition. Some pruning/thinning stand improvement activities may also be necessary to ensure the best recruitment into the overstory, and will require periodic monitoring of site conditions to determine optimal treatment schedule.

7. Are corrections or modifications needed to meet proposed outcomes?

Protective fences should be moved from the larger trees to the smaller ones. Larger pines need to be pruned, and blister rust should be monitored.

8. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Long-term management accounted for in the project plan is reasonable and necessary until originally planted trees and replants are above browse lines.

9. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Project activities do not detract from existing habitat and restoration measures have created new forest habitat.

10. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

Follow-up assessments are not required. Conifer restoration on these sites has been very successful. The seedling trees are well established, and on track to providing the future habitat benefits this project set out to accomplish.

11. Additional comments on the restoration project.

This project appears to have met its proposed outcomes, but should continue to be monitored for changes, and for success of long-term management.

Revisit Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium, or high degree of confidence in the determination.

12. The project has:

Achieved the stated goals.

13. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

14. Provide explanation of reason(s) for determination.

The site has achieved the outcome of increasing presence of long-lived conifer species free of browse pressure and likely to recruit into the overstory.

15. Site Assessor(s) Conducting Review:

Lucas Mueller, Wenck Associates



Appendix A: Revisit Site maps, Project plans or Vegetation tables



 Table 20-1 List of plants observed 10/09/2020 during a meander survey through the project area.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status	
Betula papyifera	Paper Birch	25-50%	Not Planted	Native	
Picea glauca	White Spruce	5-25%	Planted	Native	
Pinus strobus	Eastern White Pine	5-25%	Planted	Native	
Thuja occidentalis	White Cedar	1-5%	Planted	Native	
Alnus sp.	Alder Species		Not Planted	Native	
Corylus americana	Common Hazelnut	5-25%	Not Planted	Native	
Cornus rugosa	Dogwood	5-25%	Not Planted	Native	
Diervilla lonicera	Bush Honeysuckle	5-25%	Not Planted	Native	
Amelanchier	Mountain	1 50/	Not Planted	Native	
bartramiana	Serviceberry	1-5%			
Solidago canadensis	Canada Goldenrod	25-50%	Not Planted	Native	
Parthenocissus	Woodhing	E 2E0/	Not Planted	Native	
inserta	woodbine	5-25%			
Eurybia	Large Loaf Actor	1 E0/	Not Planted	Native	
macrophylla	Large Lear Aster	1-5%			
Oenothera biennis	Common Evening Primrose	1-5%	Not Planted	Native	
Desmodium sp.	Trefoil Species	1-5%	Not Planted	Native	
Pteridium aquilinum	Bracken Fern	1-5%	Not Planted	Native	
Calamagrostis canadensis	Canada Bluejoint	25-50%	Not Planted	Native	
Carex pensylvanica	Pennsylvania Sedge	1-5%	Not Planted	Native	

Appendix B: Revisit Site Photographs



Photo 20-1 White pine on the Wolf Ridge site in need of pruning and removal of tree cage.



Photo 20-2 Pruned white pines, spruce, and tree fence at the Wolf Ridge site.





Minnesota Department of Natural Resources Minnesota Board of Water and Soil Resources

Appendix C: Initial Project Evaluation

*Fields in original evaluation form may vary. Information was translated to newest version as applicable.

Project Background

Project Name: Restoration of Critical Forest Habitat in Northeast MN
Project Location: Lake / St. Louis / Cook County
Township/Range Section: Various
Project Manager / Affiliated Organization: Doug Thompson, The Nature Conservancy
Fund: OHF Fiscal Year Funds: 2010
Project Start Date: 2008
Predominant Habitat type: Forest
Additional Habitat types: Choose an item. , Choose an item.
Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

16. What are the specific project components and treatments?

Planting of white spruce, white pine, and white cedar trees. Installation of tree tubes and construction of tree enclosures around white pine and cedar trees. Treatment with plantskydd deer repellent at the Hut Two Rd Finland site. Budcapping of trees.

17. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

The project is guided by the goals in the MN Forest Resources Council's Northeast and North Central Landscape Plans, DNR Subsection Forest Resource Management Plans, and County forest management plans. Individual site prescription worksheets are available from the local land managers.

18. What are the stated goals of the project?

To improve upland forest habitat, reforest under-stocked stands, and increase productivity and diversity of commercially and ecologically important long-lived conifer forests in northeast Minnesota.

19. What are the desired outcomes of achieving the stated goals of the project?

Increased diversity of tree species composition and stand stocking levels silviculturally appropriate to each site. Specifically, an increased presence of viable long-lived conifer species free of browse pressure and likely to recruit into the overstory.

20. Were measures of restoration success identified in plans? No

If yes, list specific measurements.

No quantifiable restoration measures were described in the plans. Observation of the restored forest for increased diversity of species and presence of long-lived conifer species could be used as a measure of success.

21. Are plan Sets available? No Have project maps been created? Yes If yes, provide in Appendix A and list Maps provided:

CPL 100-111: Restoration of Critical Forest Habitat in Northeast MN. Cook, Lake, and St. Louis Counties LSOHC Northern Forest Planning Section. November 2009.

22. Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?

Site prep and timber harvests adhered closely to best management practices described in the Minnesota Site-level Forest Management Guidelines, and planted/seeded tree species selection are appropriate to each site according to the MN DNR's Tree Suitability Index developed by the Ecological Classification Program. This plan is based on current science.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

23. Were alterations made to the plan during project implementation? No

No alterations were made during project implementation.

24. In what ways did alterations change the proposed project outcome? No alterations were made during project implementation.

Site Assessment

Field Review Date: 8/24/2012

Field Visit Attendees: Jeff Busse, Wade Johnson

25. Surrounding Landscape Characteristics:

Project sites are primarily upland northern mesic mixed forest communities (MHn45 and FDn43) at various successional growth stages and condition, and are surrounded by large intact tracts of forestland.

26. Site Characteristics:

k. Soils:

In general sites are situated on a scoured bedrock terrain with a shallow non-calcareous sandyloam, loamy, or fine-sandy drift often gravelly and occassionally stony.

I. Topography:

Moderately rolling landscape, with occassional steep rugged terrain.

m. Hydrology:

Droughty well drained upland forest community matrix intersperced with surface seeps and low vernal pool and streams throughout.

n. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

In general project sites consist of marginal forest stands of early-successional species (birch/aspen/balsam) in a transitional growth stage marked by significant mortality of low vigor, over-mature canopy trees. The dominant trees in many of these site are declining due to a variety of factors including: age, ice storm, snow-loading, and wind damage. These sites are mostly poorly stocked (15 to 60 sq ft BA), with heavy grass/shurb growth preventing adequate levels of natural regeneration of desirable tree species. See Table 20-1 below.

o. Vegetation B: Meander Search Species List (as appropriate for site)

Click here to enter text.

27. Is the plan based on current science? Yes

Forest management prescriptions were developed collaboratively between forestry, ecological, and wildlife experts participating in the Manitou and Sand Lake Seven Beavers Collaboratives using an Ecological Classification System to design treatments which resemble the natural succession of northern mixed mesic forests. All sites were checked against the State Natural Heritage Database for any rare/threatened features prior to any work being done, and those sites listed as heritage features present were further ground surveyed to ensure project work did not threaten the integrity of those species.

28. List indicators of project goals at this stage of project:

Establishment of an adequate stocking of desirable long-lived conifer species, reasonably free of browse pressure and competition for growing space. Sites have been established on a trajectory to be mature forests with diverse overstory species composition within 50 years.

Caribou Falls Wayside - excellent survival with fenced white pine, good survival with fenced cedar but less than pine, excellent survival with unfenced white spruce. 2012 budcap sweep revealed very poor survival of white pine and cedar outside of fences.

DNR land adjacent to Wolf Ridge - excellent white pine survival in tubes and in fences, good survival of cedar but less than pine.

Hut Two Rd Finland - excellent survival of white pine, cedar poor survival (should have used tree tubes), can get away with budcapping here as deer density much less than down on shore.

29. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Project design is appropriate to restoring a significant long-term conifer component back into these systems that will provide improved wildlife habitat, water quality, and forest productivity. Ongoing regular maintenance of browse protection tubes/fencing will be necessary for at least several more years until trees are above deer/moose browse lines and free-to-grow from competition. Some pruning/thinning stand improvement activities may also be necessary to ensure the best recruitment into the overstory, and will require periodic monitoring of site conditions to determine optimal treatment schedule.

30. Are corrections or modifications needed to achieve proposed goals?

The project is expected to achieve proposed goals without modification.

31. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Long-term management accounted for in the project plan is reasonable and necessary until trees are above browse lines.

32. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Project activities do not detract from existing habitat and restoration measures have created new forest habitat.

33. Are follow-up assessments needed? Explain.

Follow-up assessments are not required. Conifer restoration on these sites has been very successful. The seedling trees are well established, and on track to providing the future habitat benefits this project set out to accomplish.

34. Additional comments on the restoration project.

None.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

35. The project has:

Achieved the stated goals. Confidence of outcome determination: High.

36. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

37. *Provide explanation of reason(s) for determination.*

A high level of confidence comes from the well established commitment of the multi-landowner land management collaboratives working to restore, maintain and enhance the broader landscapes of these project sites. The Manitou Landscape and Sand Lake Seven Beavers Collaboratives' support of these projects provides extra oversight and continuity that will help ensure continued monitoring and maintenance of these sites in the future, significantly improving the likelyhood of the project's success.

38. Site Assessor(s) Conducting Review:

Jeff Busse
Site Photographs



Photo 20-2 A thinned area with birch dieback.



Photo 20-3 A cedar tree with tree tube protection.



Photo 20-4 A thinned area with birch dieback.



Photo 20-5 A pine tree with netting protection.



Photo 20-6 Seedling mortality.

21) Finland Hut Two Conifer Regeneration, Revisit



Revisit Site Assessment

Field Review Date: 10/9/2020

Field Visit Attendees: Lucas Mueller, Wade Johnson

- What are the stated goals of the project?
 To improve upland forest habitat, reforest under-stocked stands, and increase productivity and diversity of commercially and ecologically important long-lived conifer forests in northeast Minnesota.
- 2. What are the desired outcomes of achieving the stated goals of the project? Increased diversity of tree species composition and stand stocking levels silviculturally appropriate to each site. Specifically, an increased presence of viable long-lived conifer species free of browse pressure and likely to recruit into the overstory.
- 3. Please note any substantive changes to the site characteristics since last site assessment. Site is healthy with a large balsam understory. No tree tubes, cages, or fencing is present—only budcaps due to a lower deer browsing presence.

4. Is the plan based on current science? Yes

Forest management prescriptions were developed collaboratively between forestry, ecological, and wildlife experts participating in the Manitou and Sand Lake Seven Beavers Collaboratives using an Ecological Classification System to design treatments which resemble the natural succession of northern mixed mesic forests. All sites were checked against the State Natural Heritage Database for any rare/threatened features prior to any work being done, and those sites listed as heritage features present were further ground surveyed to ensure project work did not threaten the integrity of those species.

5. List indicators of project goals at this stage of the project.

Establishment of an adequate stocking of desirable long-lived conifer species, reasonably free of browse pressure and competition for growing space. Sites have been established on a trajectory to be mature forests with diverse overstory species composition within 50 years.

The Hut Two Rd Finland project site has excellent survival of white pine and poor survival of cedar. Managers felt tree tubes should have used for cedar.

6. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project outcomes?

Project design is appropriate to restoring a significant long term conifer component back into these systems that will provide improved wildlife habitat, water quality, and forest productivity. Ongoing regular maintenance of browse protection tubes/fencing will be necessary for at least several more years until trees are above deer/moose browse lines and free-to-grow from competition. Some pruning/thinning stand improvement activities may also be necessary to ensure the best recruitment into the overstory, and will require periodic monitoring of site conditions to determine optimal treatment schedule.

- 7. Are corrections or modifications needed to meet proposed outcomes? None. Project is meeting the proposed outcomes.
- 8. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Long-term management accounted for in the project plan is reasonable and necessary until originally planted trees and replants are above browse lines.

9. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Project activities do not detract from existing habitat and restoration measures have created new forest habitat.

10. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. Density of mature and younger planted tree species on site indicates a trajectory toward desired mixed conifer forest type.

11. Additional comments on the restoration project.

This site was harvested in 2006, prior to planting and restoration efforts. This site seems to have had a greater degree of success in establishment compared to the other sites which were not prepped before planting.

Revisit Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

12. The project has:

Achieved the stated goals.

13. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

14. Provide explanation of reason(s) for determination.

The site has achieved the outcome of increasing presence of long-lived conifer species free of browse pressure.

15. Site Assessor(s) Conducting Review:

Lucas Mueller, Wenck Associates

Appendix A: Revisit Site maps, Project plans or Vegetation tables

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Picea glauca	White Spruce	25-50%	Planted	Native
Pinus strobus	Eastern White Pine	25-50%	Planted	Native
Abies balsamea	Balsam Fir	25-50%	Not Planted	Native
Populus tremuloides	Aspen	5-25%	Not Planted	Native
Alnus sp.	Alder Species	1-5%	Not Planted	Native
Cornus rugosa	Dogwood	5-25%	Not Planted	Native
Amelanchier	Mountain	1-5%	Not Planted	Native
bartramiana	Serviceberry	1 3/0		
Vaccinium sp.	Blueberry Species	1-5%	Not Planted	Native
Pteridium aquilinum	Bracken Fern	5-25%	Not Planted	Native
Apocynum androsaemifolium	Spreading Dogbane	5-25%	Not Planted	Native
Eurybia macrophylla	Large Leaf Aster	5-25%	Not Planted	Native
Lycopodium sp.	Club Moss	1-5%	Not Planted	Native
Carex pensylvanica	Pennsylvania Sedge	5-25%	Not Planted	Native
Piptatherum	Mountain Rice	1-5%	Not Planted	Native
pungens	Grass	1 0/0		

 Table 21-1
 List of plants observed 10/09/2020 during a meander survey through the project area.

Appendix B: Revisit Site Photographs



Photo 21-1 Pruned white pine at the Finland project site.



Photo 21-2 White pines and spruce at the Finland site are well-established and healthy.





Minnesota Department of Natural Resources Minnesota Board of Water and Soil Resources

Appendix C: Initial Project Evaluation

*Fields in original evaluation form may vary. Information was translated to newest version as applicable.

Project Background

Project Name: Restoration of Critical Forest Habitat in Northeast MN
Project Location: Lake / St. Louis / Cook County
Township/Range Section: Various
Project Manager / Affiliated Organization: Doug Thompson, The Nature Conservancy
Fund: OHF Fiscal Year Funds: 2010
Project Start Date: 2008
Predominant Habitat type: Forest
Additional Habitat types: Choose an item. , Choose an item.
Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

16. What are the specific project components and treatments?

Planting of white spruce, white pine, and white cedar trees. Installation of tree tubes and construction of tree enclosures around white pine and cedar trees. Treatment with plantskydd deer repellent at the Hut Two Rd Finland site. Budcapping of trees at the Finland site made possible by a lower deer density.

17. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

The project is guided by the goals in the MN Forest Resources Council's Northeast and North Central Landscape Plans, DNR Subsection Forest Resource Management Plans, and County forest management plans. Individual site prescription worksheets are available from the local land managers.

18. What are the stated goals of the project?

To improve upland forest habitat, reforest under-stocked stands, and increase productivity and diversity of commercially and ecologically important long-lived conifer forests in northeast Minnesota.

19. What are the desired outcomes of achieving the stated goals of the project?

Increased diversity of tree species composition and stand stocking levels silviculturally appropriate to each site. Specifically, an increased presence of viable long-lived conifer species free of browse pressure and likely to recruit into the overstory.

20. Were measures of restoration success identified in plans? No

If yes, list specific measurements.

No quantifiable restoration measures were described in the plans. Observation of the restored forest for increased diversity of species and presence of long-lived conifer species could be used as a measure of success.

21. Are plan Sets available? No Have project maps been created? Yes If yes, provide in Appendix A and list Maps provided:

CPL 100-111: Restoration of Critical Forest Habitat in Northeast MN. Cook, Lake, and St. Louis Counties LSOHC Northern Forest Planning Section. November 2009.

22. Provide list of best management practices, standards, guidelines identified in plan set? Are these based on best current science?

Site prep and timber harvests adhered closely to best management practices described in the Minnesota Site-level Forest Management Guidelines, and planted/seeded tree species selection are appropriate to each site according to the MN DNR's Tree Suitability Index developed by the Ecological Classification Program. This plan is based on current science.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

23. Were alterations made to the plan during project implementation? No

No alterations were made during project implementation.

24. In what ways did alterations change the proposed project outcome? No alterations were made during project implementation.

Site Assessment

Field Review Date: 8/24/2012

Field Visit Attendees: Chris Dunham – The Nature Conservancy; Jeff Busse, Wade Johnson – MN DNR

25. Surrounding Landscape Characteristics:

Project sites are primarily upland northern mesic mixed forest communities (MHn45 and FDn43) at various successional growth stages and condition, and are surrounded by large intact tracts of forestland.

26. Site Characteristics:

p. Soils:

In general sites are situated on a scoured bedrock terrain with a shallow non-calcareous sandyloam, loamy, or fine-sandy drift often gravelly and occassionally stony.

q. Topography:

Moderately rolling landscape, with occassional steep rugged terrain.

r. Hydrology:

Droughty well drained upland forest community matrix intersperced with surface seeps and low vernal pool and streams throughout.

s. Vegetation A: Plant Communities, Dominant Species & Invasives % Cover:

In general project sites consist of marginal forest stands of early-successional species (birch/aspen/balsam) in a transitional growth stage marked by significant mortality of low vigor, over-mature canopy trees. The dominant trees in many of these site are declining due to a variety of factors including: age, ice storm, snow-loading, and wind damage. These sites are mostly poorly stocked (15 to 60 sq ft BA), with heavy grass/shurb growth preventing adequate levels of natural regeneration of desirable tree species. See Table 21-1 below.

t. Vegetation B: Meander Search Species List (as appropriate for site)

Click here to enter text.

27. Is the plan based on current science? Yes

Forest management prescriptions were developed collaboratively between forestry, ecological, and wildlife experts participating in the Manitou and Sand Lake Seven Beavers Collaboratives using an Ecological Classification System to design treatments which resemble the natural succession of northern mixed mesic forests. All sites were checked against the State Natural Heritage Database for any rare/threatened features prior to any work being done, and those sites listed as heritage features present were further ground surveyed to ensure project work did not threaten the integrity of those species.

28. List indicators of project goals at this stage of project:

Establishment of an adequate stocking of desirable long-lived conifer species, reasonably free of browse pressure and competition for growing space. Sites have been established on a trajectory to be mature forests with diverse overstory species composition within 50 years.

Caribou Falls Wayside - excellent survival with fenced white pine, good survival with fenced cedar but less than pine, excellent survival with unfenced white spruce. 2012 budcap sweep revealed very poor survival of white pine and cedar outside of fences.

DNR land adjacent to Wolf Ridge - excellent white pine survival in tubes and in fences, good survival of cedar but less than pine.

Hut Two Rd Finland - excellent survival of white pine, cedar poor survival (should have used tree tubes), can get away with budcapping here as deer density much less than down on shore.

29. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Project design is appropriate to restoring a significant long-term conifer component back into these systems that will provide improved wildlife habitat, water quality, and forest productivity. Ongoing regular maintenance of browse protection tubes/fencing will be necessary for at least several more years until trees are above deer/moose browse lines and free-to-grow from competition. Some pruning/thinning stand improvement activities may also be necessary to ensure the best recruitment into the overstory, and will require periodic monitoring of site conditions to determine optimal treatment schedule.

30. Are corrections or modifications needed to achieve proposed goals?

The project is expected to achieve proposed goals without modification.

31. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Long-term management accounted for in the project plan is reasonable and necessary until trees are above browse lines.

32. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Project activities do not detract from existing habitat and restoration measures have created new forest habitat.

33. Are follow-up assessments needed? Explain.

Follow-up assessments are not required. Conifer restoration on these sites has been very successful. The seedling trees are well established, and on track to providing the future habitat benefits this project set out to accomplish.

34. Additional comments on the restoration project.

None.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

35. The project has:

Achieved the stated goals. *Confidence of outcome determination:* High.

36. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

37. *Provide explanation of reason(s) for determination.*

A high level of confidence comes from the well established commitment of the multi-landowner land management collaboratives working to restore, maintain and enhance the broader landscapes of these project sites. The Manitou Landscape and Sand Lake Seven Beavers Collaboratives' support of these

projects provides extra oversight and continuity that will help ensure continued monitoring and maintenance of these sites in the future, significantly improving the likelyhood of the project's success.

38. Site Assessor(s) Conducting Review:

Jeff Busse, MN DNR



Photo 21-3 The Hut Two site is still very open post logging in 2012. Planted White Pine and White Spruce will need to be released during future management to compete with Balsam Fir, Aspen and other shrubs and forbs.

22) Gusa Floodplain Forest Restoration

Project Background

Project Name: Gusa Floodplain Forest Restoration
Project Site: Richard J Dorer State Forest - Gusa Site
Township/Range Section: Township 131N Range 15
W Section 16
Project Manager / Affiliated Organization: Tim
Schlagenhaft—Audobon Minnesota
Fund: OHF Fiscal Year Funds: 2013
Project Start Date: August 15, 2013
Predominant Habitat type: Forest
Additional Habitat types: Wetland

Project Status: Establishment Phase



Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

The project components consisted of site preparation by herbicide treatment and prescribed burning, followed by planting 1200 trees: Silver Maple, Swamp White Oak, Walnut, Cottonwood, Hackberry (quantity of each species unknown) and installing tree protection measures, replanting 700 more trees following flooding losses, the removal of tree protection enclosures, and mowing maintenance of the site during establishment.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

CPL Final Accomplishment Report and the Work Plan from the Grant Application were provided by Audobon.

3. What are the stated goals of the project?

The purpose of the project is to establish floodplain forest in an area dominated by reed canary grass, in which natural regeneration is not occurring. The site was previously drained and cultivated. DNR Forestry has identified the project site as an area of high importance along the Mississippi River flyway.

4. What are the desired outcomes of achieving the stated goals of the project? The desired outcome is a closed-canopy floodplain forest which can provide habitat for forest-interior birds and other wildlife.

- Were measures of restoration success identified in plans? No If yes, list specific measurements. Click here to enter text.
- 6. Are plan Sets available? Yes Have project maps been created? No *If yes, provide in "site maps" and list maps provided:* Click here to enter text.
- Provide list of best management practices, standards, guidelines identified in plan set? Chemical control of reed canary grass.
 Prescribed burn to remove thatch and further impact reed canary grass.
 Planting of large sized container grown trees that can quickly establish above browse height. Trees were planted at stocking rates of 125, 150, and 175 trees per acre.
 Deer protection to protect the trees from browsing during the first years of establishment.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation? Yes

Due to flooding of the site and associated damage, many of the trees had to be straightened up or replaced. In addition to damaging the planted trees, the high water took out the deer exclusion protection materials.

9. In what ways did alterations change the proposed project outcome?

Flooding caused mortality of a significant percentage of the trees. The areas of lowest elevation appear to have the lowest success rate, and of the planted species, only Silver Maple and Swamp White Oak have survived. In addition, the deer protection installation was completely wiped out due to flooding. Despite the setback due to high water in 2014, the surviving trees and those which were planted after the high water of 2014 have grown quickly and appear to be well-established enough to survive future challenges to the site.

Site Assessment

Field Review Date: 9/24/2020

Field Visit Attendees: Wade Johnson-DNR Restorations Evaluations Program Coordinator, Mike Wachholz-DNR Forestry, Andrew Beebe-Audobon Minnesota Forest Ecologist, David Schmitz-Great River Greening Site Assessor

10. Surrounding Landscape Characteristics:

In the vicinity of the site, rolling terrain and bluffland give way to flat bottomland as the elevation drops to the floodplain. Like much of the Mississippi Valley floodplain, patches of reed canary grass dominate open areas, while mature stands of primarily Silver Maple comprise the forested areas. In the immediate vicinity of the project site, Box Elder, Ash, and some Swamp White Oak can be seen.

11. Site Characteristics:

a. Soil Series:

Within the project site, two primary soil types are present. The eastern side of the planting area is classified as Calco silt loam, 0 to 2 percent slopes, frequently flooded. The western side is classified as Ankeny-Zumbro complex, 0 to 3 percent lopes, occaisionally flooded.

b. Topography:

The topography of the site is primarily flat. The eastern side of the project is slightly lower in elevation.

c. Hydrology:

The project site is prone to periodic flooding. As noted in the project documents, the site was inundated from May through July of 2014, due to record rainfall amounts. Typically the inundations are more temporary.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Although the site received herbicide treatment as a site prep for planting, reed canary grass continues to be the dominant herbaceous cover. Of the planted species, Silver Maple and Swamp White Oak appear to be the two species which have survived from the original planting. In addition to the planted trees, the site prep and maintenance has allowed volunteer Ash to establish on the site as well, and these trees are being left to grow, given the losses of some of the other planted species. While Reed Canary dominates the site, many other plants were noted in the site meander, as can be seen in Table 22-1. It is not known if these plants were present prior to treatment, but it is possible that they took advantage of the temporary reprieve of Reed Canary following herbicide treatment and burning. While the restoration of the herbaceous component was not a stated project goal, it can be considered a side benefit of the work on the site, as species such as milkweeds and asters will provide benefit to pollinators.

12. Is the plan based on current science? Yes

Repeated herbicide treatment to suppress Reed Canary Grass, followed by planting of floodplain forest trees with appropriate protection is an accepted restoration practice in this setting.

13. List indicators of project goals at this stage of project:

While many of the planted species did not survive, the survivors, particularly Silver Maple, should have a good chance at success. Most of the Silver Maples still growing are over 10 feet in height and have branches above browse height and well above the reed canary. The surviving Swamp White Oaks are mostly less than 8 feet in height and are some are still struggling to reach above browse height and the reed canary. The density of the tree stand is roughly 40 percent less than the project's target density of creating a closed forest canopy. Some groves of trees do approach the target density, while other areas have only widely scattered trees.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

The project plan may have been sufficient for success were it not for record-breaking rainfall in Spring of 2014. Such high water events may be considered to be more frequent, and DNR Forester Mike Wachholz stated that the experience with this site informed a revised ideal stocking rate for analogous projects in the future. Wachholz indicated that a stocking rate of 250 trees per acre would provide a chance to achieve a closed canopy over time.

15. Are corrections or modifications needed to achieving proposed goals?

In order for the project to succeed in establishing a viable closed-canopy floodplain forest, additional planting would have to be done. While some areas of the project are approaching target tree density, much of the site is still lacking trees and dominated once again by reed canary grass.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Site mowing and additional tree protection (hardware cloth collars) will help ensure that surviving trees to not succumb to vole damage and competition from other vegetation. The establishment of an effective low water crossing to the east side of the channel that separates the unit was identified as a key component to future management.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Despite not reaching the target tree density on the site, the established trees will likely provide a modest habitat value as compared with the monoculture of reed canary that would have persisted without the project planting.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain. No.

19. Additional comments on the restoration project.

DNR Forester Wachholz discussed the tree stock that was used on the site. The trees were grown from DNR seed that was sent to a nursery in Missouri with a patented growing method called "Root Production Method." This method claims to have much more rapid root establishment as compared to bare root or other container trees, and Wachholz indicated that the cost of the individual trees was much less than locally available container tree and that the results were favorable. The size of the Silver Maples on the site after only 7 growing seasons indicates that the tree stock may indeed have helped the trees to establish quickly in the challenging growing environment of prolonged inundation.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Minimally achieved the stated goals.

21. The project will:

Minimally meet proposed outcomes. *Confidence of outcome determination:* Medium.

22. Provide explanation of reason(s) for determination.

It is likely that many of the trees that have survived thus far will persist into maturity, despite the fact that the entire project area may not see the target density of a closed canopy. Continued maintenance of the site through mowing or possibly chemical means may help assist volunteer trees to also establish on the site.

23. Site Assessor(s) Conducting Review:

David Schmitz-Great River Greening

Site Maps, Project Plans or Vegetation Tables



Figure 22-1 Map defining the planting area, as indicated in CPL work plan. Collischan Road runs parallel to the site.

Table 22-1 Species observed at the site visit. Meander was conducted for approximately 25 minutes. While Reed CanaryGrass dominates the herbaceous layer, there is evidence that the herbicide treatments may have stimulated the nativeseedbank on the site, although restoration of the ground layer vegetation was not a stated goal of the project.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Phalaris arundinacea	Reed Canary Grass	75-100%	No	Invasive
Acer saccharinum	Silver Maple	5-25%	Yes	Native
Salix sp.	Willow	1-5%	No	Native
Querus biolor	Swamp White Oak	1-5%	Yes	Native
Persicaria sp	Smartweed	1-5%	No	Native
Verbena hastata	Blue Vervain	1-5%	No	Native
Asclepias syriaca	Common Milkweed	1-5%	No	Native
Ambrosia trifada	Giant Ragweed	1-5%	No	Native
Echinochloa crus-galli	Barnyard Grass	1-5%	No	Non-native
Laportia canadensis	Wood Nettle	1-5%	No	Native
Urtica dioica	Stinging Nettle	1-5%	No	Native
Convolvulus sp.	Bindweed	1-5%	No	unknown
Bidens fondrosa	Devil's Beggarticks	1-5%	No	Native
Taraxacum officianale	Dandelion	1-5%	No	Non-native
Asclepias incarnate	Swamp Milkweed	0-1%	No	Native
Solanum dulcamara	Bittersweet Nightshade	0-1%	No	Non-native weedy
Symphyotrichum lateriflorum	Calico Aster	0-1%	No	Native
Cannibas sativa	Нетр	0-1%	No	Non-native
Brassica sp.	Mustard	0-1%	No	Non-native
Vernonia fasciculata	Ironweed	0-1%	No	Native
Symphyotrichum	Aster species	0-1%	No	Native
Panicum virgatum	Switchgrass	0-1%	No	Native
Xanthium strumarium	Cocklebur	0-1%	No	Native
Elymus sp.	Wild Rye	0-1%	No	Native

Site Photographs



Photo 22-1 Representative vegetative structure of the planting site. In the background, one of the denser stands of surviving trees can be seen. In the foreground are an example of a live Silver Maple and one that has not survived. Reed Canary Grass dominates the ground layer vegetation throughout the site, interspersed with forbs such as common milkweed in this photo. Photo from site visit September 24, 2020.



Photo 22-2 The trees have well outgrown their protective collars. Notable here is the impressive diameter of the tree after only 7 years. While Silver Maple is a fast growing tree, especially in wet locations, some of the establishment could be attributed to the Root Production Method tree stock. Photo from site visit September 24, 2020.



Photo 22-3 These swamp white oaks are adjacent to the planting area, and their presence on site indicates that the species was an appropriate choice for the planting, despite their struggles in establishment. Periodic mowing of the reed canary grass on site should help promote the volunteer trees on the site as well as those that were planted. Photo from site visit September 24, 2020.



Photo 22-4 Representative condition of the channel streambank that bisects the site. Photo from site visit September 24, 2020.



Photo 22-5 The difference in size between species is represented here, with the swamp white oaks noticeably shorter than the silver maples. Photo from site visit September 24, 2020.



Photo 22-6 The eastern side of the planting area has a much lower survival rate, as can be seen here. Only widely scattered trees remain. Photo from site visit September 24, 2020.



Photo 22-7 This photo exhibits some of the highest density of surviving trees on the site. Photo from site visit September 24, 2020.

23) Halma Swamp WMA Buckthorn Treatment

Project Background

Project Name: Halma Swamp Wildlife Management Area Buckthorn Treatment

Project Site: Halma Swamp Wildlife Management Area

Township/Range Section: Township 160 Range 47 Section 26

Project Manager / Affiliated Organization: Kim Washburn / Minnesota Deer Hunters Association (grant recipient organization) Jason Wollin / MN DNR (current land manager)

Fund: OHF - CPL Fiscal Year Funds: 2015

Project Start Date: October 2015

Predominant Habitat type: Forest

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

- What are the specific project components and treatments? Cut and stack mapped buckthorn populations. Treat stumps.
- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Limited information was available for review. A map of the treatment area was provided. Data are located at the MN DNR Karlstad Area office in Karstad, Minnesota.

- 3. What are the stated goals of the project?Control buckthorn at known locations. Focus on mature, seed-bearing plants.
- 4. What are the desired outcomes of achieving the stated goals of the project? The desired outcome is to reduce the abundance of buckthorn and limit the spread throughout Halma Swamp Wildlife Management Area (WMA) to preserve the ecological integrity of the native forest community.



- Were measures of restoration success identified in plans? Yes If yes, list specific measurements. Reduce the abundance of buckthorn within the WMA.
- 6. Are plan Sets available? No Have project maps been created? Yes If yes, provide in "site maps" and list maps provided: CCM Buckthorn Treatment Map
- 7. Provide list of best management practices, standards, guidelines identified in plan set?

In 2011 and 2012, buckthorn and other invasive species were mapped throughout Halma Swamp Wildlife Management Area. Work began in areas around the WMA in 2013 and continued through 2016.

Mature, seed-bearing buckthorn individuals were targeted for removal. Stumps were treated with an herbicide to prevent re-sprouting. Both strategies are common standard practices for buckthorn control.

Although buckthorn removal occurred over several years, follow up control (spot spraying or mechanical control of seedlings) was not planned or completed. Typically, control of buckthorn requires multiple years to address re-sprouts, saplings that were missed during initial treatments, and seedlings from the seed bank.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation? No

No alterations were made.

 In what ways did alterations change the proposed project outcome? Not applicable.

Site Assessment

Field Review Date: 10/14/2020

Field Visit Attendees: Jason Wollin, Gina Quiram – MN DNR and Mark Pranckus - Cardno

10. Surrounding Landscape Characteristics:

The project site is located in Halma Swamp WMA, which is a mostly aspen forest with lowland brush cover. The surrounding landscape is primarily a mix pasture, grassland, and scattered forested cover. The project site is 15 acres within the larger 3,000 acre Halma Swamp WMA boundary.

11. Site Characteristics:

a. Soil Series:

Rosewood fine sandy loam, dense till, 0 to 1 percent slopes Cormant and Rosewood soils, very poorly drained, 0 to 1 percent slope

b. Topography:

The topography was extremely flat with little variation on elevation across the landscape.

c. Hydrology:

Due to the combination of soils and topography, the site can be relatively wet during periods of precipitation or snowmelt because the ability for water to infiltrate or runoff is limited. Without precipitation, the site can become relatively dry.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

The plant community is primarily a scattered tree canopy consisting of aspen and black cherry. The shrub layer is dense and is primarily buckthorn with some red-osier dogwood. The ground layer is well-developed. Most herbaceous vegetation is less than 3 feet in height. Invasive species, primarily buckthorn as seedlings and saplings were common and made up between 50 to 75% of the total cover.

12. Is the plan based on current science? Portions

Mapping, cutting and stump treating are common practices. Without a follow-up treatment plan removing mature seed producing plants will have little impact on habitat quality as smaller plants mature and seeds germinate.

13. List indicators of project goals at this stage of project:

Buckthorn is common on this site and will soon altered the site dynamics as more individuals mature and produce seeds and shade out existing native vegetation.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

No. There are currently no plans to treat buckthorn because of limited staff resources and other wildlife management priorities that take precedent with the available capacity.

15. Are corrections or modifications needed to achieving proposed goals?

Yes. Buckthorn needs to be further controlled at the site to prevent spread throughout Halma Swamp. Potential management actions include: fall foliar application to treat seedlings and saplings. Forestry mowing to reduce sapling growth followed by a stump treatment and subsequent fall foliar herbicide application to treat seedlings. All follow up actions should include a multi-year component.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Currently the site is not meeting the desired outcome and will require management actions or the site will further decrease in ecological integrity and potentially be a source for the spread of buckthorn to other areas within Halma Swamp. The missed opportunity to improve the project outcome was to complete follow up treatments after 2015 to keep buckthorn under control. As previously mentioned, there are no plans for future management due to a limitation on capacity to complete the work with local staff, CCM crews or local volunteers.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No. Without future management, the current site is on a similar trajectory of being dominated by buckthorn as the site was prior to the project.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. Without further management actions, it will become a buckthorn-dominated shrub layer.

19. Additional comments on the restoration project.

- Local staff capacity have been significantly reduced years has requiring MN DNR to focus on the highest priority work that can be done to maintain the landscape. More capacity will be required to focus on increasing the quality of the overall landscape.
- Due to the location of Halma Swamp WMA in the far northwest corner of Minnesota, contracting out management activities to private vendors or the Conservation Corps of Minnesota and Iowa is difficult due to increased travel costs and lack of availability due to travel logistics.
- Other buckthorn control options such as goat browsing are likely not locally available and would be similar to other contracted services requiring resources from outside the region.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Not achieved the stated goals.

21. The project will:

Likely not meet proposed outcomes. Confidence of outcome determination:

High.

- 22. Provide explanation of reason(s) for determination.Buckthorn is fairly dense on this site and will likely dominate the shrub layer within several years without further management actions.
- 23. Site Assessor(s) Conducting Review: Mark Pranckus, Cardno

Site Maps, Project Plans or Vegetation Tables



Figure 23-1 Aerial photograph of the 15 acre project site from 2017. The yellow line represents the meander survey path taken to assess the plant community. (Source: Google Earth, accessed October 30, 2020, <u>https://www.google.com/earth</u>).



Figure 23-2 Aerial photograph of the project site showing the buckthorn control units on a portion of Halma Swamp WMA by year. Map provided by MN DNR Karlstad Area office staff.



Figure 23-3 Aerial photograph showing additional areas where buckthorn was controlled within the larger Halma Swamp WMA. Map provided by MN DNR Karlstad Area office staff.

 Table 23-1 List of plant species observed on 10/15/20 during a meander survey through the project area.

Scientific Name	Common Name	Cover Range	Species Status
Anaphalis margaritacea	pearly everlasting	1-5%	native
Anemone quinquefolia	wood anemone	1-5%	native
Antennaria neglecta	field pussytoes	1-5%	native
Carex gracillima	graceful sedge	1-5%	native
Cornus sericea	red-osier dogwood	5-10%	native
Cirsium arvense	canada thistle	1-5%	non-native
Cirsium vulgare	bull thistle	1-5%	non-native
Elymus canadensis	canada wildrye	1-5%	native
Equisetum pratense	meadow horsetail	1-5%	native
Eurybia macrophylla	bigleaf aster	1-5%	native
Fragaria virginiana	wild strawberry	1-5%	native
Galium triflorum	sweetscent bedstraw	1-5%	native
Heracleum sphondylium ssp. montanum	cow parsnip	1-5%	native
Hydrophyllum virginianum	waterleaf	1-5%	native
Lonicera dioica	wild honeysuckle	1-5%	native
Maianthemum canadense	wild lily-of-the-valley	1-5%	native
Melilotus officinalis	sweetclover	1-5%	non-native
Osmorhiza claytonii	sweet jarvil	1-5%	native
Phalaris arundinacea	reed canarygrass	1-5%	native
Populus tremuloides	quaking aspen	10-25%	native
Prunus serotina	black cherry	1-5%	native
Rhamnus cathartica	common buckthorn	50-75%	non-native
Ribes hirtellum	hairystem gooseberry	1-5%	native
Rubus pubescens	creeping blackberry	1-5%	native
Rubus sachalinensis var. sachalinensis	red raspberry	1-5%	native
Rudbeckia hirta	black-eyed susan	1-5%	native
Smilax lasioneura	carrion-flower	1-5%	native
Solidago canadensis var. canadensis	canada goldenrod	5-10%	native
Solidago gigantea	late goldenrod	5-10%	native
Spartina pectinata	prairie cordgrass	1-5%	native
Symphyotrichum lateriflorum	white woodland aster	1-5%	native
Taraxacum officinale	common dandelion	1-5%	non-native
Thalictrum dasycarpum	purple meadow rue	1-5%	native
Trientalis borealis	starflower	1-5%	native
Urtica dioica	stinging nettle	1-5%	native
Vicia sativa	common vetch	1-5%	non-native
Viola sororia	downy blue violet	1-5%	native
Zizia aurea	golden alexanders	1-5%	native

Site Photographs



Photo 23-1 Example of buckthorn re-growth at the site. Most shrub vegetation with green and yellow leaves is buckthorn. MN DNR staff in blue circle to demonstrate vegetation density and height. (Halma Swamp Wildlife Management Area, photo taken during site visit 10/14/2020 by Mark Pranckus, Cardno).



Photo 23-2 Example of the existing vegetation in the project area. Dense buckthorn dominates the understory (Halma Swamp Wildlife Management Area, photo taken during site visit 10/14/2020 by Mark Pranckus, Cardno).



Photo 23-3. Example of a mature buckthorn that was cut and stumped treated with herbicide in 2015. Treated stumps are not resprouting. (Halma Swamp Wildlife Management Area, photo taken during site visit 10/14/2020).

24) Little Nokasippi WMA Forest Restoration 1

Project Background

Project Name: Oak Savanna Restoration—Little Nokasippi River WMA

Project Site: Lt. Nokasippi WMA

Township/Range Section: Township 43 Range 32 Section 22, 23, 27

Project Manager / Affiliated Organization: Rick Horton, National Wild Turkey Federation; Christine Reisz, Department of Natural Resources Wildlife Area Supervisor

Fund: OHF - CPL Fiscal Year Funds: 2014

Project Start Date: May 2015

Predominant Habitat type: Forest

Additional Habitat types: Prairie / Savana / Grassland , Choose an item.

Project Status: Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

The property was grazed for many years, which accounts for its general structure of moderately dense, open grown Bur Oaks and Red Oaks. When cattle were removed from the site, the understory became dominated by woody brush. The CPL grant for the project included 7 sites. All sites received forestry mowing and herbicide treatment. The grant application indicated that the units would receive a timber sale to open up areas within the units, but this is yet to occur. The plan also called for a prescribed burn treatment to the units. Site 1 received a burn in Fall of 2019. Due to the difference in treatment and the distinction in the dominant plant community—Bur Oak-dominant in the western area of the property vs. Red Oak dominant in the eastern side—two site assessments were made. This report focuses on Site 1. This site also received seeding in open spots or areas disturbed by forestry mowing. The prescribed burn was completed on October 31, 2019. The burn unit was 40 acres in size.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?


Grant application, Project work plan, and Contract Public Notice documents were provided by Christine Reisz, DNR Wildife Area Manager. Contract Manager Gary Drotts was able to meet onsite to provide verbal background on project activities, timeline, and site background.

3. What are the stated goals of the project?

Goals are forest enhancement, reduction of the understory brush layer through mechanical, chemical, and prescribed fire methods.

4. What are the desired outcomes of achieving the stated goals of the project?

Expected outcomes are improved turkey brood habitat, which requires a balance of canopy, brushy cover, and open areas, as well as sufficient forage. Vegetation outcomes are increased ground layer diversity, and Bur and Red Oak regeneration. Prior to treatment, the brush layer was too dense to support diverse ground layer vegetation or oak regeneration, and the disturbance to the site should provide opportunities for germination of the native seedbank as well as the species seeded during the project.

5. Were measures of restoration success identified in plans? No If yes, list specific measurements.

Enhance 40 acres of oak savanna by mowing the understory in patches, followed by a timber sale and prescribed burning.

6. Are plan Sets available? Yes Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:

Site map showing all 7 units of the project. Site 1 is the focus of this report. Species observed at visit to Site 1.

- 7. Provide list of best management practices, standards, guidelines identified in plan set?
 - 1. Forestry mowing to remove woody brush.
 - 2. Seeding—open and disturbed areas were hand-seeded following forestry mowing
 - 3. Herbicide treatment—woody brush regrowth was treated in the fall following mowing in Site 1 with 3 oz/gal Garlon/Element 3A[®].
 - Prescribed burning—Fall 2019 burn to set back regrowth of the brush layer in site 1. The above methods are consistent with current science for management of an oak woodland.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

- 8. Were alterations made to the plan during project implementation?
 - Yes

Prescribed burn was initially slated for 2017, but did not occur until fall of 2019. Timber sale is also yet to be conducted.

9. In what ways did alterations change the proposed project outcome?

Target brush species showed signs of effective top-kill following the burn, so the delay did not appear to affect the outcome negatively, perhaps was well-timed, setting back the regrowth after the plants had had time to recover from the initial disturbance. The objective of the planned timber sale was to create openings in the canopy for habitat value, and since the harvest did not occur, no new canopy openings were created, and the presumptive result is diminished habitat improvement and less oak regeneration.

Site Assessment

Field Review Date: 8/3/2020

Field Visit Attendees: David Schmitz-Great River Greening site assessor, Gina Quiram-DNR Restoration Evaluations Specialist, Christine Reisz-DNR Wildife Area Manager, and Gary Drotts-Gone Wild Enterprises, LLC.

10. Surrounding Landscape Characteristics:

The surrounding landscape is comprised of a patchwork of open fields, forest, and wetlands. The Little Nokasippi River winds through the Wildlife Management Area (WMA) prior to entering the Mississippi, roughly dividing the property in half. The WMA also contains a seeded prairie unit adjacent to Site 1 (see Figure 24-1). As noted elsewhere, the areas west of the river are dominated by Bur Oak, while the areas east of the river are mainly Red Oak-dominant.

11. Site Characteristics:

a. Soil Series:

The soils in the large treatment area (labeled as "Site 1" on site map) are classified as Hubbard Sandy Loam, 2-6 percent slope. The Hubbard soil series consists of very deep, excessively and well drained soils that formed in sandy glacial outwash or sandy alluvial sediments of the Late Wisconsin glaciation.

b. Topography:

The treatment areas themselves are primarily flat, although the surrounding topography contains slopes down to the Little Nokasippi River and several wetland depressions.

c. Hydrology:

The project treatment sites are all upland areas.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

The west unit of the property is dominated by bur oaks in the canopy (50-75%), with occasional red oaks (5-25%). In the understory, prickly ash and hazel are present in the shrub layer (25-50%), but are sparse in some spots with an abundant ground-layer of native sedge, mostly *Carex pennsylvanica* (5-25%) and forbs, with Sweet Cicely, Wild Strawberry, Pointed-leaf tick trefoil, and Asters being the most common (5-25%). Prickly ash and hazel showed evidence of recent top-kill by fire, with resprouting occurring from the base. Contract manager Gary Drotts showed us some examples of the seeded pockets, where bottlebrush grass, Solomon's seal, and Wild Geranium, all of which were present in the seed mix, were evident (1-5%). See Table 24-1 for lists of plants observed during the site meander.

12. Is the plan based on current science? Yes

Methods of treatment, including forestry mowing followed by herbicide application and prescribed burning, are consistent with BMP's for Oak Wodland/Savanna restoration.

13. List indicators of project goals at this stage of project:

As compared with the density prior to treatment, there has been roughly a 65 percent reduction in the brush layer density, as well as a 45 percent reduction in height of the brush—specifically prickly ash and hazel. As the contract manager described, prior to treatment one could not reasonably walk through the site, and now most sections are open enough to walk about without difficulty. As indicated by the plant species documented, desirable native understory plants have increased in abundance and diversity. There is evidence of a good amount of brush top-kill from the Fall 2019 burn completed in Site

1. Additionally, the targeted seeding of scraped areas observed in Site 1 appears to have been effective in establishing understory plants. Also, prescribed fire seems to have been effective at maintaining the brush layer.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Continued success of the project will likely depend on continued management, particularly prescribed fire, which will prevent the hazel and prickly ash from continuing to reestablish. If further management is not conducted, the site will likely revert largely to its state prior to the project inception. The species introduced via seeding would likely persist without further management, but presumably would benefit from continued suppression of the brush layer.

15. Are corrections or modifications needed to achieving proposed goals?

Wildlife Area Manager Christine Reisz identified prescribed fire as the primary tool for maintenance of the project, but was unsure when fire will be conducted.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

The question of a possible timber sale was noted in the site visit, and it should be noted that timber harvest would change the composition of the site, and would likely require additional measures. Additional management would likely be necessary to ensure that open and disturbed areas are colonized by desirable native vegetation and that invasive vegetation is managed. That being said, less tree density would move the units more squarely toward a savanna structure, creating potential for more habitat for various species. Oak regeneration would likely be more successful long term with more openings in the canopy, as well.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

As noted above, timber harvest could change the management needs of the property as the canopy is reduced.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

This site could benefit from follow-up, especially if a timber sale is conducted.

19. Additional comments on the restoration project.

The site benefited largely from the partnership between Agency managers, NWTF, and Gary Drotts, who was able to bring his knowledge of the area overall to bear on the project implementation, as well as contribute a lot of pertinent information to the evaluation process.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* Medium.

22. Provide explanation of reason(s) for determination.

Future success seems contingent on available resources. Without further management (prescribed fire), the property will likely revert back to its former state, although there would still be a likely increase in overall diversity of ground-layer species due to the brush suppression and seeding that was done.

23. Site Assessor(s) Conducting Review:

David Schmitz, Great River Greening

Site Maps, Project Plans or Vegetation Tables



Figure 24-1 Site 1 received forestry mowing, herbicide follow up, seeding, and a prescribed burn.



Minnesota Woodland Mix

Acres:	2.00		
PLS lbs:	20.00		
Bulk ibs;	33.23		
Lot Number:	MNLWDM1504		

8740 77th Street NE Otsego, MN 55362

Scientific Name	Common Name		Pure		Hard or		Total
Boutelous ourtinendula	Side Oete Campa	Genetic Origin/ Variety	Seed	Germ	Dormant	TZ	Viable
Bromus pubescens	Side-Oats Grama	Douglas Co. MN	1.25	80.00	16.00	0.00	96.00
Carex radiate	Hairy Woodand Brome	Steams Co. MN	5.54	75.00	1.00	0.00	76.00
Carey sprengelij	Eastern Star Sedge	Benton/Morrison Co. MN	9.70	0.00	76.00	0.00	76.00
Elymus hustrix	Long-Beaked Sedge	Morrison Co. MN	30.10	0.00	27.00	0.00	27.00
Elymos nysuix	Bottlebrush Grass	Benton/Wright Co. MN	4.59	0.00	0.00	95.00	95.00
Elymus visolatere	Silky Wild Rye	Morrison Co. MN	11.50	0.00	0.00	89.00	89.00
Elynius wiginious	Virginia Wild Rye	Rice Co. MN	7.28	91.00	0.00	0.00	91.00
Schizachynum scopanum	Little Bluestern	Marshall Co. MN	6.84	66.00	22.00	0.00	88.00
Agastache foeniculum	Fragrant Giant Hyssop	McLeod Co. MN	1.66	0.00	0.00		
Aquilegia canadensis	Columbine	Kandivohi Co. MNI	0.27	0.00	0.00	97.00	97.00
Aster ciliclatus	Lindley's Aster	Benton Co. MN	0.57	29.00	53.00	0.00	82.00
Aster lateriflorus	Calico Aster	Beston Co. Mill	0.69	0.00	0.00	87.00	87.00
Aster macrophyllus	Large Leaf Aster	Benien Co. MN	0.65	0.00	0.00	92.00	92.00
Campanula americana	Tall Belthower	Benton Co. MN	0.16	0.00	0.00	92.00	92.00
Geranium maculatum	Wild Geranium	Vemon Co. WI	0.35	82.00	4.00	0.00	86.00
Helianthus strumosus	Pale-Lopved Surflower	Fillmore Co. MN	0.17	14.00	76.00	0.00	90.00
Heuchera richardsonii	Prairie Alummot	Columbia Co. WI	1.25	0.00	0.00	24.00	24.00
Lysimachia ciliata	Fringed Loosectrife	Ottertail Co. MN	0.58	26.00	0.00	0.00	26.00
Monarda fistulosa	Wild Bornesst	Morrison Co. MN	0.35	0.00	0.00	85.00	85.00
Polygonatum billogum	Colomoto Cont	McLeod Co. MN	1.14	0.00	0.00	79.00	79.00
Rudheckia lacinista	Solomons Seal	Winona Co. MN	0.34	13.00	75.00	0.00	88.00
Rudbeckis teleba	Wild Golden Glow	Rock Co. WI	1.09	6.00	77.00	0.00	83.00
Solidona daida	Brown-Eyed Susan	Allamakee Co. IA	0,60	0.00	0.00	75.00	75.00
Zizin surce	Stiff Goldenrod	McLeod Co. MN	7.52	11.00	33.00	0.00	44.00
zizia aurea	Golden Alexanders	McLeod Co. MN	1.90	2.00	93.00	91.00	95.00
Purity:	95.53	and the second		2			
Inert:	4.27						
Other Crop:	0.17						
Weed Seed:	0.03						
Noxious Weeds/lb:	None						
Test Date:	5/30/2014						

Figure 24-2 Minnesota Woodland Mix used to hand seed areas scalped during forestry mowing.

Table 24-1 Results from site meander in area labeled as "Site 1" in Figure 24-1. Site meander was approximately25 minutes long.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Achillea milefolia	Yarrow	1-5%	No	Native
Actea rubra	Red baneberry	1-5%	No	Native
Ageratina altissima	White Snakeroot	1-5%	No	Native
Allium stelatum	Prairie onion	0-1%	Yes	Native
Ampicarpaea bracteta	Hog peanut	5-25%	No	Native
Campanula rotundifolium	Harebell	1-5%	No	Native
Campanulastrum americanum	Bellflower	1-5%	No	Native
Circaea lutetiana	Enchanter's nightshade	1-5%	No	Native
Cirsium arvense	Canada thistle	1-5%	No	Invasive
Corylus americana	Hazel	5-25%	No	Native
Desmodium glutinosum	Pointed-leaf tick trefoil	5-25%	No	Native
Elymus hystrix	Bottlebrush	1-5%	Yes	Native
Eurybia macrophylla	Large-leafed Aster	1-5%	No	Native
Fragaria sp.	Wild Strawberry	1-5 %	No	Native
Galium boreale	Northern Bedstraw	1-5%	no	
Geranium maculatum	Wild Geranium	1-5%	Yes	Native
Hackelia virginiana	Stickseed	1-5%	No	Native
Laportia canadensis	Wood Nettle	5-25%	No	Native
Monarda fistulosa	Beebalm	1-5%	Yes	Native
Osmohiza claytonia	Sweet Cicely	1-5%	No	Native
Parthenocissus quinquefolia	Virginia creeper	1-5%	No	Native
Polygonatum biflorum	Solomon's seal	1-5%	Yes	Native
Prunus serotina	Black cherry	1-5%	No	Native
Prunus virginiana	Chokecherry	1-5%	No	Native
Quercus macrocarpa	Bur Oak	50-75%	no	Native
Quercus rubra	Red Oak	25-50%	No	Native
Rosa sp.	Wild Rose	1-5%	No	Native
Rudbeckia hirta	Black-eyed Susan	1-5%	Yes	Native
Smilax tamnoides	Greenbrier		no	
Solidago Canadensis	Canada Goldenrod	1-5%	No	Native
Toxicodendron radican	Poison Ivy	5-25%	No	Native
Urtica dioica	Stinging nettle	1-5%	No	Non-native
Zanthoxylem americanum	Prickly Ash	5-25%	No	Native

Site Photographs



Photo 24-1 This photo shows the condition of the site prior to treatment. Notable is the height and density of the brush layer. (photo taken 5/15)



Photo 24-2 Following the forestry mowing. Note the even spacing and age of the trees. This reflects the site history as pasture. (photo taken after 5/15/15)



Photo 24-3 Showing the condition of the site in August of 2016. The brush is showing signs of regrowth. (photo taken 8/24/16)



Photo 24-4 The prescribed fire had met objectives and further set back the woody brush. (photo taken 10/31/2019)



Photo 24-5 In the growing season following the burn, many open pockets remain clear of overabundant woody brush, and ground layer herbaceous vegetation is filling in. (photo taken 8/3/20)



Photo 24-6 As can be seen above, the woody brush was effectively top-killed by the prescribed fire treatment. (photo taken 8/3/20)

25) Little Nokasippi WMA Forest Restoration 2

Project Background

Project Name: Oak Savanna Restoration—Little Nokasippi River WMA

Project Site: Lt. Nokasippi WMA

Township/Range Section: Township 43 Range 32 Section 22, 23, 27

Project Manager / Affiliated Organization: Rick Horton, National Wild Turkey Federation; Christine Reisz, Department of Natural Resources Wildlife Area Supervisor

Fund: OHF - CPL Fiscal Year Funds: 2014

Project Start Date: May 2015

Predominant Habitat type: Forest

Additional Habitat types: Prairie / Savana / Grassland , Choose an item.

Project Status: Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

The CPL grant for the project included 7 sites. All sites received forestry mowing and herbicide treatment. The grant application indicated that the units would receive a timber sale to open up areas within the units, but this has yet to occur. The plan also called for a prescribed burn treatment to the units Site 1 was burned in Fall of 2019. Due to the difference in treatment and the distinction in the dominant plant community—Bur Oak-dominant in the western area of the property vs. Red Oak dominant in the eastern side—two site assessments were made. This report focuses on Site 4, which is be representative of the four eastern units of the project. These sites received forestry mowing and a follow-up herbicide treatment.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Grant application, Project work plan, and Contract Public Notice documents were provided by Christine Reisz, DNR Wildife Area Manager. Contract Manager Gary Drotts was able to meet onsite to provide verbal background on project activities, timeline, and site background.



3. What are the stated goals of the project?

Goals are forest enhancement, reduction of the understory brush layer through mechanical, chemical, and prescribed fire methods.

4. What are the desired outcomes of achieving the stated goals of the project?

Expected outcomes are improved turkey brood habitat, which requires a balance of canopy, brushy cover, and open areas, as well as sufficient forage. Vegetation outcomes are increased ground layer diversity, and Bur and Red Oak regeneration. Prior to treatment, the brush layer was too dense to support diverse ground layer vegetation or oak regeneration, and the disturbance to the site should provide opportunities for germination of the native seedbank as well as the species seeded during the project.

5. Were measures of restoration success identified in plans? Yes If yes, list specific measurements.

Enhance 40 of red oak by mowing the understory in patches, followed by a timber sale and prescribed burning.

6. Are plan Sets available? Yes Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:
Site map showing all 7 units of the project. Site 4 is the focus of this report.

Species observed at visit to Site 4.

7. Provide list of best management practices, standards, guidelines identified in plan set?

- 5. Forestry mowing to remove woody brush.
- Herbicide treatment—woody brush regrowth was treated in the fall following mowing in Site 4.
 Triclopyr 3A was applied at a rate of 3 ounces per gallon.
 The above methods are consistent with current science for management of an oak woodland.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

- 8. Were alterations made to the plan during project implementation?
 - Yes

To date neither a timber sale nor prescribed burn has been completed on Site 4.

9. In what ways did alterations change the proposed project outcome?

The grant application specified openings in the canopy created by a timber sale as beneficial to habitat and oak regeneration. Without a timber sale there are minimal openings in the canopy however Red Oak regeneration is happening. A future prescribed burn would help to set back the brush layer as well.

Site Assessment

Field Review Date: 8/3/2020

Field Visit Attendees: David Schmitz-Great River Greening Site Assessor, Gina Quiram-DNR Restoration Evaluations Specialist, Christine Reisz-DNR Wildife Area Manager, and Gary Drotts-Gone Wild Enterprises, LLC.

10. Surrounding Landscape Characteristics:

The eastern side of the Little Nokasippi Wildlife Management Area is dominated by Red Oak, which are mostly mature trees. The unit is bordered by the Little Nokasippi and Nokasippi Rivers.

11. Site Characteristics:

a. Soil Series:

Sites 4-7 are primarily Eutrudepts-Graycalm-Rollins complex, pitted, 2 to 10 percent slopes. Signs of erosion were not observed.

b. Topography:

The treatment areas themselves are primarily flat, although the surrounding topography contains slopes down to the Little Nokasippi River and several wetland depressions.

c. Hydrology:

The project treatment sites are all upland areas.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

The eastern area of the property is dominated by Red Oaks (50-75%), with Basswood and Bur Oaks interspersed (5-25%). In the understory, prickly ash and hazel are present in the shrub layer (25-50%), but are less dense than in the adjacent untreated areas. Despite not receiving supplemental seed, the site showed some diversity of native ground layer plants.

12. Is the plan based on current science? Yes

Methods of treatment, including forestry mowing followed by herbicide application are consistent with BMP's for Oak Wodland restoration.

13. List indicators of project goals at this stage of project:

As compared with the density prior to treatment, there has been roughly a 50 percent reduction in the brush layer density, as well as a 35 percent reduction in height of the brush—specifically prickly ash and hazel. Within Site 4, young oak seedlings were observed. This indicates that the treatment area benefited from additional sunlight created by the forestry mowing.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Continued success of the project will likely depend on continued management, particularly prescribed fire, which will prevent the hazel and prickly ash from continuing to reestablish. If further management is not conducted, the site will likely revert largely to its state prior to the project inception.

15. Are corrections or modifications needed to achieving proposed goals?

Wildlife Area Manager Christine Reisz identified prescribed fire as the primary tool for maintenance of the project, but was unsure a fire will be conducted.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

The question of a possible timber sale was noted in the site visit, and it should be noted that timber harvest would drastically change the composition of the site, and would likely require additional measures. If timber harvest occurs, steps will need to be taken to ensure that any disturbance or openings created are colonized by desirable vegetation rather than weedy or invasive species. Oak regeneration would be expected to increase with more canopy penetration.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

As noted above, timber harvest could change the management needs of the property as the canopy is reduced.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

This site could benefit from follow-up, especially to assess if further management is undertaken.

19. Additional comments on the restoration project.

The site benefited largely from the partnership between Agency managers, NWTF, and Gary Drotts, who was able to bring his knowledge of the area overall to bear on the project implementation, as well as contribute a lot of pertinent information to the evaluation process.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Minimally achieved the stated goals.

21. The project will:

Minimally meet proposed outcomes. *Confidence of outcome determination:* Medium.

22. Provide explanation of reason(s) for determination.

Future success seems contingent on available resources. Without further management (prescribed fire), the property will likely revert back to its former state, although there would still be a likely increase in overall diversity of ground-layer species due to the brush suppression and seeding that was done.

23. Site Assessor(s) Conducting Review: David Schmitz, Great River Greening

Site Maps, Project Plans or Vegetation Tables



Figure 25-1 Sites 4-7 received forestry mowing, herbicide follow up.

Table 25-1 Results from site meander in area labeled as "Site 4" in Figure 25-1. Meander survey occurred on8/3/2020 for 30 minutes on the south side of Site 4.

Scientific Name	Common Name	Cover Range	Species Status
Achillea millefolia	Yarrow	1-5%	Native
Agastache scrofularifloria	Anise hyssop	0-1%	Native
Ampicarpaea bracteta	Hog peanut	5-25%	Native
Corylus Americana	Hazel	50-75%	Native
Desmiodium glutinosum	Pointed-leaf tick trefoll	1-5%	Native
Eurybia macrophylla	Large-leaved Aster	1-5%	Native
Fragaria sp.	Strawberry	1-5%	Native
Galium boreale	Northern bedstraw	1-5%	Native
Geranium maculatum	Wild Geranium	1-5%	Native
Helianthus tuberosa	Jerusalem Artichoke	5-25%	Native
Osmohiza claytonia	Sweet Cicely	1-5%	Native
Polygonatum biflorum	Solomon's seal	1-5%	Native
Prunus virginiana	Chokecherry	1-5%	Native
Quercus macrocarpa	Bur Oak	25-50%	Native
Quercus rubra	Red Oak	50-75%	Native
Ribes sp.	Gooseberry	1-5%	Native
Rubus ideaus	Wild red raspberry	1-5%	Native
Sanguinaria Canadensis	Bloodroot	1-5%	Native
Tillia Americana	Basswood	5-25%	Native
Vaccinium angustifolium	Lowbush blueberry	1-5%	Native

Site Photographs



Photo 25-1 Area of brush removal in Site 4 showing a mix of remaining openings and resprouting brush (photo taken during site visit on 8/3/2020).



Photo 25-2 Area characteristic of where more regrowth has happened on the site following brush removal (photo taken during the site visit on 8/3/2020).



Photo 25-3 Photo characteristic of the understory vegetation in Site 4 (phot taken during site visit on 8/3/2020).



Photo 25-4 Untreated area NE of site 4. Untreated areas were covered pretty consistently by 3-5 ft brush with few to no openings (photo taken during site visit 8/3/2020).

26) Tamarac National Wildlife Refuge Young Forest Enhancement 1

Project Background

Project Name: American Bird Conservancy Young Forest Conservation (ML 2013) Phase I

Project Site: Tamarac #12R (Site 3), Tamarac National Wildlife Refuge (NWR)

Township/Range Section: Township 141N Range 39W Section 33

Project Manager / Affiliated Organization: Peter Dieser, American Bird Conservancy

Fund: OHF Fiscal Year Funds: 2013

Project Start Date: 1/1/2014

Predominant Habitat type: Forest

Additional Habitat types: Forest , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

Small tree and brush mowing utilizing a Terex PT110 and Terex PT100G skidsteer w/brushmower attachment.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for

the data?

Records retained by American Bird Conservancy Including:

- Project Site Location (shapefiles)
- Desired Outcomes
- Site Description
- Project Area
- Contractor
- Equipment Used
- Pre-treatment Conditions
- Post-treatment Conditions (including photos)



Project note

3. What are the stated goals of the project?

Create early successional habitat comprised of herbaceous and young woody regrowth.

4. What are the desired outcomes of achieving the stated goals of the project?

The main objective of this project was to utilize science-based best management practices to create high quality early successional nesting and brood rearing habitat for golden-winged warbler, American woodcock and associated early successional deciduous forest habitat species, such as ruffed grouse, rose-breasted grosbeak, veery and black-billed cuckoo, while also promoting a greater range of structural diversity within the 1000 Acre Tract at Tamarac NWR. The cutting focus was on the dense hazel growth with only very limited cutting of any sapling sized tree species to promote forest regeneration throughout the site. This resulted in a high percentage of woody retention. Hazel growth had suppressed tree regeneration and growth in some areas.

A complimentary objective of this project was to reduce the density of woody vegetation, primarily hazel, which limits the spread of prescribed fire in this unit, allowing Tamarac NWR to complete follow-up fire treatments in subsequent years to encourage additional age and species diversity within this stand and throughout the 1,000 Acre Tract.

5. Were measures of restoration success identified in plans? Yes

If yes, list specific measurements.

Acres of land treated

6. Are plan Sets available? No Have project maps been created? Yes

If yes, provide in "site maps" and list maps provided:

No plan sets were developed as there was no construction. Maps developed by American Bird Conservancy:

- Pre-treatment aerial photo/map with project area outlined (Figure 26-1)
- Post-treatment aerial photo/map with project area outlined (Figure 26-2)

7. Provide list of best management practices, standards, guidelines identified in plan set?

Best Management Practices applied during field execution of the project included:

- Adhering to MN DNR Op Order 113 Invasive Species protocols
- Utilizing appropriate-sized equipment to accomplish mowing of woody growth
- Maintaining level of mowing equipment approximately 8-12 inches above soil surface to minimize risk of soil disturbance
- Conducting work during frozen ground conditions to minimize risk of rutting and soil compaction

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation?

No

Click here to enter text.

9. In what ways did alterations change the proposed project outcome?

Not applicable – project was implemented as anticipated.

Site Assessment

Field Review Date: 8/18/2020

Field Visit Attendees: Peter Dieser, American Bird Conservancy (ABC); Kent Sudseth, USFWS Tamarac NWR Refuge Manager; Gina Quiram, MN DNR; Paul Bockenstedt, Stantec

10. Surrounding Landscape Characteristics:

This particular treatment site within Tamarac NWR is known as the 1,000-acre tract. The site is located within five miles of the border between the Pine Moraines and Outwash Plains subsections of the Laurentian Mixed Forest Province and the Hardwood Hills subsection of the Eastern Broadleaf Forest Province as defined by the MN DNR Ecological Classification System. This site occurs adjacent to the Otter Tail River. The topography is gently rolling, with gentle slopes that drain from east to west within the site, toward from the Ottertail River.

11. Site Characteristics:

a. Soil Series:

Soils in the area of this treatment site are characterized by coarse-loamy Eutroboral or Haplaquols, with soil series including Dorset, Marquette and Forada.

b. Topography:

The area is characterized by moderately rolling terrain. Slope/relief range average only of 0-20% but can be briefly as steeps as 30-45% on some hill slopes of the rolling project site.

Hydrology:

This treatment area is primarily characterized by rolling upland with well-drained soils. Upland shrubland/woodland/forest areas are interspersed with small, depressional wet meadow and shrub carr areas where the water table is temporarily or seasonally at the surface.

c. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Project sites are located within a unique young forest area of Tamarac NWR known as the 1000 Acre Tract. This area is composed of young, even-aged aspen and mixed hardwood regeneration with some large burr oak, aspen and red pine dispersed throughout. This tract is unique because it was a part of a project in the late 1990s to create a large open land on the refuge (it is notable that the Tall Grass Prairie ecological province is located only 5 miles to the west of the refuge). This effort was abandoned when it became evident that forest regeneration could not be halted and is now being managed to return to a mixed – age forested state. The mature trees on this site are primarily burr oak. Pre-existing invasive, nonnative plant cover at this site is higher than other ABC project sites, although it comprises a relatively small portion of the total cover (approximately 2-3%, total). The most common invasive, nonnative plant species observed are common tansy and spotted knapweed.

12. *Is the plan based on current science?* Yes

The species of wildlife that the project was intended to benefit are known to utilize the habitat composition and structure that resulted from vegetation management work.

13. List indicators of project goals at this stage of project:

There is good structural arrangement of habitat, including variations in habitat that include herbaceous vegetation and young, woody plants. Desirable habitat at ground level at this site continues to include herbaceous cover (including graminoids) as a significant component.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, habitat resulting from management achieves desired outcomes.

15. Are corrections or modifications needed to achieve proposed goals?

None required.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Accepted practice for long-term management of early-successional (woody regrowth and herbaceous) habitat requires periodic mowing and/or fire. The long-term challenge for maintaining early successional habitats such as the ones in this project is the need to periodically re-mow or burn every 6-10 years.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Project activities are all supportive of desired habitat outcomes.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

Follow-up assessment is not necessary as the project met the stated goals.

19. Additional comments on the restoration project.

This site has patchier composition of tree and shrub cover interspersed with herbaceous vegetation. Compared to other treatment sites at Tamarac NWR, this site had a higher level of pre-existing invasive, nonnative plants including tansy.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes.

Confidence of outcome determination:

High.

22. Provide explanation of reason(s) for determination.

Subjective evaluations and observations by natural resources professionals indicates that managed areas are indeed attracting species of wildlife that depend on early successional habitats comprised of herbaceous vegetation and young woody growth, particularly birds identified as target species for this project. Although woody regrowth at this site has been relatively aggressive since the treatment occurred in 2014, the value of the treatment has endured through the anticipated period of time. This site will be in need of additional mechanical or prescribed fire management to set back woody growth to an early successional stage in the coming years.

23. Site Assessor(s) Conducting Review:

Paul Bockenstedt

Site Maps and Vegetation Tables



Figure 26-1 Pre-treatment aerial imagery of project site dominated by dense hazel from 1-3" DBH, completed in Winter 2016-17 (2015 True Color).



Figure 26-2 Post-treatment aerial imagery of project site includes more aspen and oak regeneration, though still robust hazel component, (Google Earth 2020).

Table 26-1 Meander vegetation survey results. *0-1%, 1-5%, 5-25%, 25-50%, 50-75%, 75-100%

 **N=native, I=introduced/nonnative

Scientific Name	Common Name	Cover Range*	Species Status**
Quercus ellipsoidalis	Northern pin oak	1-5%	N
Populus tremuloides	Quaking aspen	5-25%	N
Quercus macrocarpa	Bur oak	1-5%	N
Prunus resinosa	Red pine	1-5%	N
Symphoricarpos albus	Snowberry	1-5%	N
Rubus cf flagellaris	Northern blackberry	1-5%	N
Rhus glabra	Smooth sumac	1-5%	N
Toxicodendron radicans	Poison ivy	1-5%	N
Corylus americana	American hazelnut	5-25%	N
Salix discolor	Pussy willow	1-5%	N
Amelanchier cf. arborea	Downy serviceberry	1-5%	N
Cornus sericea	Red-osier dogwood	1-5%	N
Rubus strigosus	American red raspberry	1-5%	N
Carex cf. inops	Sun-loving sedge	1-5%	N
POA PRATENSIS	KENTUCKY BLUEGRASS	5-25%	I
Carex pensylvanica	Pennsylvania sedge	1-5%	N
Andropogon gerardii	Big bluestem	5-25%	N
Muhlenbergia mexicana	Leafy satin grass	1-5%	N
Elymus canadensis	Canada wildrye	1-5%	N
Muhlenbergia racemosa	Upland timothy	1-5%	Ν
Solidago gigantea	Giant goldenrod	1-5%	N
Agastache foeniculum	Blue giant hyssop	1-5%	N
Monarda fistulosa	Wild bergamot	1-5%	N
Solidago canadensis	Canada goldenrod	5-25%	N
Pteridium aquilinum	Bracken fern	1-5%	N
Fraxinus virginiana	Wild strawberry	1-5%	Ν
Helianthus strumosus	Woodland sunflower	1-5%	N
Galium boreale	Northern bedstraw	1-5%	N
Solidago nemoralis	Gray goldenrod	1-5%	N
Eurybia macrophylla	Large-leaved aster	1-5%	N
Euthamia graminifolia	Grass-leaved goldenrod	1-5%	N
TANACETUM VULGARE	COMMON TANSY	1-5%	I
CENTAUREA STOEBE	SPOTTED KNAPWEED	1-5%	I
Asclepias syriaca	Common milkweed	0-1%	N
Campanula rotundifolia	Harebell	0-1%	Ν
Lathyrus venosus	Veiny pea	0-1%	N
Castilleja coccinea	Indian paintbrush	1-5%	N
Polygonum cf. scandens	Climbing false buckwheat	1-5%	Ν
Pedicularis lanceolata	Swamp lousewort	1-5%	Ν
Comandra umbellata	Bastard toadflax	1-5%	Ν
Apocynum androsaemifolium	Spreading dogbane	1-5%	Ν
Solidago rigida	Stiff leaved goldenrod	1-5%	N

Scientific Name	Common Name	Cover Range*	Species Status**
Anemone virginiana	Tall thimbleweed	1-5%	N
Zizia aurea	Golden Alexanders	0-1%	N

Site Photographs



Photo 26-1 Treatment area illustrating open meadows that are interspersed with dense regrowth of beaked hazel and other brush after forestry mowing in 2017 (photo taken 8.18.20).



Photo 26-2 View from hillside, showing regrowth of mowed woody vegetation and scattered taller trees that were retained during the treatment (8.18.20).



Photo 26-3 Portion of treatment area that had pre-existing native grasses and flowers, surrounded by regrowth of brush following forestry mowing (8.18.20).



Photo 26-4 Portion of treatment area with dense brush regrowth following forestry mowing (8.18.20).

Project Manager Summary

Project Site Location: Tamarac National Wildlife Refuge (NWR)

Outdoor Heritage Fund Parcel Identification: Tamarac #12R

County: Becker

Year Completed: 1/1/2017-3/15/2017 Winter Project Season

Desired Outcomes:

The main objective of this project was to utilize science-based best management practices to create high quality early successional nesting and brood rearing habitat for golden-winged warbler, American woodcock and associated early successional deciduous forest habitat species, such as ruffed grouse, rose-breasted grosbeak, veery and black-billed cuckoo, while also promoting a greater range of structural diversity within the 1000 Acre Tract at Tamarac NWR. The cutting focus was on the dense hazel growth with only very limited cutting of any sapling sized tree species to promote forest regeneration throughout the site. This resulted in a high percentage of woody retention. Hazel growth had suppressed tree regeneration and growth in some areas.

A complimentary objective of this project was to reduce the density of woody vegetation, primarily hazel, which limits the spread of prescribed fire in this unit, allowing Tamarac NWR to complete follow-up fire treatments in subsequent years to encourage additional age and species diversity within this stand and throughout the 1000 Acre Tract.

Site Description:

Project sites are located within a unique young forest area of Tamarac NWR known as the 1000 Acre Tract. This area is composed of young, even-aged aspen and mixed hardwood regeneration with some large burr oak, aspen and red pine dispersed throughout. This tract is unique because it was a part of a project in the late 1990s to create a large openland on the refuge (it is notable that the Tall Grass Prairie ecological province is located only 5 miles to the west of the refuge). This effort was abandoned when it became evident that forest regeneration could not be halted and is now being managed to return to a mixed – age forested state. The mature trees on this site are primarily burr oak. It is on a rolling, primarily upland topography with adjacent wetland located in the Pine Moraines & Outwash Plains subsection of the Laurentian Mixed Forest Province as defined by the MN DNR Ecological Classification System. Soils in this area are characterized by a coarse-loamy to fine-loamy eutroboralf, fragiboralf or haplaquoll with hemic borohemist and other wetland soils in some areas throughout the tract. Neighborhood soil series include Dorset, Beltrami, Nebish, Marquette, Rockwood and Mooselake. Slope/relief range average only of 0-20%, but can be briefly as steeps as 30-45% on some hill slopes of the rolling project site.

Due to the presence of wetland soils at site edges, somewhat steep slopes in some areas, and concerns about the sensitivity of undisturbed cultural resources on Tamarac NWR, all projects were completed under frozen ground conditions. Sites were accessed using existing forest roads and logging trails. No wetlands or streams were crossed in order to access project sites. A cultural resources review was completed and no potential impacts were noted.

Project Area: 14.99 acres

Contractor: Iserv LLC.

Equipment Used: Terex PT110 and Terex PT100G skidsteer w/brushmower attachment

Pre-treatment Conditions:

This project site was dominated by dense hazel, aspen, birch, and oak species from 1-3" DBH with a component of mature burr oak (5+" DBH) distributed singly or in patches with most occurring in more upland topography. The site had very dense and thick hazel growth throughout the site, with an equally dense component of deciduous forest sapling species in some areas.



This site is in a fire dependent native plant community and part of a prescribed fire burn unit that had become densely vegetated.

Post-treatment Conditions:



Post-treatment habitat conditions included the cutting/thinning of the dense shrub understory with limited cutting of any tree species. Cut woody material averaged approximately 1-3" with some shrub clumps having a higher aggregate DBH at their base. Larger individuals of any tree species, most sapling tree species, and a component of bush cover were retained as residual woody structure. Legacy patches were also distributed throughout the site due to the natural presence of patches of mature trees or dense sapling growth, creating heterogeneity in the vertical and horizontal structure. Legacy patches totaled approximately 10% of the treatment area in addition to shrub clumps and individual trees, though some cutting of brush spp. did take place under mature trees without damaging them. The objective was to leave a higher density of residual wood material (30-50%) on sites located within the 1000 Acre Tract because the tract is relatively young throughout its extent because there was a focus on avoiding damage to most tree regeneration. Also, additional disturbance was going to be provided in the form of prescribed fire.

This project was complimented by prescribed fire in 2017, resulting in some areas being left more open, promoting diverse forb growth in some patches, while also increasing the competitive success of existing tree regeneration, especially aspen and oak, the latter of which is now a much more robust component of regeneration on the project site. However, hazel growth has again been extremely vigorous in some

areas since treatments were completed and follow-up treatments may be necessary to build upon the progress of this project.

Project Notes:

Tamarac NWR has one of the highest population densities of golden-winged warbler in the world and lies at the intersection of the Laurentian Mixed Forest and the Eastern Broadleaf Forest Provinces, making it one of northern Minnesota's most unique biological and ecological communities.

As stated above, this project worked in a rolling site located on the 1000 Acre Tract. A complimentary prescribed fire was completed in the spring 2017 burn season, setting back some of the regeneration and maintaining a diverse and patchy landscape, but this tract is still relatively even aged and has a very competitive brush component. As such, to maintain a young forest habitat component, while promoting a successional trajectory towards diverse mid successional habitat, it is recommended that follow-up mechanical and prescribed fire treatments be completed on sites within the 1000 Acre Tract in the next 5 years, concentrating on reducing the dense hazel component and continuing to promote the growth of regenerating tree species.

27) Tamarac National Wildlife Refuge Young Forest Enhancement 2

Project Background

Project Name: American Bird Conservancy Young Forest Conservation (ML 2013) Phase I

Project Site: Tamarac #11R (Site 2), Tamarac National Wildlife Refuge (NWR)

Township/Range Section: Township 141N Range 39W Section 27

Project Manager / Affiliated Organization: Peter Dieser, American Bird Conservancy

Fund: OHF Fiscal Year Funds: 2013

Project Start Date: 1/1/2014

Predominant Habitat type: Forest

Additional Habitat types: Forest , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

- What are the specific project components and treatments? Brush and small tree mowing utilizing Terex PT110 and Terex PT100G skidsteer w/brushmower attachment
- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Records retained by American Bird Conservancy Including:

- Project Site Location (shapefiles)
- Desired Outcomes
- Site Description
- Project Area
- Contractor
- Equipment Used
- Pre-treatment Conditions
- Post-treatment Conditions (including photos)



• Project notes

3. What are the stated goals of the project?

Create early successional habitat comprised of herbaceous and young woody regrowth.

4. What are the desired outcomes of achieving the stated goals of the project?

Create high quality early successional nesting and brood rearing habitat to benefit golden-winged warbler, American woodcock and associated early successional deciduous forest habitat species, such as ruffed grouse, rose-breasted grosbeak, veery and black-billed cuckoo, and other species that rely on early successional habitat.

A complimentary objective of this project was to reduce the density of woody vegetation (willow, alder, hazel and aspen) in a prescribed fire burn unit to allow Tamarac NWR to complete follow-up fire treatments in subsequent years. This would allow the prescribed fire to penetrate some areas that would otherwise not burn well due to the density of the woody vegetation.

- Were measures of restoration success identified in plans? Yes If yes, list specific measurements. Acres treated
- 6. Are plan Sets available? No Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:

No plan sets were developed as there was no construction. Maps developed by American Bird Conservancy:

- Pre-treatment aerial photo/map with project area outlined (Figure 27-1)
- Post-treatment aerial photo/map with project area outlined (Figure 27-2)
- Provide list of best management practices, standards, guidelines identified in plan set?
 Best Management Practices applied during field execution of the project included:
 - Adhering to MN DNR Op Order 113 Invasive Species protocols
 - Utilizing appropriate-sized equipment to accomplish mowing of woody growth
 - Maintaining level of mowing equipment approximately 8-12 inches above soil surface to minimize risk of soil disturbance
 - Conducting work during frozen ground conditions to minimize risk of rutting and soil compaction

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation? No

Click here to enter text.

 In what ways did alterations change the proposed project outcome? Not applicable – project was implemented as anticipated.

Site Assessment

Field Review Date: 8/18/2020

Field Visit Attendees: Peter Dieser, American Bird Conservancy (ABC); Kent Sudseth, USFWS Tamarac NWR Refuge Manager; Gina Quiram, MN DNR; Paul Bockenstedt, Stantec

10. Surrounding Landscape Characteristics:

The Tamarac NWR sites are located within five miles of the border between the Pine Moraines and Outwash Plains subsections of the Laurentian Mixed Forest Province and the Hardwood Hills subsection of the Eastern Broadleaf Forest Province as defined by the MN DNR Ecological Classification System. This site occurs within Tamarac NWR in an area adjacent to the Otter Tail River. The topography is gently rolling, with gentle slopes that drain from east to west within the site, toward from the Ottertail River.

11. Site Characteristics:

a. Soil Series:

Soils in this area are characterized by coarse-loamy Eutroboral or Haplaquols, with soil series including Dorset, Marquette and Forada. This project site also both includes and is adjacent to wetland communities and soil types.

b. Topography:

Slope/relief is gently rolling. However short slopes may be up to 20%, especially as the site moves from lowland in the west to upland in the east.

c. Hydrology:

The area is characterized by slightly rolling terrain with modest vertical relief in the landscape. Upland shrubland/woodland/forest areas are interspersed with wet meadow and shrub carr areas. Wetlands are associated with depressions and the floodplain/riparian corridor of the Otter Tail River. Within and immediately adjacent to wetlands, the water table is typically at or near the surface for extended periods, particularly during wetter than average periods.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

This project site is dominated by dense, alder, willow, hazel and aspen species from 1-3" DBH with a component residual mature trees including aspen, bur oak, and red pine (6+" DBH) distributed singly or in patches with most occurring in more upland topography. The willow and alder brush were concentrated in the lowland areas in the western half of the site with hazel and aspen dominating understory of the eastern half of the site as the topography becomes more upland. This site is in a fire- dependent native plant community and part of a prescribed fire burn unit that had become densely vegetated. Invasive species levels are low with less than 1% cover of the nonnatives smooth brome and silvery cinquefoil noted.

12. Is the plan based on current science? Yes

The species of wildlife that the project was intended to benefit are known to utilize the habitat composition and structure that resulted from vegetation management work.

13. List indicators of project goals at this stage of project:

The three-dimensional structure of the resulting habitat is good for wildlife species with an affinity for early successional habitats, including variations in habitat comprised of herbaceous vegetation and young, woody plants.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, habitat resulting from management achieves desired outcomes.

- **15.** Are corrections or modifications needed to achieve proposed goals? No.
- 16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Accepted practice for long-term management of early-successional (woody regrowth and herbaceous) habitat requires periodic mowing and/or fire. The long-term challenge for maintaining early successional habitats such as the ones in this project is the need to periodically re-mow or burn approximately every 6-10 years.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Project activities are all supportive of desired habitat outcomes.

- **18.** Are follow-up assessments by the Restoration Evaluation Program needed? Explain. Follow-up is not necessary as the project met goals.
- 19. Additional comments on the restoration project.

Tamarac NWR is considered to host the single largest concentration of golden-winged warblers in the world. ABS and USFWS staff subjective observations indicate a positive response to habitat management in this project by ruffed grouse, warblers, rose-breasted grosbeak, alder flycatcher, and well as seasonal utilization by migrating birds with an affinity for early successional habitats.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

Subjective evaluations and observations by natural resources professionals indicates that managed areas are indeed attracting species of wildlife that depend on early successional habitats comprised of herbaceous vegetation and young woody growth, particularly birds identified as target species for this project. Although woody regrowth at this site has been relatively aggressive since the treatment occurred in 2014, the value of the treatment has endured through the anticipated period of time. This site will be in need of additional mechanical or prescribed fire management to set back woody growth to an early successional stage in the coming years.

23. Site Assessor(s) Conducting Review: Paul Bockenstedt, Stantec
Site Maps and Vegetation Tables



Figure 27-1 Pre-treatment aerial imagery of project site dominated by illustrating dense willow, alder and aspen species from 1-3" DBH within a matrix of singly dispersed and clumped mature tree species, (2010 True Color).



Figure 27-2 Post-treatment aerial image of project illustrating the increase in shorter stature vegetation following brush mowing. Site treatment focused on dense willow, alder and aspen species from 1-3" DBH, completed in Winter 2013-14 (2016 True Color).

Scientific Name	Common Name	Cover Range*	Species Status**
Pinus resinosa	Red pine	5-25%	N
Pinus banksiana	Jack pine	5-25%	N
Quercus macrocarpa	Bur oak	5-25%	N
Vitis riparia	Riverbank grape	1-5%	N
Salix discolor	Pussy willow	5-25%	N
Toxicodendron radicans	Poison ivy	1-5%	N
Betula papyrifera	Paper birch	1-5%	N
Alnus incana	Speckled alder	25-50%	N
Prunus virginiana	Chokecherry	1-5%	N
Rubus idaeus	American red raspberry	5-25%	N
Fraxinus nigra	Black ash	1-5%	N
Salix cf lucida	Shining willow	0-1%	N
Betula pumila	Bog birch	5-25%	N
Cornus sericea	Red-osier dogwood	0-1%	N
Salix cf candida	Sage-leaved willow	0-1%	N
Populus tremuloides	Quaking aspen	1-5%	N
Rosa arkansana	Prairie rose	1-5%	N
Carex lacustris	Lake sedge	5-25%	N
Calamagrostis canadensis	Canada bluejoint	5-25%	N
Carex stricta	Tussock sedge	5-25%	N
Doellingeria umbellata	Flat-topped white aster	1-5%	N
Eutrochium maculatum	Spotted Joe-pye weed	1-5%	N
Symphyotrichum punecium	Red-stemmed aster	1-5%	N
Thalictrum dasycarpum	Tall meadow rue	1-5%	N
Solidago gigantea	Giant goldenrod	1-5%	N
Rumex orbiculatus	Water dock	0-1%	N
Thelypteris palustris	Northern marsh fern	1-5%	N
Galium cf labradoricum	Labrador bedstraw	1-5%	N
Humulus lupulus	Common hop	1-5%	N

 Table 27-1 Upland-wetland transition area meander vegetation survey results for Tamarac #11R (Site 1).

*0-1%, 1-5%, 5-25%, 25-50%, 50-75%, 75-100%

**N=native, I=introduced/nonnative

 Table 27-2 Upland area meander vegetation survey results for Tamarac #11R (Site 1).

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Viburnum rafinesquianum Downy arrow-wood 0-1% N
Amelanchier arborea Downy serviceberry 1-5% N
Prunus serotina Black cherry 1-5% N
Diervilla lonicera Bush honeysuckle 5-25% N
BROMUS INERMIS SMOOTH BROME 0-1% I
Carex pensylvanica Pennsylvania sedge 5-25% N
Muhlenbergia racemosa Marsh muhly 1-5% N
Elymus trachycaulus Slender wheatgrass 0-1% N
POA PRATENSIS KENTUCKY BLUEGRASS 0-1% I
Danthonia spicata Poverty oatgrass 1-5% N
Carex pedunculata Long stalked sedge 0-1% N
Brachyelytrum erectum Bearded shorthusk 1-5% N
<i>Elymus canadensis</i> Canada wildrye 1-5% N
Andropogon gerardii Big bluestem 5-25% N
Schyzachyrium scoparium Little bluestem 1-5% N
Erggrostis spectabilis Purple lovegrass 1-5% N
Oliaoneuron riaidium Stiff goldenrod 1-5% N
Anemone virginigng Tall anemone 1-5% N
Artemisia biennis Prairie sage 1-5% I.N
Maignthemum stellatum Starry false Solomon's seal 1-5% N
Achilleg millefolium Common varrow 0-1% N
Arglig nudicgulis Wild sarsaparilla 5-25% N

Scientific Name	Common Name	Cover Range*	Species Status**
Maianthemum canadense	Canada Mayflower	1-5%	Ν
Aquilegia canadensis	Wild columbine	0-1%	N
Thalictrum dasycarpum	Tall meadow rue	1-5%	N
Pedicularis cf lanceolata	Swamp lousewort	1-5%	N
Viola canadensis	Canadian white violet	0-1%	N
POTENTILLA ARGENTEA	SILVER CINQUEFOIL	0-1%	I
Maianthemum racemosum	False Solomon's seal	1-5%	N
Sanicula cf. marilandica	Maryland black snakeroot	0-1%	N

Site Photographs



Photo 27-1 Upland portion of site project area illustrating relatively even, short herbaceous and woody resprout growth following brush mowing. Mature trees in photo include Jack pine and bur oak (8.18.20).



Photo 27-2 Forestry mowed areas include small, pre-existing openings characterized as having thin, droughty soils dominated by dry-mesic prairie/savanna graminoids and forbs (8.18.20).



Photo 27-3 Peter Dieser of American Bird Conservancy standing on a maintained trail, next to an area of dense woody regrowth (8.18.20).

Project Manager Summary

Project Site Location: Tamarac National Wildlife Refuge (NWR)

Outdoor Heritage Fund Parcel Identification: Tamarac #11R (Site 2)

County: Becker

Year Completed: 1/1/2014-3/15/2014 Winter Project Season

Desired Outcomes:

The main objective of this project was to utilize science-based best management practices to create high quality early successional nesting and brood rearing habitat for golden-winged warbler, American woodcock and associated early successional deciduous forest habitat species, such as ruffed grouse, rose-breasted grosbeak, veery and black-billed cuckoo.

A complimentary objective of this project was to reduce the density of woody vegetation (willow, alder, hazel and aspen) in a prescribed fire burn unit to allow Tamarac NWR to complete follow-up fire treatments in subsequent years. This would allow the prescribed fire to penetrate some areas that would otherwise not burn well due to the density of the woody vegetation.

Site Description:

Project sites are located at Tamarac NWR in a lowland to upland transition area (sloping upward from west to east from the Ottertail River). Sites are located within five miles of the border between the Pine Moraines and Outwash Plains subsections of the Laurentian Mixed Forest Province and the Hardwood Hills subsection of the Eastern Broadleaf Forest Province as defined by the MN DNR Ecological Classification System. Soils in this area are characterized by coarse-loamy Eutroboral or Haplaquols, with soil series including Dorset, Marquette and Forada. However, this project site both includes and is adjacent to wetland communities and soil types. Slope/relief may be up to 20% within project sites, especially as the site moves from lowland in the west to upland in the east.

Due to the presence of wetland soils and concerns about the sensitivity of undisturbed cultural resources on Tamarac NWR all projects were completed under frozen ground conditions. Sites were accessed using existing forest roads and logging trails. No wetlands or streams were crossed in order to access project sites. A cultural resources review was completed and no potential impacts were noted.

Project Area: 59.93 acres

Contractor: Iserv LLC.

Equipment Used: Terex PT110 and Terex PT100G skidsteer w/brushmower attachment

Pre-treatment Conditions:

This project site was dominated by dense, alder, willow, hazel and aspen species from 1-3" DBH with a component residual mature trees including aspen, burr oak, and red pine (6+" DBH) distributed singly or in patches with most occurring in more upland topography. The willow and alder brush were concentrated in the lowland areas in the

western half of the site with hazel and aspen dominating understory of the eastern half of the site as the topography becomes more upland.



This site is in a fire dependent native plant community and part of a prescribed fire burn unit that had become densely vegetated.

Post-treatment Conditions:



Post-treatment habitat conditions include the cutting/thinning of the dense shrub layer and a component of the aspen saplings. Cut woody material averaged 1-3" with some shrub clumps having a higher aggregate DBH at their

base and larger individuals of any tree species and a component of bush cover were retained as residual woody structure.

Tree clumps and legacy patches were also distributed throughout the site to create heterogeneity in the vertical and horizontal structure. This mature tree retention totaled approximately 10-15% of the treatment area in addition to shrub clumps and individual trees. Project edges were also feathered in some areas adjacent to more mature forest stands to avoid a hard edge and create a more gradual transition between stands. Post-treatment woody vegetative regeneration has been vigorous, with more than expected aspen suckering in the upland portion of the site.

Project Notes:

Tamarac NWR has one of the highest population densities of golden-winged warbler in the world and lies at the intersection of the Laurentian Mixed Forest and the Eastern Broadleaf Forest Provinces, making it one of northern Minnesota's most unique biological and ecological communities.

Tamarac NWR was ABC's first partner in Young Forest Conservation Phase I, which started in July 2013, making the 2013-14 winter project season, in which this project was completed, the first of what would become a landscape level program, with projects throughout Minnesota's northern forest region. Tamarac NWR and ABC integrated the golden-winged warbler best management practices with additional biological and ecological considerations to complete a diverse array of upland and lowland young forest and brushland projects in Phase I. This and other projects completed in Phase I laid the educational, collaborative and operational groundwork that would be critical to the long term success of this program.

As stated above, this project was in a lowland to upland transition area. In the 7 growing seasons since this project was completed, aspen and brush regeneration has been vigorous. A complimentary prescribed fire was completed in the spring 2017 burn season, setting back some of the brush regeneration, while maintaining a diverse and patchy landscape in the lowland portion of the site, but the upland portion of the site maintained vigorous regeneration with aspen outcompeting brush species in most areas.

28) Tamarac National Wildlife Refuge Young Forest Enhancement 3

Project Background

Project Name: American Bird Conservancy Young Forest Conservation (ML 2013) Phase I

Project Site: Tamarac #11R (Site 1), Tamarac National Wildlife Refuge (NWR)

Township/Range Section: Township 141N Range 39W Section 27

Project Manager / Affiliated Organization: Peter Dieser, American Bird Conservancy

Fund: OHF Fiscal Year Funds: 2013

Project Start Date: 1/1/2014

Predominant Habitat type: Forest

Additional Habitat types: Forest , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

Small tree and brush mowing utilizing a 721 wheeled Hydroaxe with mower deck

2. What plans / record of project decisions / prescription worksheets are available? Provide location for

the data?

Records retained by American Bird Conservancy Including:

- Project Site Location (shapefiles)
- Desired Outcomes
- Site Description
- Project Area
- Contractor
- Equipment Used
- Pre-treatment Conditions
- Post-treatment Conditions (including photos)



Project note

3. What are the stated goals of the project?

Create early successional habitat comprised of herbaceous and young woody regrowth.

4. What are the desired outcomes of achieving the stated goals of the project?

The main objective of this project was to utilize science-based best management practices to create high quality early successional nesting and brood rearing habitat for golden-winged warbler, American woodcock and associated early successional deciduous forest habitat species, such as, ruffed grouse, rose-breasted grosbeak, veery and black-billed cuckoo.

A complimentary objective of this project was to create diverse early successional habitat in the aspen cover type at Tamarac NWR. Tamarac NWR had an overabundance of 3-4" aspen across the refuge proportional to their total acreage and desired to add diversity in this size class through targeted treatments in some stands.

5. Were measures of restoration success identified in plans? Yes

If yes, list specific measurements.

Acres of land treated

6. Are plan Sets available? No Have project maps been created? Yes

If yes, provide in "site maps" and list maps provided:

No plan sets were developed as there was no construction. Maps developed by American Bird Conservancy:

- Pre-treatment aerial photo/map with project area outlined (Figure 28-1)
- Post-treatment aerial photo/map with project area outlined (Figure 28-2)

7. Provide list of best management practices, standards, guidelines identified in plan set?

Best Management Practices applied during field execution of the project included:

- Adhering to MN DNR Op Order 113 Invasive Species protocols
- Utilizing appropriate-sized equipment to accomplish mowing of woody growth
- Maintaining level of mowing equipment approximately 8-12 inches above soil surface to minimize risk of soil disturbance
- Conducting work during frozen ground conditions to minimize risk of rutting and soil compaction

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation?

No

Click here to enter text.

9. In what ways did alterations change the proposed project outcome?

Not applicable - project was implemented as anticipated.

Site Assessment

Field Review Date: 8/18/2020

Field Visit Attendees: Peter Dieser, American Bird Conservancy (ABC); Kent Sudseth, USFWS Tamarac NWR Refuge Manager; Gina Quiram, MN DNR; Paul Bockenstedt, Stantec

10. Surrounding Landscape Characteristics:

The Tamarac NWR sites are located within five miles of the border between the Pine Moraines and Outwash Plains subsections of the Laurentian Mixed Forest Province and the Hardwood Hills subsection of the Eastern Broadleaf Forest Province as defined by the MN DNR Ecological Classification System. The topography is gently rolling, with gentle slopes that drain from east to west within the site, toward from the Ottertail River.

11. Site Characteristics:

a. Soil Series:

Soils in the area of this treatment site are characterized by coarse-loamy Eutroboral or Haplaquols, with soil series including Dorset, Marquette and Forada.

b. Topography:

Slope/relief is minimal, but slopes may reach 10% within project site.

c. Hydrology:

The area is characterized by slightly rolling terrain with modest vertical relief in the landscape. Upland shrubland/woodland/forest areas are interspersed with wet meadow and shrub carr areas. Wetlands are associated with depressions and the floodplain/riparian corridor of the Otter Tail River. Within and immediately adjacent to wetlands, the water table is typically at or near the surface for extended periods, particularly during wetter than average period.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Prior to treatment, this project site was dominated by 3-4" DBH aspen, with little internal vertical or horizontal heterogeneity within the site other than a limited mix of northern hardwoods, as well as a small component of red pine and white pine. The center of the site included a large landing that was not buffered when cut in order to promote aspen regeneration to creep in along its edges. The surrounding forest matrix was dominated by aspen stands in a similar size class and a small component of northern hardwoods, larger aspen and pine spp. Invasive plant cover is very low (<1%) and includes Kentucky bluegrass and Canada bluegrass.

12. Is the plan based on current science? Yes

The species of wildlife that the project was intended to benefit are known to utilize the habitat composition and structure that resulted from vegetation management work.

13. List indicators of project goals at this stage of project:

The three-dimensional structure of the resulting habitat is good for wildlife species with an affinity for early successional habitats, including variations in habitat comprised of herbaceous vegetation and young, woody plants.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes, habitat resulting from management achieves desired outcomes.

15. Are corrections or modifications needed to achieve proposed goals?

None required.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Accepted practice for long-term management of early-successional (woody regrowth and herbaceous) habitat requires periodic mowing and/or fire. The long-term challenge for maintaining early successional habitats such as the ones in this project is the need to periodically re-mow or burn every 6-10 years.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Project activities are all supportive of desired habitat outcomes.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

Follow-up assessment is not necessary as the project met the stated goals.

19. Additional comments on the restoration project.

This site included retention of "tree islands" comprised primarily of quaking aspen, most of which occurred in relatively dense stands with average tree diameter ranging from about four to eight inches dbh. The intent of leaving tree islands was to provide diversity of vertical structure that golden-winged warblers and other species that could be utilized during different stages of their nesting/life cycle.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes.

Confidence of outcome determination:

High.

22. Provide explanation of reason(s) for determination.

Subjective evaluations and observations by natural resources professionals indicates that managed areas are indeed attracting species of wildlife that depend on early successional habitats comprised of herbaceous vegetation and young woody growth, particularly birds identified as target species for this project. Although woody regrowth at this site has been relatively aggressive since the treatment occurred in 2014, the value of the treatment has endured through the anticipated period of time. This site will be in need of additional mechanical or prescribed fire management to set back woody growth to an early successional stage in the coming years.

23. Site Assessor(s) Conducting Review:

Paul Bockenstedt

Site Maps and Vegetation Tables



Figure 28-1 Pre-treatment aerial imagery of site dominated by 3-4" DBH Aspen (2010 True Color).



Figure 28-2 Post-treatment aerial imagery, 3-4" DBH aspen cut w/ reserved and legacy patches, completed in Winter 2013-14 (2016 True Color).

 Table 28-1 Meander vegetation survey results.

Scientific Name	Common Name	Cover	Species
		Range*	Status**
Betula papyrifera	Paper birch	1-5%	N
Quercus macrocarpa	Bur oak	1-5%	N
Populus tremuloides	Quaking aspen	25-50%	N
Fraxinus pennsylvanica	Green ash	0-1%	N
Ostrya virginiana	Ironwood	0-1%	N
Salix cf bebbiana	Bebb's willow	1-5%	N
Rubus strigosus	American red raspberry	5-25%	N
Vitis riparia	Riverbank grape	0-1%	N
Prunus americana	Wild plum	0-1%	N
Symphoricarpos occidentalis	Wolfberry	1-5%	N
Viburnum rafinesquianum	Downy arrow-wood	1-5%	N
Prunus virginiana	Chokecherry	1-5%	N
Populus basalmifera	Balsam poplar	0-1%	N
Corylus cornuta	Beaked hazelnut	5-25%	N
Andropogon gerardii	Big bluestem	1-5%	N
Bromus kalmii	Prairie brome	0-1%	N
POA COMPRESSA	CANADA BLUEGRASS	0-1%	I
Bromus ciliatus	Fringed brome	1-5%	N
Elymus canadensis	Canada wildrye	1-5%	N
POA PRATENSIS	KENTUCKY BLUEGRASS	0-1%	I
Carex pennsylvanica	Pennsylvania sedge	1-5%	N
Asclepias syriaca	Common milkweed	0-1%	N
Solidago nemoralis	Gray goldenrod	0-1%	N
Anemone virginiana	Tall thimbleweed	0-1%	N
Geum aleppicum	Yellow avens	0-1%	N
Symphyotrichum oolentangiense	Sky-blue aster	1-5%	N
Euthamia graminifolia	Grass-leaved goldenrod	5-25%	N
Castilleja cf coccinea	Indian paintbrush	0-1%	N
Achillea millefolium	Common yarrow	0-1%	N
Eurybia macrophylla	Large-leaved aster	1-5%	N
Helianthus giganteus	Giant sunflower	0-1%	N
Viola pubescens	Downy yellow violet	0-1%	N
Solidago canadensis	Canada goldenrod	0-1%	N
Symphyotrichum sagittifolium	Arrow-leaved aster	1-5%	N
Vicia americana	American vetch	1-5%	N
Pedicularis lanceolata	Swamp lousewort	1-5%	N
Potentilla arguta	Tall cinquefoil	1-5%	N
Agastache foeniculum	Blue giant hyssop	1-5%	N
Lathyrus venosus	Veiny pea	1-5%	N
Aralia nudicaulis	Wild sarsaparilla	5-25%	N
Fragaria virginiana	Wild strawberry	1-5%	N
Pteridium aquilinum	Bracken fern	5-25%	N
Sanicula odorata	Clustered black snakeroot	1-5%	N
Heliopsis helianthoides	Early sunflower	1-5%	N

Scientific Name	Common Name	Cover Range*	Species Status**
Agrimonia gryposepala	Tall agrimony	0-1%	N
Osmorhiza claytonia	Sweet cicely	0-1%	N
Thalictrum dasycarpum	Tall meadow rue	0-1%	N
Asarum canadense	Canadian wild ginger	0-1%	N
Desmodium glutinosum	Pointed-leaf tick-trefoil	1-5%	N
Uvularia grandiflora	Large-flowered bellwort	0-1%	N

*0-1%, 1-5%, 5-25%, 25-50%, 50-75%, 75-100% **N=native, I=introduced/nonnative

Site Photographs



Photo 28-1 Treatment area illustrating dense regrowth of quaking aspen six years after forestry mowing (8.19.20).



Photo 28-2 Portion of treatment area that also shows dense, but somewhat shorter, regrowth of woody vegetation (8.18.20).



Photo 28-3 Photo of tree island in broader forestry mowed area with quaking aspen common (8.18.20).



Photo 28-4 Regrowth of quaking aspen has been substantial in the six years since forestry mowing (8.18.20).

Project Manager Summary

Project Site Location: Tamarac National Wildlife Refuge (NWR)

Outdoor Heritage Fund Parcel Identification: Tamarac #11R (Site 1)

County: Becker

Year Completed: 1/1/2014-3/15/2014 Winter Project Season

Desired Outcomes:

The main objective of this project was to utilize science-based best management practices to create high quality early successional nesting and brood rearing habitat for golden-winged warbler, American woodcock and associated early successional deciduous forest habitat species, such as, ruffed grouse, rose-breasted grosbeak, veery and black-billed cuckoo.

A complimentary objective of this project was to create diverse early successional habitat in the aspen covertype at Tamarac NWR. Tamarac NWR had an overabundance of 3-4" aspen across the refuge proportional to their total acreage and desired to add diversity in this size class through targeted treatments in some stands.

Site Description:

Project sites are located at Tamarac NWR on upland sites within five miles of the border between the Pine Moraines and Outwash Plains subsections of the Laurentian Mixed Forest Province and the Hardwood Hills subsection of the Eastern Broadleaf Forest Province as defined by the MN DNR Ecological Classification System.

Soils in this area are characterized by coarse-loamy Eutroboral or Haplaquols, with soil series including Dorset, Marquette and Forada. Slope/relief is minimal very low, but may range up to 10% within project site.

Project sites are often located adjacent to wetland communities and soil types. Due to this and concerns about the sensitivity of undisturbed cultural resources on Tamarac NWR all projects were completed under frozen ground conditions. Sites were accessed using existing forest roads and logging trails. No wetlands or streams were crossed in order to access project sites. A cultural resources review was completed and no potential impacts were noted.

Project Area: 65.83 acres

Contractor: Brushwacker Inc.

Equipment Used: 721 wheeled hydroaxe w/mowerdeck

Pre-treatment Conditions:

This project site was dominated by 3-4" DBH aspen, with little internal vertical or horizontal heterogeneity within the site other than a limited mix of northern hardwoods, as well as a small component of red pine and white pine. The center of the site included a large landing that was not buffered when cut in order to promote aspen regeneration to creep in along its edges.



The surrounding forest matrix was dominated by aspen stands in a similar size class and a small component of northern hardwoods, larger aspen and pine spp.

Post-treatment Conditions:



Post-treatment habitat conditions included the cutting/thinning of dense 3-4" DBH aspen, while retaining a variable subset of dominant and codominant tree species, including singly spaced and patched aspen regeneration and other mature tree species such as burr oak and red pine to create a greater range site-level diversity. This project retained 5–15 trees/acre and multiple legacy patches distributed throughout the site. Legacy patches

totaled approximately 10-15% of the treatment area and were retained to create additional heterogeneity across the site beyond individual tree retention. Total woody retention more than doubled guidance associated with the Minnesota Voluntary Site-level Guidelines to maximize internal structural diversity, while still promoting internal aspen regeneration and avian breeding and brood rearing habitat. The center of this site was cut more intensively around a former timber landing in order to promote aspen regeneration to begin to creep in along the edges.

Since treatment the site has regenerated vigorously, with regeneration already approximately 8-10'. Post treatment photos above are taken over the top of aspen regeneration. Anecdotally, there has been no observed reduction in the vigor of aspen regeneration associated with increased aspen retention during this project.

Project Notes:

Tamarac NWR has one of the highest population densities of golden-winged warbler in the world and lies at the intersection of the Laurentian Mixed Forest and the Eastern Broadleaf Forest Provinces, making it one of northern Minnesota's most unique biological and ecological communities.

Tamarac NWR was ABC's first partner in Young Forest Conservation Phase I, which started in July 2013, making the 2013-14 winter project season, in which this project was completed, the first of what would become a landscape level program, with projects throughout Minnesota's northern forest region. Tamarac NWR and ABC integrated the golden-winged warbler best management practices with additional biological and ecological considerations to complete a diverse array of upland and lowland young forest and brushland projects in Phase I. This and other projects completed in Phase I laid the educational, collaborative and operational groundwork that would be critical to the long term success of this program.

As stated above, this project site was located in an aspen covertype and retained far more woody structure and site-level heterogeneity than is common for a traditional aspen harvest. To complete this work, a large, wheeled cutting machine was used (often referred to as a hydroaxe), rather than a skidsteer-style machine with a cutting attachment.

It is possible that a second, smaller follow-up project will be completed in the next few years on this site in the form of ~5 acre patch cuts to add even more structural diversity, while providing additional young forest openings and early successional breeding habitat.

29) Thief Lake WMA Forest Buckthorn Treatment

Project Background

Project Name: Thief Lake Wildlife Management Area (WMA) Buckthorn Treatment

Project Site: Thief Lake Wildlife Management Area

Township/Range Section: Township 157 Range 43 Section 21

Project Manager / Affiliated Organization: Kim Washburn / Minnesota Deer Hunters Association (grant recipient organization) Kyle Arola / MN DNR (current land manager)

Fund: OHF - CPL Fiscal Year Funds: 2015

Project Start Date: October 2015

Predominant Habitat type: Forest

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

- What are the specific project components and treatments? Cut and stack mapped buckthorn populations. Treat stumps. Follow up foliar treatment the next year on seedlings and saplings.
- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Limited information was available for review. A map of the treatment area was provided. Data are located at the MN DNR Thief Lake Area office in Middle River, Minnesota.

- 3. What are the stated goals of the project? Control buckthorn at a known location. Focus on mature, seed-bearing plants and follow up foliar treatment to keep the establishment limited to a small, manageable area.
- 4. What are the desired outcomes of achieving the stated goals of the project? The desired outcome is to reduce the abundance of buckthorn and limit the spread throughout Thief Lake Wildlife Management Area project unit to preserve the ecological integrity of the native forest community.



- Were measures of restoration success identified in plans? Yes
 If yes, list specific measurements.
 Reduce the abundance of buckthorn within the WMA.
- 6. Are plan Sets available? No Have project maps been created? Yes If yes, provide in "site maps" and list maps provided: SCA Buckthorn foliar treatment map
- 7. Provide list of best management practices, standards, guidelines identified in plan set?

Mature, seed-bearing buckthorn individuals were targeted for removal. Stumps were treated with an herbicide to prevent re-sprouting. Both strategies are common standard practices for buckthorn control.

Following up with a foliar application targeting seedlings and saplings after mature specimens have been removed is an additional standard practice.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

- Were alterations made to the plan during project implementation? No
 No alterations were made.
- 9. In what ways did alterations change the proposed project outcome?

Site Assessment

Field Review Date: 10/15/2020

Not applicable.

Field Visit Attendees: Kyle Arola, Gina Quiram – MN DNR and Mark Pranckus - Cardno

10. Surrounding Landscape Characteristics:

The project site is located in Thief Lake WMA. This management unit of the WMA is a small 119-acre parcel that is primarily forested. The surrounding landscape is primarily pasture/hay fields with a mix of forested cover.

11. Site Characteristics:

a. Soil Series:

Redby loamy fine sand, 0 to 3 percent slopes Cormant loamy fine sand, 0 to 2 percent slopes Markey muck, ponded Rosewood fine sandy loam, Aspen Parkland, 0 to 1 percent slopes Rosewood fine sandy loam, dense till, 0 to 1 percent slopes

b. Topography:

The topography was extremely flat with little variation on elevation across the landscape.

c. Hydrology:

The site is relatively dry and has limited influence from flooding due to streams or drainages. Surface drainage from rain or snow are the main hydrologic influences.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

The site was logged in 2016-2017. Most of the mature canopy trees were removed. The remaining tree canopy is scattered patches of dense aspen with bur oak and American elm individuals. The shrub layer is patchy to dense and is primarily buckthorn. The ground layer is well-developed. Most herbaceous vegetation is less than 3 feet in height. Invasive species, primarily buckthorn as seedlings and saplings were common and made up between 25 to 50% of the total cover.

12. Is the plan based on current science? Portions

Mapping, cutting and stump treating are common practices. Completing a follow up foliar application is standard practice. To be more effective, foliar treatments following logging should have been completed for multiple years to prevent re-establishment.

13. List indicators of project goals at this stage of project:

Buckthorn is common on this site and will soon alter the site dynamics as more individuals mature and produce seeds and shade out existing native vegetation.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

No. MN DNR staff have recognized that this site may threaten the integrity of adjacent lands including private forested land. They are currently evaluating how to change management to control buckthorn.

15. Are corrections or modifications needed to achieving proposed goals?

Yes. Buckthorn needs to be controlled at the site to prevent spread throughout the management unit and onto private lands. Potential management actions include: fall foliar application to treat seedlings and saplings. Forestry mowing to reduce sapling growth followed by a stump treatment. Developing the management unit into a prescribed burn unit. All follow up actions should include a multi-year component.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Currently the site is not meeting the desired outcome and will require management actions or the site will further decrease in ecological integrity and potentially be a source for the spread of buckthorn to other areas within the management unit. In hindsight the missed opportunity to improve the project outcome was to complete follow up treatments following logging keep buckthorn under control or to not log the area so disturbance was introduced to the forest floor.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

Yes. Without future management, the site may end up in a worse condition than what it was before it started.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. Without further management actions, it will likely become a buckthorn-dominated shrub layer.

19. Additional comments on the restoration project.

- Buckthorn was identified in this management unit during a MN DNR Forestry timber cruise to
 prepare for future logging. MN DNR Forestry let the MN DNR Thief Lake staff know buckthorn
 was present and Thief Lake staff started with an initial cut and stump-treat treatment followed
 by the foliar treatment. At the time, MN DNR Thief Lake staff felt the buckthorn was
 manageable. Logging occurred in 2016-2017. The logging activity likely released the seed bank
 because of the soil disturbance and the increased light availability. MN DNR Thief Lake staff
 were not able provide resources following the logging to foliar treat buckthorn. Three years
 later, there is the potential that this area of buckthorn could become a seed source for further
 spread into adjacent lands (estimated at 100,000 acres of forest). MN DNR Thief Lake staff are
 evaluating the best options for treatment, which may include forestry mowing and turning the
 larger 119 acre parcel into a burn unit.
- Foresters should consider the presence of buckthorn or other forest invasive species when planning timber sales to avoid creating an additional management issue for local resource managers. A checklist or decision matrix to avoid activities that increase the spread of invasive species could be developed. Required follow up actions such as planning and funding invasive species control following a sale where invasive species are present should also be considered.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

- **20.** The project has: Not achieved the stated goals.
- 21. The project will:

Likely not meet proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

Buckthorn is fairly dense on this site and will likely dominate the shrub layer within several years without further management actions.

23. Site Assessor(s) Conducting Review: Mark Pranckus, Cardno

Site Maps, Project Plans or Vegetation Tables



Figure 29-1 Aerial photograph of the 8 acre project site from 2015. The yellow line represents the meander survey path taken to assess the plant community. (Source: Google Earth, accessed October 30, 2020, <u>https://www.google.com/earth</u>).



Figure 29-2 Aerial photograph of the project site showing the buckthorn control unit on a portion of Thief Lake WMA. Map provided by MN DNR Thief Lake Area office staff.

Table 29-1 List of plant species observed on 10/15/20 during a meander survey through the project area.

Scientific Name	Common Name	Cover Range	Species Status
Alnus incana	speckled alder	1-5%	native
Anemone quinquefolia	wood anemone	1-5%	native
Arctium minus	common burdock	1-5%	non-native
Bromus inermis	Hungarian brome	1-5%	non-native
Carex gracillima	graceful sedge	5-10%	native
Carex pensylvanica	common oak sedge	5-10%	native
Cirsium vulgare	bull thistle	1-5%	non-native
Corylus cornuta	beaked hazelnut	1-5%	native
Elymus repens	quackgrass	1-5%	non-native
Elymus trachycaulus	slender wheat grass	1-5%	native
Equisetum pratense	meadow horsetail	1-5%	native
Fragaria virginiana	thick-leaved wild strawberry	1-5%	native
Galium boreale	northern bedstraw	1-5%	native
Galium triflorum	fragrant bedstraw	1-5%	native
Heracleum maximum	American cow-parsnip	1-5%	native
Osmorhiza claytonii	bland sweet cicely	1-5%	native
Pedicularis canadensis	Canadian lousewort	1-5%	native
Phalaris arundinacea	reed canary grass	10-25%	non-native
Phleum pratense	timothy	1-5%	non-native
Populus tremuloides	aspen	25-50%	native
Quercus macrocarpa	bur oak	1-5%	native
Rhamnus cathartica	common buckthorn	25-50%	non-native
Ribes hirtellum	hairy-stem gooseberry	1-5%	native
Rosa arkansana	dwarf prairie rose	1-5%	native
Sanicula marilandica	black snakeroot	1-5%	native
Solidago canadensis	Canadian goldenrod	1-5%	native
Solidago gigantea	giant goldenrod	1-5%	native
Symphyotrichum lateriflorum	side-flowering aster	5-10%	native
Thalictrum dioicum	early meadow-rue	1-5%	native
Ulmus americana	American elm	1-5%	native
Viburnum rafinesquianum	arrow-wood	1-5%	native
Vicia americana	American vetch	1-5%	native
Viola sororia	wood violet	1-5%	native
Zizia aurea	common golden alexanders	1-5%	native

Site Photographs



Photo 29-1 Example of buckthorn re-growth at the site. Most shrub vegetation with green and yellow leaves is buckthorn. Aspen saplings are re-growing and competing with the buckthorn for resources. (Thief Lake Wildlife Management Area, photo taken during site visit 10/15/2020).



Photo 29-2 Example of the existing vegetation in the project area where buckthorn has not established yet (Thief Lake Wildlife Management Area, photo taken during site visit 10/15/2020).



Photo 29-3 Example of the existing fruiting buckthorn in the project area (Thief Lake Wildlife Management Area, photo taken during site visit 10/15/2020).



Photo 29-4. Example of the adjacent area with the management unit where buckthorn was not present prior to logging. In the near future, buckthorn may become established in the understory. (Thief Lake Wildlife Management Area, photo taken during site visit 10/15/2020 by Mark Pranckus, Cardno).

30) Thief Lake WMA Prairie Burnet saxifrage Treatment

Project Background

Project Name: Thief Lake Wildlife Management Area (WMA) Invasive Species Treatment

Project Site: Thief Lake Wildlife Management Area

Township/Range Section: Township 158 Range 41 Section 27

Project Manager / Affiliated Organization: Kim Washburn / Minnesota Deer Hunters Association (grant recipient organization) Kyle Arola / MN DNR (current land manager)

Fund: OHF - CPL Fiscal Year Funds: 2015

Project Start Date: June 2015

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

- What are the specific project components and treatments? Prescribed mowing to reduce flowering burnet saxifrage (*Pimpinella saxifrage*). Spot herbicide treatment with broad spectrum and selective herbicides to control invasive species, specifically burnet saxifrage and common tansy.
- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Herbicide records and treatment maps were provided along with information about burnet saxifrage. Data are located at the MN DNR Thief Lake Area office in Middle River, Minnesota.

3. What are the stated goals of the project?

Reduce and control invasive species, in particular burnet saxifrage and common tansy. These two species had limited distribution on the WMA.



4. What are the desired outcomes of achieving the stated goals of the project?

The desired outcome is to prevent the spread of either a new (burnet saxifrage) or an uncommon (common tansy) invasive plant species on the WMA before either species became more established and control and management became would become more difficult. Controlling either species helped to preserve the ecological integrity of the native grassland communities where they are present.

5. Were measures of restoration success identified in plans? Yes If yes, list specific measurements. Reduce the abundance of burnet saxifrage and common tansy to as low of levels as possible within the WMA.

- 6. Are plan Sets available? No Have project maps been created? Yes If yes, provide in "site maps" and list maps provided: Pimpinella saxifrage location at Thief Lake WMA Common tansy locations
- 7. Provide list of best management practices, standards, guidelines identified in plan set?

When MN DNR staff first identified burnet saxifrage at the WMA, outside expertise from Three Rivers Park District was contacted for additional information. MN DNR staff also consulted with natural resource managers in Wisconsin to determine the best course of management actions.

Using integrated pest management techniques (mowing, selective herbicide use) along with qualitative monitoring to understand response of the targeted species is a standard best management practice.

Planning for and completing multiple years of treatments to address the seed bank.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation?

Yes

The treatment areas was split into mowing only and mowing plus herbicide treatment areas.

9. In what ways did alterations change the proposed project outcome?

The side by side comparison allowed MN DNR staff to see if there is a difference in treatments for a species that doesn't have a well-developed body of knowledge on its management and control.

Site Assessment

Field Review Date: 10/15/2020

Field Visit Attendees: Kyle Arola, Gina Quiram – MN DNR and Mark Pranckus - Cardno

10. Surrounding Landscape Characteristics:

The project site is located in Thief Lake WMA and is less than 0.5 miles directly south of Thief Lake, a 7,100 acre marsh. The surrounding landscape is primarily mixture of native grassland, scattered forested cover, and hay/pasture fields. The project site is 9 acres within the larger approximate 55,000 acre Thief Lake WMA boundary.

11. Site Characteristics:

a. Soil Series:

Hamre muck, 0 to 1 percent slopes Reiner fine sandy loam, 0 to 2 percent slopes Smiley loam, 0 to 1 percent slopes Garnes fine sandy loam, 0 to 2 percent slopes

b. Topography:

The topography was extremely flat with little variation on elevation across the landscape.

c. Hydrology:

The site is relatively dry with no apparent influence from concentrated flows like streams or drainages. Surface inputs from snow and rain appear to be the most important factor.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

The plant community is primarily a native grassland community with some cool season grasses. Scattered trees and shrubs are present on the site. Invasive species, including saxifrage burnet and common tansy are less than 25% of the total cover.

12. Is the plan based on current science? Yes

MN DNR response is a good example of early detection and rapid response to finding a new invasive species. MN DNR reached out to regional experts to learn more, develop an integrated management plan, and provided consistent resources to address the project. The addition of having side-by-side treatments to see differences was also value-added element.

13. List indicators of project goals at this stage of project:

Burnet saxifrage is still present on the site, but has been reduced from 30 to 40% cover to less than 10%. Common tansy abundance has been reduced by 90%.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes. MN DNR staff has identified potential techniques that control burnet saxifrage and expansion by both burnet saxifrage and common tansy have been limited since treatment started. They have also prioritized monitoring and completing treatments for burnet saxifrage.

15. Are corrections or modifications needed to achieving proposed goals?

No. None needed at this time.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Yes. Long term management appears to be practical and reasonable. Adding two different treatment types was valuable. A present or future opportunity would be to formalize monitoring of the treatments to determine if there is a preferred management action. Future success may ultimately depend the ability to reduce or minimize establishment of future populations or control future seed sources.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No. Management actions have reduced the spread of a new invasive species that could have negative impact on the WMA's grassland communities. Future management may continue to be required until the species is outcompeted by existing vegetation or remains at background levels.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.No. The site is on a trajectory to reach success. The MN DNR will continue to monitor the project area.

19. Additional comments on the restoration project.

• MN DNR staff acted in an appropriate manner to address a potential problem at a stage where control was still possible. They used outside expertise to supplement their own knowledge and developed integrated management strategy to deal with the invasive species.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Likely exceed proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

Burnet saxifrage and common tansy have been reduced on-site. MN DNR staff has existing and proposed management strategies to try to continue to keep the abundance of both species from invading adding areas of the WMA.

23. Site Assessor(s) Conducting Review:

Mark Pranckus, Cardno
Site Maps, Project Plans or Vegetation Tables



Figure 30-1 Aerial photograph of the 22 acre project site from 2017. The yellow line represents the meander survey path taken to assess the plant community. (Source: Google Earth, accessed October 30, 2020, <u>https://www.google.com/earth</u>).

Pimpinella saxifraga location at Thief Lake WMA



Figure 30-2 Aerial photograph of the project site showing the location of burnet saxifrage in Thief Lake WMA. Map provided by MN DNR Thief Lake Area office staff.



Figure 30-3 Aerial photograph showing the locations of common tansy treatment areas in Thief Lake WMA. Map provided by MN DNR Thief Lake Area office staff.

 Table 30-1
 List of plant species observed on 10/15/20 during a meander survey through the project area.

Scientific Name	Common Name	Cover Range	Species Status
Achillea millefolium	common yarrow	1-5%	native
Agrostis gigantea	redtop	5-10%	non-native
Agrostis hyemalis	southern hair grass	5-10%	native
Agrostis scabra	creeping bentgrass	5-10%	native
Anemone quinquefolia	nightcaps	1-5%	native
Bromus inermis	hungarian brome	1-5%	non-native
Calamagrostis canadensis	blue-joint grass	5-10%	native
Carex gracillima	graceful sedge		native
Carex lacustris	common lake sedge	1-5%	native
Carex trichocarpa	hairy-fruit lake sedge	5-10%	native
Doellingeria umbellata	flat-top aster	1-5%	native
Fragaria virginiana	thick-leaved wild strawberry	1-5%	native
Galium boreale	northern bedstraw	1-5%	native
Medicago lupulina	black medick	1-5%	non-native
Muhlenbergia richardsonis	mat muhly	1-5%	native
Phalaris arundinacea	reed canary grass	1-5%	non-native
Phleum pratense	timothy	10-25%	non-native
Picea glauca	white spruce		native
Pimpinella saxifraga	solid-stem burnet-saxifrage	5-10%	non-native
Poa pratensis	kentucky bluegrass	5-10%	non-native
Populus tremuloides	aspen	1-5%	native
Prunella vulgaris	heal-all	10-25%	native
Prunus serotina	wild black cherry	1-5%	native
Rosa arkansana	dwarf prairie rose	1-5%	native
Rudbeckia hirta	black-eyed susan	1-5%	native
Rumex orbiculatus	great water dock	1-5%	native
Salix bebbiana	beaked willow	1-5%	native
Salix petiolaris	meadow willow	5-10%	native
Solidago canadensis	canadian goldenrod	1-5%	native
Solidago nemoralis	dyers-weed goldenrod	1-5%	native
Symphyotrichum lateriflorum	side-flowering aster	1-5%	native
Symphyotrichum oolentangiense	sky-blue aster	1-5%	native
Viola sororia	door-yard violet	1-5%	native

Site Photographs



Photo 30-1 Example of the site where burnet saxifrage was controlled. (Thief Lake Wildlife Management Area, photo taken during site visit 10/15/2020).



Photo 30-2 Example of the existing vegetation in the project area. (Thief Lake Wildlife Management Area, photo taken during site visit 10/15/2020).

31) Yaeger Lake WMA Savanna Enhancement 1

Project Background

Project Name: American Bird Conservancy Young Forest Conservation (ML2013) Phase I

Project Site: Yaeger Lake WMA #1

Township/Range Section: Township 137N Range 34W Section 10

Project Manager / Affiliated Organization: Peter Dieser, American Bird Conservancy

Fund: OHF Fiscal Year Funds: 2013

Project Start Date: 1/1/2014

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Forest , Choose an item.

Project Status: Post Establishment Phase



Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

- What are the specific project components and treatments?
 Brush and small tree mowing utilizing Terex PT110 and Terex PT100G skidsteer w/brushmower attachment
- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Records retained by American Bird Conservancy Including:

- Project Site Location (shapefiles)
- Desired Outcomes
- Site Description
- Project Area
- Contractor
- Equipment Used
- Pre-treatment Conditions
- Post-treatment Conditions (including photos)
- Project notes

3. What are the stated goals of the project?

Create early successional habitat comprised of herbaceous and young woody regrowth.

4. What are the desired outcomes of achieving the stated goals of the project?

Create high quality early successional nesting and brood rearing habitat to benefit golden-winged warbler, American woodcock and associated early successional deciduous forest habitat species, such as ruffed grouse, rose-breasted grosbeak, veery and black-billed cuckoo, and other species that rely on early successional habitat.

- Were measures of restoration success identified in plans? Yes
 If yes, list specific measurements.
 Acres of brushland restored
- 6. Are plan Sets available? No Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:

No plan set developed as construction activities were not required/involved. Maps developed by American Bird Conservancy:

- Pre-treatment aerial photo/map with project area outlined (Figure 31-1)
- Post-treatment aerial photo/map with project area outlined (Figure 31-2)
- Provide list of best management practices, standards, guidelines identified in plan set?
 Best Management Practices applied during field execution of the project included:
 - Adhering to MN DNR Op Order 113 Invasive Species protocols
 - Utilizing appropriate-sized equipment to accomplish mowing of woody growth
 - Maintaining level of mowing equipment approximately 8-12 inches above soil surface to minimize risk of soil disturbance
 - Conducting work during frozen ground conditions to minimize risk of rutting and soil compaction
 - Golden-Winged Warbler Best Management Practices
 - American Woodcock Best Management Practices

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

- 8. Were alterations made to the plan during project implementation? No
- 9. In what ways did alterations change the proposed project outcome? Not applicable as there were no modifications to the work plan

Site Assessment

Field Review Date: 8/19/2020

Field Visit Attendees: Peter Dieser, American Bird Conservancy (ABC); Gina Quiram, MN DNR; Paul Bockenstedt, Stantec

10. Surrounding Landscape Characteristics:

This site is located in the N. Minnesota Drift and Lake Plains subsection of the Laurentian Mixed Forest province as defined by the MN DNR Ecological Classification System. The area is characterized by nearly level to gently undulating topography with numerous wetland basins.

11. Site Characteristics:

a. Soil Series:

Soils in this area are characterized by a sandy udipsamment or psammaquent. Soil series include Menagha, Meehan, and Newson.

b. Topography:

Slope/relief range average 0-15% within the project site. The vast majority of areas observed were actually 0-2% slope.

c. Hydrology:

Relatively little vertical relief in the landscape results in the interspersion of wet meadow, shrub cover, and upland shrubland/woodland/forest. The water table is reported to be at or near the surface for extended periods, particularly during wetter than average periods.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Plant community present in the work area is perhaps best characterized as FDn33 Northern Drymesic Mixed Woodland. The mixed pine-hardwood forest comprised of a mostly patchy but sometimes closed canopy characterized by bur and pin oak, as well as red and jack pine. The shrub layer is sparse to open in most areas with beaked hazel. Seasonally flooded shrub carr areas include a mix of native and nonnative herbaceous cover (reed canary grass is common), along with patches to scattered red-osier dogwood and willow.

12. Is the plan based on current science? Yes

Wildlife species project was intended to benefit are known to utilize the habitat composition and structure that resulted from vegetation management work.

13. List indicators of project goals at this stage of project:

There is good structural arrangement of habitat, including variations in habitat comprised of herbaceous vegetation and young, woody plants.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes

15. Are corrections or modifications needed to achieve proposed goals? No

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Accepted practice for long-term management of early-successional (woody regrowth and herbaceous) habitat requires periodic mowing and/or fire. The long-term challenge for maintaining early successional habitats such as the ones in this project is the need to periodically re-mow or burn approximately every 6-10 years.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No. Resulting habitat was improved as anticipated.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No, project achieved desired habitat structure outcomes/objectives.

19. Additional comments on the restoration project.

ABC staff indicated that there is evidence of prescribed burn at this site, though it was not likely burned since the project was completed. ABC staff recommends application of regular fire to maintain benefits of habitat management realized during this project. Future prescribed fire application is likely to be conducted solely by MN DNR, however, burning could also be conducted through partnership with ABC and/or others in the future.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Exceeded the stated goals.

21. The project will:

Likely exceed proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

Subjective evaluations and observations by natural resources professionals indicates that managed areas are indeed attracting species of wildlife, particularly birds identified as target species, that depend on early successional habitats comprised of herbaceous vegetation and young woody growth. The basis for believing that this site will exceed goals include the relatively droughty/sandy soils and minimal amount of invasive species at this particular site which should provide improved longevity for results compared to sites that are more mesic, on richer soils, and are not burned periodically.

23. Site Assessor(s) Conducting Review:

Paul Bockenstedt

Site Maps and Vegetation Tables



Figure 31-1 Pre-treatment view of project area. Project site was dominated by dense alder in the lowland and a mix of regenerating hardwoods competing with alder and hazel in the upland (2015 True Color).



Figure 31-2 Post-treatment aerial photo image of project area. Upland area dominated by hardwood regeneration and lowland has begun rigorous alder regeneration, (True Color 2017).

Table 31-1 Upland meander vegetation survey results for Yaeger Lake WMA #1

Scientific Name	Common Name	Cover Range*	Species Status**
Quercus ellipsoidalis	Northern pin oak	25-50%	N
Quercus macrocarpa	Bur oak	25-50%	N
Pinus banksiana	Jack pine	5-25%	N
Betula papyrifera	White birch	1-5%	N
Corylus cornuta	Beaked hazel	5-25%	N
Rubus idaeous	Red raspberry	5-25%	N
Rubus allegheniensis	Blackberry	1-5%	N
Toxicodendron radicans	Poison ivy	1-5%	N
Rosa cf. arkansana	Wild rose	0-1%	N
Prunus serotina	Black cherry	0-1%	N
Vaccinium cf. angustifolium	Blueberry	1-5%	N
Symphoricarpos occidentalis	Buckbrush	0-1%	N
Andropogon gerardii	Big bluestem	25-50%	N
Carex pensylvanica	Pennsylvania sedge	5-25%	N
Crocanthenum bicknellii	Frostweed	0-1%	N
Vicia americana	American vetch	0-1%	N
Fragaria virginiana	Wild strawberry	0-1%	N
Galium boreale	Northern bedstraw	1-5%	N
Maianthemum canadense	Canada mayflower	1-5%	N
Aralia nudicaulis	Wild sarsaparilla	5-25%	N
Thalictrum dioicum	Early meadow rue	0-1%	N
Anemone quinquefolia	Wood anemone	0-1%	N
Achillea millefolium	Yarrow	0-1%	N
Botrychium cf. dissectum	Rattlesnake fern	0-1%	N
Pteridium aquilinum	Bracken fern	1-5%	N
Thalictrum dasycarpum	Tall meadow rue	0-1%	N
Aquilegia canadense	Wild columbine	0-1%	N
Agastache foeniculum	Anise hyssop	0-1%	Ν
Lithospermum canescens	Hoary puccoon	0-1%	N

*0-1%, 1-5%, 5-25%, 25-50%, 50-75%, 75-100%

**N=native, I=introduced/nonnative

Table 31-2 Wetland meander vegetation survey results for Yaeger Lake #1

Scientific Name	Common Name	Cover Range*	Species Status**
Alnus incana	Speckled alder	5-25%	N
Rubus idaeus	Red raspberry	1-5%	N
Betula papyrifera	White birch	1-5%	N
Salix petiolaris	Slender willow	1-5%	N
Cornus sericea	Red-osier dogwood	1-5%	N
Ulmus americanus	American elm	0-1%	N
Rosa cf. arkansana	Wild rose	0-1%	N
Carex lacustris	Lake sedge	1-5%	N
Calamagrostis canadensis	Bluejoint grass	1-5%	N
Carex stricta	Tussock sedge	1-5%	N
PHALARIS ARUNDINACEA	REED CANARY GRASS	50-75%	I
Onoclea sensibilis	Sensitive fern	1-5%	N
Thelypteris palustris	Marsh fern	1-5%	N
Solidago gigantea	Giant goldenrod	1-5%	N
Eutrochium maculatum	Spotted Joe-pye weed	1-5%	N
URTICA DIOICA	STINGIING NETTLE	1-5%	I
Impatiens capensis	Spotted touch-me-not	1-5%	N
Persicaria sagittata	Arrow-leaved tearthumb	1-5%	N

*0-1%, 1-5%, 5-25%, 25-50%, 50-75%, 75-100%

**N=native, I=introduced/nonnative

Site Photographs



Photo 31-1 Site photo taken 8.19.20 illustrating are that was forestry mowed (foreground) as well as area that was untreated.



Photo 31-2 Portion of project area that includes areas where brush and small trees were forestry mowed (center-left) surrounded by areas that were likely relatively open prior to treatment, dominated by big bluestem grass (8.19.20).



Photo 31-3 Overhead view of area that was forestry mowed showing resprouts of beaked hazel, raspberry, and pin oak and herbaceous graminids big bluestem and sedge species (8.19.20).



Photo 31-4 View of shrub carr area that was forestry mowed to improve structural diversity of habitat illustrating mix of herbaceous, shrub and young tree cover (8.19.20).

Project Manager Summary

Project Site Location: Yaegar Lake Wildlife Management Area (WMA)

Outdoor Heritage Fund Parcel Identification: Yaeger Lake WMA #2

County: Wadena

Year Completed: 1/1/2016-3/15/2016 Winter Project Season

Desired Outcomes: The main objective of this project was to utilize science-based best management practices to create high quality early successional nesting and brood rearing habitat for golden-winged warbler, American woodcock and associated early successional deciduous forest habitat species, such as ruffed grouse, rose-breasted grosbeak, veery and black-billed cuckoo.

The habitat focus was to cut the dense hazel growth to reduce competition and open small pockets within young hardwood regeneration in the upland portion of the site to the west and to cut very large, dense monotypic alder brush in the eastern lowland portion of the site to open ground level nesting habitat with only very limited or no cutting of any sapling sized or mature tree species in any portion of the site.

Site Description: This site is located within the Yaeger Lake WMA and in the N. Minnesota Drift and Lake Plains subsection of the Laurentian Mixed Forest province as defined by the MN DNR Ecological Classification System. Neighborhood soils are characterized by a sandy udipsamment or psammaquent. Soil series include Menagha, Meehan, and Newson. However, this project site both includes and is adjacent to wetland communities and soil types, especially in the eastern portion of the site. Though slope/relief is minimal within this site (only 0-10%), the central portion where the site slopes from upland to lowland has a greater slope (10-20%) and was retained as a legacy patch. This site was accessed using existing forest roads. A cultural resources review was completed and no potential impacts were noted.

This project site is somewhat unique, in that it is a combination of both upland regenerating hardwoods in the west and lowland brush in the east. The upland portion of the site had a dense hazel brush component that was competing with the hardwood regeneration and the eastern portion of the site was composed of very dense alder lowland.

This project site is also within a burn unit, and has evidence of past burns in the upland portion of the site, though it is likely that this site has not been burned since this project concluded and it may no longer be an active burn unit.

Project Area: 11.54 acres

Contractor: Iserv LLC.

Equipment Used: Terex PT110 and Terex PT100G skidsteer w/brushmower attachment

Pre-treatment Conditions: This project site was dominated by very dense alder in the lowland portion of the site in the east averaging approximately 2-3" DBH but with some as very large individuals up to 4"+ with a much higher aggregate diameter at the base of the clump. This lowland area is a narrow strip located between the upland portion of this site in the west and a mix of mature and regenerating hardwoods in the east and scattered lowland brush in the south.

The upland portion of the site was dominated by hardwood sapling regeneration, with some mature hardwood species (5"+ DBH) distributed throughout the site.

Post-treatment Conditions:



Post-treatment habitat conditions in the lowland portion of the site included the cutting of the very large and dense alder brush. Because this site is relatively small (8.25 acres) and very narrow (width averaging 150'-200'), the distance to its edge from any point in the site is low, reducing the need for internal woody retention. Also, the brush had never been treated and was extremely thick and large. As such, a higher percentage of brush was cut in this small area (up to approximately 85%). As expected, it did grow back vigorously, but will be much easier to manage if targeted for future treatments due to its reduced average stem diameter.

A legacy patch retained between the upland and lowland portions of the site on the transition slope. This patch is composed of more mature hardwood tree species.

The upland portion of the site included the cutting/thinning of the dense hazel shrub (with some alder) understory with limited or no cutting of any tree species, and special attention paid to avoiding damage to regenerating sapling sized trees. Cut woody material averaged approximately 1-3" with some shrub clumps having a higher aggregate DBH at their base and totaled only approximately 50% of the woody vegetation. Larger individuals of any tree species were retained and also left undamaged as residual woody structure, though the contractor did cut under the canopy of regenerating and mature tree species to the extent possible to reduce brush competition and open up the understory. The result, was a feathered upland site that would fully regenerate into a mixed hardwood stand, while providing nesting and brood rearing habitat in its openings and adjacent upland post-fledge habitat to the adjacent lowland.

Project Notes: The alder brush cut in the lowland portion of this site was very difficult for the operators due to its size. It is likely that it had never been cut and had become stagnant due to its density. Though it has vigorously regenerated (standing approximately 8'), it is much less dense, and still retains some open pockets.

The upland portion of this site has filled in with hardwood regeneration and, though there is still a hazel brush component, tree regeneration is not impeded.

As with most sites, the cut brush is quick to decompose or be buried just a few years post treatment, but it still surprising that there is not more evidence of cut woody material on the ground in the lowland portions of the site because it was so dense and thick, and was cut at a high percentage. This is notable, because it shows that even though very large brush was cut and dropped, this cut material does not impede woody regeneration or forb development and disappears quickly.

There is evidence of prescribed fire on the upland portion of this site, though it is unlikely it has been burned since this project was completed, and it is not recommended that it be burned until the site has had more time for the tree species to grow for at another 5-10 years.

32) Yaeger Lake WMA Savanna Enhancement 2

Project Background

Project Name: American Bird Conservancy Young Forest Conservation (ML2013) Phase I

Project Site: Yaeger Lake WMA #2

Township/Range Section: Township 137N Range 34W Section 3

Project Manager / Affiliated Organization: Peter Dieser, American Bird Conservancy

Fund: OHF Fiscal Year Funds: 2013

Project Start Date: 1/1/2014

Predominant Habitat type: Prairie / Savanna / Grassland

Additional Habitat types: Prairie / Savana / Grassland , Choose an item.

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

- What are the specific project components and treatments? Brush and small tree mowing utilizing Terex PT110 and Terex PT100G skidsteer w/brushmower
 - attachment
- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

Records retained by American Bird Conservancy. Including:

- Project Site Location (shapefiles)
- Desired Outcomes
- Site Description
- Project Area



County: Wadena

Primary Activity: Savanna Enhancement

Project Size: 23 acres

Project Completed: 7/31/16

- Contractor
- Equipment Used
- Pre-treatment Conditions
- Post-treatment Conditions (including photos)
- Project notes

3. What are the stated goals of the project?

Create early successional habitat comprised of herbaceous and young woody regrowth.

4. What are the desired outcomes of achieving the stated goals of the project?

Create high quality early successional nesting and brood rearing habitat to benefit golden-winged warbler, American woodcock and associated early successional deciduous forest habitat species, such as ruffed grouse, rose-breasted grosbeak, veery and black-billed cuckoo, and other species that rely on early successional habitat.

- 5. Were measures of restoration success identified in plans? Yes If yes, list specific measurements. Acres of brushland restored
- 6. Are plan Sets available? No Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:

No plan set developed as construction activities were not required/involved. Maps developed by American Bird Conservancy:

- Pre-treatment aerial photo/map with project area outlined (Figure 32-1)
- Post-treatment aerial photo/map with project area outlined (Figure 32-2)
- 7. *Provide list of best management practices, standards, guidelines identified in plan set?* Best Management Practices applied during field execution of the project included:
 - Adhering to MN DNR Op Order 113 Invasive Species protocols
 - Utilizing appropriate-sized equipment to accomplish mowing of woody growth
 - Maintaining level of mowing equipment approximately 8-12 inches above soil surface to minimize risk of soil disturbance
 - Conducting work during frozen ground conditions to minimize risk of rutting and soil compaction.
 - Golden-Winged Warbler Best Management Practices
 - American Woodcock Best Management Practices

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

- 8. Were alterations made to the plan during project implementation? No
- 9. In what ways did alterations change the proposed project outcome? Not applicable as there were no modifications to the work plan

Site Assessment

Field Review Date: 8/19/2020

Field Visit Attendees: Peter Dieser, American Bird Conservancy (ABC); Gina Quiram, MN DNR; Paul Bockenstedt, Stantec

10. Surrounding Landscape Characteristics:

This site is located on the N. Minnesota Drift and Lake Plains subsection of the Laurentian Mixed Forest province as defined by the MN DNR Ecological Classification System. The area is characterized by nearly level to gently undulating topography with numerous wetland basins.

11. Site Characteristics:

a. Soil Series:

Soils in this area are characterized by a sandy udipsamment or psammaquent. Soil series include Menagha, Meehan, and Newson.

b. Topography:

Slope/relief range reported to average 0-15% within the project site. The vast majority of areas observed were actually 0-2% slope.

c. Hydrology:

Relatively little vertical relief in the landscape results in the interspersion of wet meadow, shrub cover, and upland shrubland/woodland/forest. The water table is reported to be at or near the surface for extended periods, particularly during wetter than average periods.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

Plant community present in the work area is perhaps best characterized as FDn33 Northern Drymesic Mixed Woodland. The mixed pine-hardwood forest comprised of a mostly patchy but sometimes closed canopy characterized by bur and pin oak, as well as red and jack pine. The shrub layer is sparse to open in most areas with beaked hazel.

12. Is the plan based on current science? Yes

Wildlife species project was intended to benefit are known to utilize the habitat composition and structure that resulted from vegetation management work.

13. List indicators of project goals at this stage of project:

There is good structural arrangement of habitat, including variations in habitat comprised of herbaceous vegetation and young, woody plants.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes

15. Are corrections or modifications needed to achieve proposed goals? No

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Accepted practice for long-term management of early-successional (woody regrowth and herbaceous) habitat requires periodic mowing and/or fire. The long-term challenge for maintaining early successional habitats such as the ones in this project is the need to periodically re-mow or burn approximately every 6-10 years. Long-term management will primarily be the responsibility of MN DNR, although ABC may

be involved in future management in support of MN DNR to sustain the improvements that have been made in habitat.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No.

- **18.** Are follow-up assessments by the Restoration Evaluation Program needed? Explain. No, project achieved desired habitat structure outcomes/objectives.
- 19. Additional comments on the restoration project.

There is evidence of prescribed burn at this site, though it was not likely burned since the project was completed. ABC staff recommends application of regular fire to maintain benefits of habitat management realized during this project. Future prescribed fire application is likely to be conducted solely by MN DNR, however, burning could also be conducted through partnership with ABC and/or others in the future project. ABC staff indicated that there is evidence of prescribed burn at this site, though it was not likely burned since the project was completed. ABC staff recommends application of regular fire to maintain benefits of habitat management realized during this project.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Exceeded the stated goals.

21. The project will:

Likely exceed proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

Subjective evaluations and observations by natural resources professionals indicates that managed areas are indeed attracting species of wildlife, particularly birds identified as target species, that depend on early successional habitats comprised of herbaceous vegetation and young woody growth. The basis for believing that this site will exceed goals include the relatively droughty/sandy soils and minimal amount of invasive species at this particular site which should provide improved longevity for results compared to sites that are more mesic, on richer soils, and are not burned periodically.

23. Site Assessor(s) Conducting Review:

Paul Bockenstedt

Site Maps and Vegetation Tables



Figure 32-1 Pre-treatment view of project area. Project site was dominated by dense hazel from 1-3" DBH within scattered and clumped mature norther hardwoods overstory, (2015 True Color).



Figure 32-2 Post-treatment aerial photo image of project area. Site treatment completed in July 2017 focused on cutting dense hazel understory while avoiding damage of mature trees, (2017 True Color).

Table 32-1 Upland meander vegetation survey results for Yaeger Lake WMA #2

Scientific Name	Common Name	Cover Range*	Species Status**
Populus tremuloides	Quaking aspen	5-25%	N
Quercus ellipsoidalis	Northern pin oak	5-25%	N
Quercus macrocarpa	Quercus macrocarpa	5-25%	N
Pinus resinosa	Red pine	5-25%	N
Pinus banksiana	Jack pine	5-25%	N
Betula papyrifera	White birch	1-5%	N
Corylus cornuta	Beaked hazel	5-25%	N
Rubus idaeous	Red raspberry	1-5%	N
Rubus flagellaris	Dewberry	5-25%	N
Toxicodendron radicans	Poison ivy	1-5%	N
Rosa cf. arkansana	Wild rose	0-1%	N
Vaccinium cf. angustifolium	Blueberry	1-5%	N
Andropogon gerardii	Big bluestem	25-50%	N
Carex pensylvanica	Pennsylvania sedge	5-25%	N
Danthonia spicata	Poverty oat grass	1-5%	N
Onoclea sensibilis	Sensitive fern	1-5%	N
Symphyotrichum oolentangiense	Sky blue aster	1-5%	N
Fragaria virginiana	Wild strawberry	0-1%	N
Artemisia ludoviciana	White sage	1-5%	N
Galium boreale	Northern bedstraw	1-5%	N
Apocynum cannabinum	Indian hemp	1-5%	N
Liatris aspera	Rough blazingstar	0-1%	N
Comandra umbellata	Bastard toadflax	0-1%	N
Lathyrus venosus	Veiny pea	1-5%	N
Achillea millefolium	Yarrow	0-1%	N
Crocanthenum bicknellii	Frostweed	0-1%	N
Solidago nemoralis	Oldfield goldenrod	1-5%	N
Solidago ptarmacoides	Upland white goldenrod	0-1%	N
Vicia americana	American vetch	0-1%	N
Symphyotrichum laeve	Smooth blue aster	0-1%	N
Lathyrus ochroleucus	Pale vetchling	0-1%	N

*0-1%, 1-5%, 5-25%, 25-50%, 50-75%, 75-100%

**N=native, I=introduced/nonnative

Site Photographs



Photo 32-1 Area at Yaeger Lake #2 site illustrating areas of brush that were forestry mowed in center of photo, bracketed by pre-existing areas of native dry woodland/prairie grasses and forbs (lighter green vegetation) (8.19.20).



Photo 32-2 Areas of brush that were forestry mowed on left and right sides of photo, with pre-existing areas of native dry woodland/prairie grasses and forbs (lighter green in center of photo) (8.19.20).



Photo 32-3 Ground cover in forestry mowed area, with regrowth of big bluestem grass, blueberry and others (8-19-20).



Photo 32-4 Area that was forestry mowed with multi-stem white birch exhibiting fire scars from a previously conducted prescribed burn (8.19.20).

Project Manager Summary

Project Site Location: Yaeger Lake Wildlife Management Area (WMA)

Outdoor Heritage Fund Parcel Identification: Yaeger Lake WMA #1

County: Wadena

Year Completed: 7/15/2016-7/31/2016

Desired Outcomes: The main objective of this project was to utilize science-based best management practices to create high quality early successional nesting and brood rearing habitat for golden-winged warbler, American woodcock and associated early successional deciduous forest habitat species, such as ruffed grouse, rose-breasted grosbeak, veery and black-billed cuckoo. The management focus was on reducing the dense hazel growth with only very limited or no cutting of any sapling sized or mature tree species. Mature hardwood tree species such as aspen, birch and burr oak with a mix of conifers (mostly red pine) are widely distributed throughout the site and work concentrated reducing dense hazel cover to open ground level nesting habitat.

This project site is also a burn unit, though it was and continues to be uncertain when a follow-up prescribed fire treatment will be implemented by the MN DNR due to staff limitations. Despite this, a complimentary objective of this project was to reduce the density of woody vegetation, primarily hazel, to allow fire to better travel through the understory of the site.

Site Description: This site is located within the Yaeger Lake WMA and in the N. Minnesota Drift and Lake Plains subsection of the Laurentian Mixed Forest province as defined by the MN DNR ECS. Neighborhood soils are characterized by a sandy udipsamment or psammaquent. Soil series include Menagha, Meehan, and Newson. Slope/relief is minimal on this site is minimal (only 0-5%). This project site is located adjacent to wetland communities, but is an upland site and very well drained, making it a site where dry season project treatments were able to be completed. This site has an abundant, but well-spaced component of single and patched hardwood tree species with some conifer, as well as dense hazel growth that limits forb growth in some areas.

This site was accessed using existing forest roads. A cultural resources review was completed and no potential impacts were noted. This project site is somewhat unique, in that it has a well distributed though dispersed mix of hardwood species dominated by burr oak with a mix of red pine as well. Though mature tree cover is present throughout the site, it is very open outside of the thick hazel growth.

Project Area: 22.79 acres

Contractor: Iserv LLC.

Equipment Used: Terex PT110 and Terex PT100G skidsteer w/brushmower attachment

Pre-treatment Conditions: This project site was dominated by dense hazel, 1-3" DBH with a component of hardwood sapling regeneration. Mature hardwood species, with a component of red pine that range in size from 3"-10"+ are the dominant overstory tree species and are evenly distributed singly or in patches. This creates an almost parkland setting with openings and single trees and/or patches distributed at regular intervals.

This site is in a fire dependent native plant community and part of a prescribed fire burn unit that had become densely vegetated.

Post-treatment Conditions:



Post-treatment habitat conditions included the cutting/thinning of the dense hazel shrub understory with limited or no cutting of any tree species. Because of the very will distributed tree species already providing site-level diversity and preventing cutting in some patches, hazel was cut intensively on this site when possible. Cut woody material averaged approximately 1-3" with some shrub clumps having a higher aggregate DBH at their base. Larger individuals of any tree species and most sapling tree species were retained and left undamaged as residual woody structure. Small legacy patches were also distributed naturally throughout the site due to the presence of patches of denser mature forest, though, in some cases, when mature trees were spaced widely enough for skidsteer access, patches had their understory brush thinned and edges feathered to the extent possible.

Project Notes: There is evidence of prescribed fire on this site, though it is unlikely it has been burned since this project was completed. The hazel brush has grown back vigorously and will continue limit fire spread if not burned at regular intervals within the next couple years.

This site is beautiful, and, though hazel has begun to grow back and the site would benefit from more frequent use of prescribed fire, it still retains an openness that is somewhat unique in comparison to many of the sites completed in Phase I. The forb component has benefitted from brush treatments (and there is a rich component of blueberries and raspberries in some areas), but, if it is not burned, it is a site that may require second cut in 5 years after the brush has once again closed the open forb-rich patches and limited its quality as young forest breeding habitat.

33) Hartley Park Buckthorn Control

Project Background

Project Name: Hartley Park Buckthorn Management and Restoration

Project Site: Hartley Park, St. Louis County

Township/Range Section: Township 50 Range 14 Sections 2, 3, 10, & 11

Project Manager / Affiliated Organization: Jim Shoberg – City of Duluth Parks

Fund: PTF Fiscal Year Funds: 2015

Project Start Date: March 2016

Predominant Habitat type: Forest

Additional Habitat types: Prairie / Savana / Grassland , Wetland

Project Status: Post Establishment Phase

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

Buckthorn was removed with saws and chemically treated to prevent regrowth. Buckthorn seedlings were treated using an herbicide overspray. Forested areas were selectively harvested for pines and clear-cut areas were replanted with native grasses and forbs. Areas replanted for a pollinator prairie were managed using mowing, integrated pest management (IPM), herbicide spot-spraying, and controlled burns. Prairie areas were also controlled for the growth of woody plants using mechanical pulling, basal pruning and chemical treatment, and girdling of large trees.

- 2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?
 - Buckthorn and Restoration Management Plan for Hartley Park, Prairie Restorations Inc, January 19, 2017.
 - City of Duluth-Hartley Park Timber General Harvesting Specifications & Map.



3. What are the stated goals of the project?

The goal of this specific project funding was to remove and manage Glossy and European Buckthorn along the Hartley Road Trail and Hartley Nature Center. Per the project grant reporting this project intends to support "restoration of 640 acres of native prairie and forest with invasive species removal and establishment of ongoing land management procedures". Some areas of the restoration were anticipated to be seeded with a native prairie/pollinator mix, while other areas were anticipated to restore naturally with the existing seed bank once the buckthorn was removed/thinned out.

4. What are the desired outcomes of achieving the stated goals of the project?

The site currently supports a diverse and healthy plant community, there are numerous invasive species, including buckthorn, which pose a threat to the park's ecosystem. Removal and management of Buckthorn is intended provide greater opportunity for native species to reestablish from existing plant communities and be augmented by strategic planting and seeding.

5. Were measures of restoration success identified in plans? No If yes, list specific measurements.

Although a plan for continued monitoring was described in the proposal, quantifiable performance measures were not set for the project.

- 6. Are plan Sets available? Yes Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:
 - Buckthorn and Restoration Management Plan for Hartley Park, Prairie Restorations Inc, January 19, 2017.
 - **City of Duluth-Hartley Park Timber General Harvesting Specifications & Map**, Two by Forestry.
- 7. Provide list of best management practices, standards, guidelines identified in plan set?
 - Mechanical removal of buckthorn.
 - Chemical treatment with herbicides including glyphosate, 2,4-D, clopyralid, metsulfuron, triclopyr, and imazapic.
 - Spot mowing and site mowing for prairie management.
 - Mechanical pulling, basal pruning, girdling, and foliar spraying for management of woody plants.
 - Integrated Plant Management (IPM).
 - Spring and fall controlled-burns for prairie management.

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation? No

No significant alterations were made during project implementation.

9. In what ways did alterations change the proposed project outcome? No significant alterations were made during project implementation.

Site Assessment

Field Review Date: 10/10/2020

Field Visit Attendees: Lucas Mueller, Wade Johnson.

10. Surrounding Landscape Characteristics:

Hartley Park primarily contains woodland, wetland, and prairie habitats. The surrounding land is primarily residential areas, with the park adjacent to the Woodland neighborhood of Duluth.

11. Site Characteristics:

a. Soil Series:

Soils are primarily Hermantown-Canosia-Giese depressional complex (F135A), Ahmeek-Normanna-Canosia complex (F138D), and Ahmeek-Normanna-Canosia complex (F147D).

b. Topography:

Moderately rolling landscape, with some steeper slopes.

c. Hydrology:

Well-drained upland forest areas, with wetlands surrounding Hartley Pond and Tischer Creek.

- d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:
- See Table 33-1.

12. Is the plan based on current science? Yes

Cutting and stump treating, followed by foliar herbicide treatment are accepted practices for reducing buckthorn abundance. Site management methods and planting lists are based on literature by the Nebraska Department of Agriculture, the Minnesota Department of Natural Resources, and the University of Minnesota including <u>Weeds of Nebraska and the Great Plains</u>, <u>Nebraska Weeds</u>, <u>Minnesota</u> <u>invasive non-native terrestrial plants: an identification guide for resource managers</u>, <u>Minnesota's Native</u> <u>Vegetation: A Key to Natural Communities</u>, and <u>Minnesota's Geology</u>.

13. List indicators of project goals at this stage of project:

Glossy buckthorn present and dominating in the cut and slash project area as well as along the southern side of the trail. Prairie restoration area appears to have had a greater degree of success in reducing buckthorn.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

The project plan allows for achieving the proposed goals with continued long-term management procedures as listed for woody vegetation control.

15. Are corrections or modifications needed to achieving proposed goals?

Project goals will likely be achieved with the proposed long-term management procedures.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

Long-term management accounted for in the project plan is reasonable and will be necessary on an ongoing basis to establish control of buckthorn in the project area. Continued future funding will be needed to maintain and further progress.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

The project activities are not anticipated to have negative impacts to habitat. The addition of the pollinator prairie planting will provide new habitat along the trail corridor.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

Click here to enter text.Yes, the project has had some success since the start date in 2016, but is in need of additional glossy buckthorn removal in portions of the project areas. If additional restoration methods and maintenance is going to applied to the site, a follow-up or evaluation of the progress would be recommended.

19. Additional comments on the restoration project.

Glossy Buckthorn seedlings dominated the groundcover in much of the wet-mesic forest areas of the project. The drier pollinator planting area appeared to be largely free of Buckthorn. Continued monitoring and management will be needed to ensure maintenance of project goals throughout the treated areas.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Minimally achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* Medium.

22. Provide explanation of reason(s) for determination.

Due to the overall size of the project, varied site conditions and habitat areas (forest, wetland and prairie), suppressing Glossy Buckthorn within the park will be difficult. Methods used to reduce the overall presence of Glossy Buckthorn within the work area were not successful in all areas. Additional cutting and spot spraying treatments are recommended to achieve project goals. Given the ongoing management actions guided by the Park's Buckthorn and Restoration Management Plan, it can be projected, with medium confidence, that that the longer term outcomes of

23. Site Assessor(s) Conducting Review:

Lucas Mueller (Wenck)

Site Maps, Project Plans or Vegetation Tables



Figure 33-1 Site map of Hartley Park showing past and proposed restoration efforts.

 Table 33-1 List of plants observed 10/09/2020 during a meander survey through the project area.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Frangula alnus	Glossy Buckthorn	25-50%	Not Planted	Invasive, Non- Native Species
Phalaris arundinacea	Reed Canary Grass	10-25%	Not Planted	Invasive, Non- Native Species
Alnus incana	Speckled Alder	10-25%	Not Planted	Native
Betula papyrifera	Paper Birch	5-15%	Not Planted	Native
Pinus strobus	Eastern White Pine	5-15%	Not Planted	Native
Picea glauca	White Spruce	5-15%	Planted	Native
Salix bebbiana	Bebbs Willow	5-15%	Not Planted	Native
Salex exigua	Sandbar Willow	5-15%	Not Planted	Native
Solidago canadensis	Canada Goldenrod	5-15%	Not Planted	Native
Apocynum androsaemifolium	Spreading Dogbane	5-15%	Not Planted	Native
Monarda fistulosa	Wild Bergamot	5-15%	Not Planted	Native
Tanacetum vulgare	Common Tansy	5-15%	Not Planted	Invasive, Non- Native Species
Eurybia macrophylla	Large-leaved Aster	5-15%	Not Planted	Native
Larix laricina	Tamarack	1-5%	Planted	Native
Acer saccharum	Sugar Maple	1-5%	Not Planted	Native
Syringa sp.	Lilac	1-5%	Not Planted	Non-Native
Rubus occidentalis	Black Raspberry	1-5%	Not Planted	Native
Calamagrostis canadensis	Canada Bluejoint	1-5%	Not Planted	Native

Site Photographs



Photo 33-1 Prairie restoration area of Hartley Park October 2020. Buckthorn management practices have been fairly successful at this location, with very few seedlings present and less than 5% cover of Buckthorn. This area was planted with a native seed mix after the removal of the buckthorn. The native seed mix appears to have reduced the amount of buckthorn revegetation.



Photo 33-2 Glossy buckthorn present in project area (in background)—average height around 6 to 8 ft. It appeared that 6-8 ft. was the average height/age of the buckthorn throughout the park. This is the revegetated buckthorn from the first removal in 2017.


Photo 33-3 A view of the trail, with buckthorn management more successful on the left side of the photo.

34) Itasca Park East Entrance Forest Restoration

Project Background

Project Name: Itasca State Park Reforestation

Project Site: East Entrance

Township/Range Section: Township 143 Range 35 Section 19

Project Manager / Affiliated Organization: Louis Peterson / MN DNR (current contact)

Fund: PTF Fiscal Year Funds: 2012

Project Start Date: May 2012

Predominant Habitat type: Forest

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Post Establishment Phase



Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

Following a blowdown of mature trees in 2012, approximately 36,000 white pine seedlings, 9,000 red pine seedlings, and 500 jack pine seedlings were planted in the East Entrance site in 2012 at a rate of 600 tree seedlings/acre. Prior to planting, the site was prepared through mechanical control of brush vegetation. Tree seedlings were released through mechanical control of competing woody vegetation in 2015. Bud capping occurred in 2012 through 2019. Tree cages were installed to a portion of the planted trees in 2017. An additional 610 white pines were planted in 2017 following another blowdown event in 2016.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

MN DNR staff have maintained a detailed record of annual activities completed for the site from 2009 through 2019. Information includes year when management actions occurred and quantities and species of trees planted. Maps for management activities from 2011 through 2019 are available. Data are located at the MN DNR Lake Bemidji State Park Trails and Parks Area office in Bemidji, Minnesota.

3. What are the stated goals of the project? The stated goal is to plant and establish 45,500 pine trees in forest openings and understory following a blowdown that impacted Itasca State Park in 2012.

4. What are the desired outcomes of achieving the stated goals of the project?

The project was a component to a larger effort by the MN DNR staff to restore forest communities within Itasca Park. Overall project outcomes include (East Entrance outcomes in parentheses):

- Manage Itasca's mixed pine forests for future generations (East Entrance)
- Plant missing pine species in MHc26a, due to turn of the century logging
- Plant pine species in old fields
- Reconstruct areas where blowdowns or other natural events create openings within existing FDc34a communities, by planting or under-planting pine in these areas (East Entrance)
- Protect seedlings from deer browse (East Entrance)
- Release pines from competing vegetation when necessary (East Entrance)
- Utilize standard forestry practices to prepare a site for pine restoration, such as removing hardwoods by logging
- Monitor/control invasive species as they arise due to forest management activities (East Entrance)
- 5. Were measures of restoration success identified in plans? Yes

If yes, list specific measurements.

Establish a target number of trees per acre. Post-planting monitoring has been tracking survival and the intensity of deer browse.

6. Are plan Sets available? No Have project maps been created? Yes
 If yes, provide in "site maps" and list maps provided:
 2012 Itasca acres done

7. Provide list of best management practices, standards, guidelines identified in plan set?

Best Management Practices were used prior to, during and following the tree planting project and include:

- Mechanical tree and brush removal to prepare for planting
- Use of local ecotype seed material
- Brush saw release to reduce competition
- Bud capping to prevent deer browse
- Tree caging to prevent deer browse

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation?

No alterations were made.

9. In what ways did alterations change the proposed project outcome? Not applicable.

Site Assessment

Field Review Date: 8/26/2020

Field Visit Attendees: Louis Peterson, Gina Quiram – MN DNR and Mark Pranckus - Cardno

10. Surrounding Landscape Characteristics:

The project site is located in Itasca State Park. The surrounding landscape is primarily forested with a mixture of small lakes, ponds, and wetlands scattered throughout the forested cover. The southern end of Itasca Lake is located approximately 4,000 feet to the west.

11. Site Characteristics:

a. Soil Series:

Willosippi loam, 0 to 2 percent slopes

Two Inlets-Eagleview-Steamboat complex, pitted, 3 to 15 percent slopes Potatolake, very fine sand loam, 1 to 8 percent slopes.

b. Topography:

The topography was generally flat with a few areas of gentle slopes associated with increasing elevation.

c. Hydrology:

The site is a relatively dry upland forest community with limited surface water influence from the surrounding watershed due to the drainage patterns towards Itasca Lake to the east and a wetland to the west of the site.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

The plant community is classified as FDc34a – red pine – white pine forest by MN DNR staff. Following the 2012 blowdown, limited closed canopy was present. The site is a combination of open canopy with scattered standing dead trees and a few remaining mature pine, aspen, birch, and spruce trees in patches to a denser closed canopy composed of hardwood species. The understory is dominated by herbaceous and a woody vegetation including bracken fern, beaked hazelnut, round-leaved dogwood, planted pine species, and other sapling trees. The shrub and subcanopy layer is dense and well-structured with multiple dominant species across the site. Invasive species were minimal and less than 5% of the total cover with Canada thistle being the most common invasive species.

12. Is the plan based on current science? Yes

Tree material stock – All seed stock is sourced from Itasca State Park and grown by a MN DNR nursery. Using local ecotype is often considered a preferred first option for restorations. Using local ecotype tree seed material is also identified in the Itasca State Park management plan.

Establishment and management activities such as reducing competing vegetation through a brush saw release, and bud capping and caging trees to reduce deer browse are common forestry practices. Because this portion of Itasca State Park was designated as old growth forest, the Park's management plan clearly identified what management options are (or are not) available for old growth stands. For example, salvage logging was not an option to prepare the site as in other areas of the park.

13. List indicators of project goals at this stage of project:

Many planted pine seedlings have grown to a height that they are above competition from ground vegetation, at a height that negative impacts to deer browse will be limited, and are established enough to continue to grow into future canopy trees.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes. MN DNR staff has dedicated consistent and appropriate management efforts over the course of several years to allow for obtaining the goal of establishing pines in the open areas resulting from the 2012 blow down.

- **15.** Are corrections or modifications needed to achieving proposed goals? None at this time.
- 16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

All proposed and planned future steps are practical and reasonable for establishing pines in the East Entrance project area. Planting occurred in 2012 and 2017, which creates two age classes initially, but over time, the tree will essentially be very similar in age. Young seedlings were observed indicating some seed bank re-generation from existing pine trees. Additional plantings to diversify the age classes may be required in the future to provide both structural and age composition diversity. Future potential challenges and limitations include the potential impact of climate change and disease to forest stands. Because the site is located within Itasca State Park, local land use will likely remain the same.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. The site is progressing on a trajectory that indicates success. MN DNR is actively engaged in managing the site.

19. Additional comments on the restoration project.

MN DNR staff mentioned they have observed a longer lasting beneficial impact of conducting a brush saw release when completed in the fall. This is likely because woody vegetation hasn't transferred nutrients from aboveground production into the root system yet. Based on their observations, the effect of a fall brush saw release can be two or more years in reducing competition for the target species. For the park this work is contracted and is done primarily in the spring. Consideration should be given to exploring contracting options that allow completing the work when it will have the longest-lasting benefit.

Tree planting occurred in 2012 and used local ecotype seed. Currently, there is a debate within the ecological restoration community on the importance of seed source location in the face of climate change. In situations such as forest restorations where it will take decades to potentially achieve the desired outcomes, it may be valuable to consider alternative approaches such as mixing genotypes from surrounding ecotypes or assisting migration by selecting species that may be more appropriate for future climatic conditions.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

During the assessment, many planted pine trees were observed to be at a growth stage above the herbaceous and shrubby vegetation in the open area where the blow down occurred. Many trees are at a height that the impacts to deer browse will be limited.

23. Site Assessor(s) Conducting Review:

Mark Pranckus, Cardno

Site Maps, Project Plans or Vegetation Tables



Figure 34-1 Aerial photograph of the project site from 2017, approximately 5 years after the blowdown. The yellow line represents the meander survey path taken to assess the plant community. (Source: Hubbard County, Minnesota GIS interactive map accessed September 28, 2020 https://gis.co.hubbard.mn.us/Link/jsfe/index.aspx).



Figure 34-2 Aerial photograph of the project site from 2011, approximately 1 year before the blowdown (Source: Hubbard County, Minnesota GIS interactive map accessed September 28, 2020 <u>https://gis.co.hubbard.mn.us/Link/jsfe/index.aspx</u>)



Figure 34-3 Map of forest restoration work completed at Itasca State Park in 2012 by MN DNR staff. East Entrance site is highlighted in "black" circle.

 Table 34-1 List of plant species observed on 8/26/20 during a meander survey through the project area.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Acer rubrum	red maple	1-5%	No	native
Acer saccharum	hard maple	1-5%	No	native
Aronia melanocarpa	black chokeberry	1-5%	No	native
Betula papyrifera	canoe birch	1-5%	No	native
Carex pensylvanica	common oak sedge	1-5%	No	native
Carpinus caroliniana	blue-beech	1-5%	No	native
Chelone glabra	turtlehead	1-5%	No	native
Cirsium arvense	Canada thistle	1-5%	No	non-native
Cornus alternifolia	alternate-leaved dogwood	1-5%	No	native
Cornus rugosa	round-leaved dogwood	10-25%	No	native
Corylus cornuta	beaked hazelnut	10-25%	No	native
Ciervilla Lonicera	northern bush- honeysuckle	1-5%	No	native
Frangula alnus	European alder buckthorn	1-5%	No	non-native
Fraxinus pennsylvanica	green ash	1-5%	No	native
Lonicera canadensis	American fly honeysuckle	1-5%	No	native
Maianthemum racemosum	false Solomon's-seal	1-5%	No	native
Osmunda cinnamomea	cinnamon fern	1-5%	No	native
Picea glauca	white spruce	1-5%	No	native
Pinus resinosa	red pine	10-25%	Yes	native
Pinus strobus	eastern white pine	5-10%	Yes	native
Poa pratensis	Kentucky bluegrass	1-5%	No	non-native
Populus grandidentata	big-tooth aspen	1-5%	No	native
Populus tremuloides	aspen	5-10%	No	native
Prunus serotina	wild black cherry	1-5%	No	native
Pteridium aquilinum	bracken	10-25%	No	native
Quercus	bur oak	1 5%	No	native
macrocarpa		1-5 /0		
Quercus rubra	northern red oak	1-5%	No	native
Rubus	Allegheny	5-10%	No	native
allegheniensis	blackberry	0-1070		
Rubus hispidus	bristly dewberry	1-5%	No	native
Rubus idaeus	American red raspberry	1-5%	No	native
Rubus parviflorus	thimbleberry	5-10%	No	native
Rubus pubescens	Dwarf raspberry	1-5%	No	native

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Solidago gigantea	giant goldenrod	1-5%	No	native
Streptopus Ianceolatus	Twisted-stalk	1-5%	No	native
Taraxacum officinale	Common dandelion	1-5%	No	non-native
Thalictrum dioicum	Early meadow-rue	1-5%	No	native
Tilia americana	American linden	1-5%	No	native
Viburnum rafinesquianum	Arrow-wood	1-5%	No	native

Site Photographs



Photo 34-1 Example of pine plantings that have been release through a brush saw cut, protected with tree cages, and/or bud capped (Itasca State Park, photo taken during site visit 8/26/2020 by Mark Pranckus, Cardno).



Photo 34-2 Example of the pine planting in an area with more dense herbaceous and woody vegetation that provides competition for the planted pine tree, which is barely above the 3 to 4 feet tall vegetation. Red circle indicates a small pine that was previously budcapped. (Itasca State Park, photo taken during site visit 8/26/2020 by Mark Pranckus, Cardno).



Photo 34-3 Example of a small pine seeding that was previously budcapped. The paper material around the terminal buds prevents deer browse. The tree is growing next to a large pine tree that died and fell down. (Itasca State Park, photo taken during site visit 8/26/2020 by Mark Pranckus, Cardno).



Photo 34-4 Example of existing understory vegetation and density where pine trees were planted after the blowdown. (Itasca State Park, photo taken during site visit 8/26/2020 by Gina Quiram, MN DNR).



Photo 34-5 Example of remaining mature pine trees following the blowdown of 2012 and 2016. Most of the site does not have a closed canopy due to the blowdowns. (Itasca State Park, photo taken during site visit 8/26/2020 by Mark Pranckus, Cardno).

35) Itasca Park Gartner Field Forest Restoration

Project Background

Project Name: Itasca State Park Reforestation

Project Site: Gartner Field

Township/Range Section: Township 142 Range 36 Section 5, 8

Project Manager / Affiliated Organization: Louis Peterson / MN DNR (current contact)

Fund: PTF Fiscal Year Funds: 2011

Project Start Date: May 2011

Predominant Habitat type: Forest

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Post Establishment Phase

County: Becker Primary Activity: Forest Restoration Project Size: 70 acres Project Completed: 2011

Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

Approximately 11,500 white pine seedlings, 23,500 red pine seedlings, and 400 jack pine seedlings were planted in the Gartner site in 2011 at a rate of 500 tree seedlings/acre to convert an old field into a pine forest. In 2011 and 2012, Plantskydd, a commercially available blood meal solution, was applied to seedlings to reduce deer browse. Bud capping occurred in 2013 through 2019. An additional 500 jack pines were planted in 2012 due to the loss of 500 red pine seedlings from the 2011 planting.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

MN DNR staff have maintained a detailed record of annual activities completed for the site from 2009 through 2019. Information includes year when management actions occurred and quantities and species of trees planted. Maps for management activities from 2011 through 2019 are available. Data are located at the MN DNR Lake Bemidji State Park Trails and Parks Area office in Bemidji, Minnesota.

- 3. What are the stated goals of the project? The stated goal is to plant and establish 35,500 pine trees in old field that was previously hayed.
- 4. What are the desired outcomes of achieving the stated goals of the project? The project was a component to a larger effort by the MN DNR staff to restore forest communities within Itasca Park. Overall project outcomes include (Gartner Field outcomes in parentheses):

- Manage Itasca's mixed pine forests for future generations (Gartner Field)
- Plant missing pine species in MHc26a, due to turn of the century logging
- Plant pine species in old fields (Gartner Field)
- Reconstruct areas where blowdowns or other natural events create openings within existing FDc34a communities, by planting or under-planting pine in these areas
- Protect seedlings from deer browse (Gartner Field)
- Release pines from competing vegetation when necessary
- Utilize standard forestry practices to prepare a site for pine restoration, such as removing hardwoods by logging
- Monitor/control invasive species as they arise due to forest management activities (Gartner Field)
- 5. Were measures of restoration success identified in plans? Yes If yes, list specific measurements.

Establish a target number of trees per acre. Post-planting monitoring has been tracking survival and the intensity of deer browse.

6. Are plan Sets available? No Have project maps been created? Yes If yes, provide in "site maps" and list maps provided:
2011 Itasca NPC restoration sites

2011 Itasca major seedling protection sites

7. Provide list of best management practices, standards, guidelines identified in plan set?

Best Management Practices were used prior to, during and following the tree planting project and include:

- Use of local ecotype seed material
- Apply chemical treatment to deter deer browse
- Bud capping to prevent deer browse

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation? No

No alterations were made.

9. In what ways did alterations change the proposed project outcome? Not applicable.

Site Assessment

Field Review Date: 8/26/2020

Field Visit Attendees: Louis Peterson, Gina Quiram – MN DNR and Mark Pranckus - Cardno

10. Surrounding Landscape Characteristics:

The project site is located in Itasca State Park. The surrounding landscape is primarily forested with a mixture of small lakes, ponds, and wetlands scattered throughout the forested cover. The site is located near the southern boundary of Itasca State Park.

11. Site Characteristics:

a. Soil Series:

Dalbo silt loam, 0 to 2 percent slopes Dalbo silt loam, 0 to 8 percent slopes Sugarbush-Two Inlets complex, 1 to 8 percent slopes Sugerbush-Two Inlets complex 3 to 15 percent slopes Lindaas silty clay loam, morainic

b. Topography:

The topography was gently rolling with subtle slopes and areas that were relatively flat.

c. Hydrology:

The site is a relatively dry upland with limited surface water influence from the surrounding watershed due its position in the landscape. There are several small wetlands and depressions adjacent to the project site.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

The plant community is old field understory with planted pine trees. The herbaceous ground layer is primarily cool season grasses with scattered forbs including common milkweed and Canada goldenrod. The shrub and subcanopy layer is primarily planted pine trees with scattered spruce. Tree canopy is absent. Invasive species minus the cool season grasses was minimal and less than 5% of the total cover, with Canada thistle being one of the most common invasive species.

12. Is the plan based on current science? Yes

Tree material stock – All seed stock is sourced from Itasca State Park and grown by a MN DNR nursery. Using local ecotype is a preferred first option for restorations. Using local ecotype tree seed material is also identified in the Itasca State Park management plan.

Establishment and management activities such as applying Plantskydd and bud capping to reduce deer browse are common forestry practices.

13. List indicators of project goals at this stage of project:

Many planted pine seedlings have grown to a height that they are above competition from ground vegetation, at a height that negative impacts to deer browse will be limited, and are established enough to continue to grow into future canopy trees.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes. MN DNR staff has dedicated consistent and appropriate management efforts over the course of several years to allow for obtaining the goal of establishing pines in the old field.

15. Are corrections or modifications needed to achieving proposed goals?

None at this time.

16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

All proposed and planned future steps are practical and reasonable for establishing pines in the Gartner project area. Planting occurred in 2011 and 2012, which creates essentially a single age class of trees initially. The open space of the old field may allow for natural regeneration through seed once the planted trees reach maturity, which will help to diversify the age and structure of the future forest. There was no site preparation to remove the cool season grasses in the existing pasture before it was planted or no native grass and forb seeding. MN DNR staff could have considered including the native seeding as part of the restoration in 2011, however, that would have added considerable cost and potentially increased the complexity of restoration. As trees continue to mature and cool season grasses decrease due to shading, an understory seeding could be considered. Future potential challenges and limitations include the potential impact of climate change and disease to forest stands. Because the site is located within Itasca State Park, local land use will likely remain the same.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. The site is progressing on a trajectory that indicates success. MN DNR is actively engaged in managing the site.

19. Additional comments on the restoration project.

MN DNR is continuing to bud cap smaller trees each year; however, the amount of effort required annually has dramatically decreased as the trees have increased in size. At some point in the near future, bud capping may not be required. The metric used to signal the end of bud capping will likely be driven by the number of trees capped per hour vs. a biological metric such as tree density. The pine planting is relatively successful. Many trees are at a size that negative impacts to deer browse is reduced.

Tree planting occurred in 2011 and used local ecotype seed. Currently, there is a debate within the ecological restoration community on the importance of seed source location in the face of climate change. In situations such as forest restorations where it will take decades to potentially achieve the desired outcomes, it may be valuable to consider alternative approaches such as mixing genotypes from surrounding ecotypes or assisting migration by selecting species that may be more appropriate for future climatic conditions.

The goal to restore a mixed pine forest for this site potentially could have been further advanced by seeding native herbaceous species into the ground layer either prior to or after the tree planting. Future enhancement work may want to consider this activity.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

During the assessment, many planted pine trees were observed to be at a growth stage above the herbaceous ground layer. Many trees are at a height that the impacts to deer browse will be limited.

23. Site Assessor(s) Conducting Review:

Mark Pranckus, Cardno

Site Maps, Project Plans or Vegetation Tables



Figure 35-1 Aerial photograph of the project site from 2017, approximately 6 years after trees were planted. The yellow line represents the meander survey path taken to assess the plant community. (Source: Becker County, Minnesota GIS interactive map accessed September 29, 2020 <u>https://gis-server.co.becker.mn.us/link/isfe/index.aspx</u>)



Figure 35-2 Aerial photograph of the project site from 2010, approximately 1 year before trees were planted on the site (Source: Becker County, Minnesota GIS interactive map accessed September 28, 2020 <u>https://gis-server.co.becker.mn.us/link/jsfe/index.aspx</u>)



Figure 35-3 Map of forest restoration work completed at Itasca State Park in 2011 by MN DNR staff. Gartner site is highlighted in "black" circle.



Figure 35-4 Map of forest restoration seedling protection work completed at Itasca State Park in 2011 by MN DNR staff. Gartner site is highlighted in "black" circle.

 Table 35-1 List of plant species observed on 8/26/20 during a meander survey through the project area.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Achillea millefolium	common yarrow	1-5%	No	native
Agrostis gigantea	redtop	1-5%	No	non-native
Anaphalis margaritacea	pearly everlasting	1-5%	No	native
Asclepias syriaca	common milkweed	1-5%	No	native
Bromus inermis	hungarian brome	5-10%	No	non-native
Cirsium arvense	canada thistle	1-5%	No	non-native
Dactylis glomerata	orchard grass	1-5%	No	non-native
Danthonia spicata	poverty danthonia	1-5%	No	native
Doellingeria umbellata	flat-top aster	1-5%	No	native
Erigeron strigosus	daisy fleabane	1-5%	No	native
Eurybia macrophylla	big-leaved aster	5-10%	No	native
Fragaria virginiana	thick-leaved wild strawberry	5-10%	No	native
Geum aleppicum	yellow avens	1-5%	No	native
Hieracium caespitosum	field hawkweed	1-5%	No	non-native
Lonicera hirsuta	hairy honeysuckle	1-5%	No	native
Maianthemum racemosum	false Solomon's-seal	1-5%	No	native
Oryzopsis asperifolia	rough-leaved rice grass	1-5%	No	native
Phleum pratense	timothy	5-10%	No	non-native
Picea glauca	white spruce	1-5%	No	native
Pinus banksiana	jack pine	1-5%	Yes	native
Pinus resinosa	red pine	10-25%	Yes	native
Pinus strobus	eastern white pine	5-10%	Yes	native
Poa pratensis	Kentucky bluegrass	10-25%	No	non-native
Prunella vulgaris	heal-all	1-5%	No	native
Prunus serotina	wild black cherry	1-5%	No	native
Rubus	Allegheny	1 5%	No	native
allegheniensis	blackberry	1-570		
Rubus idaeus	American red raspberry	1-5%	No	native
Rubus pubescens	Dwarf raspberry	1-5%	No	native
Schizachne	false melic grass	1 5%	No	native
purpurascens		1-570		
Solidago canadensis	Canadian goldenrod	5-10%	No	native
Solidago nemoralis	dyers-weed goldenrod	1-5%	No	native
Solidago speciosa	showy goldenrod	1-5%	No	native
Symphyotrichum laeve	smooth blue aster	1-5%	No	native

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Taraxacum officinale	common dandelion	1-5%	No	non-native
Trifolium pratense	red clover	1-5%	No	non-native
Verbascum thapsus	common mullein	1-5%	No	non-native
Vicia americana	American vetch	1-5%	No	native

Site Photographs



Photo 35-1 Example of pine plantings from 2011. Most trees have grown to a height of at least 8 to 10 feet and appear to be resistant to deer browse. Note the smaller tree with a previous bud cap. (Itasca State Park, photo taken during site visit 8/26/2020 by Mark Pranckus, Cardno).



Photo 35-2 Example of the pine planting in an area of the site with reduced density. There was a good mixture of tree density throughout the site that added to the "naturalness" of the planting, instead of trees planted in rows. (Itasca State Park, photo taken during site visit 8/26/2020 by Mark Pranckus, Cardno).



Photo 35-3 Example of a small pine seeding that was previously budcapped. The paper material around the terminal buds prevents deer browse. (Itasca State Park, photo taken during site visit 8/26/2020 by Mark Pranckus, Cardno).



Photo 35-4 Example of the grass and forb community scattered among the trees. The old field vegetation is still present on the side, but will likely decrease as shading from mature trees increases (Itasca State Park, photo taken during site visit 8/26/2020 by Mark Pranckus, Cardno).

36) Itasca Park Schoolcraft West Forest Restoration

Project Background

Project Name: Itasca State Park Reforestation
Project Site: Schoolcraft West
Township/Range Section: Township 143 Range 36

Section 2, 3

Project Manager / Affiliated Organization: Louis Peterson / MN DNR (current contact)

Fund: PTF Fiscal Year Funds: 2014

Project Start Date: May 2014

Predominant Habitat type: Forest

Additional Habitat types: Choose an item. , Choose an item.

Project Status: Post Establishment Phase



Project Goals and Planning

(Site Assessment Preparation from Plan Sets and Documents)

1. What are the specific project components and treatments?

Following a blowdown of mature trees in 2012, 22,500 pine tree seedlings (white pine, red pine, and jack pine) were planted in the Schoolcraft West site in 2014. Prior to planting, the site was prepared through salvage logging and mechanical control of brush vegetation. Tree seedlings were released through mechanical control of competing woody vegetation in 2017 and 2019. Bud capping occurred in 2017 through 2019. Tree cages were installed to a portion of the planted trees in 2017 and 2019. An additional 2,000 trees (red pine and white pine were planted in 2019.

2. What plans / record of project decisions / prescription worksheets are available? Provide location for the data?

MN DNR staff have maintained a detailed record of annual activities completed for the site from 2009 through 2019. Information includes year when management actions occurred and quantities and species of trees planted. Maps for management activities from 2011 through 2019 are available. Data are located at the MN DNR Lake Bemidji State Park Trails and Parks Area office in Bemidji, Minnesota.

3. What are the stated goals of the project?

The stated goal is to plant and establish 22,500 pine trees (7,500 each of white pine, red pine and jack pine) in forest openings and understory following a blowdown that impacted Itasca State Park in 2012.

4. What are the desired outcomes of achieving the stated goals of the project?

The project was a component to a larger effort by the MN DNR staff to restore forest communities within Itasca Park. Overall project outcomes include (Schoolcraft West outcomes in parentheses):

- Manage Itasca's mixed pine forests for future generations (Schoolcraft West)
- Plant missing pine species in MHc26a, due to turn of the century logging (Schoolcraft West)
- Plant pine species in old fields
- Reconstruct areas where blowdowns or other natural events create openings within existing FDc34a communities, by planting or under-planting pine in these areas
- Protect seedlings from deer browse (Schoolcraft West)
- Release pines from competing vegetation when necessary (Schoolcraft West)
- Utilize standard forestry practices to prepare a site for pine restoration, such as removing hardwoods by logging (Schoolcraft West)
- Monitor/control invasive species as they arise due to forest management activities (Schoolcraft West)

5. Were measures of restoration success identified in plans? Yes

If yes, list specific measurements.

Establish a target number of trees per acre. Post-planting monitoring has been tracking survival and the intensity of deer browse.

- 6. Are plan Sets available? No Have project maps been created? Yes
 If yes, provide in "site maps" and list maps provided:
 2014 Itasca acres done
- 7. Provide list of best management practices, standards, guidelines identified in plan set?

Best Management Practices were used prior to, during and following the tree planting project and include:

- Mechanical tree and brush removal to prepare for planting
- Use of local ecotype seed material
- Brush saw release to reduce competition
- Bud capping to prevent deer browse
- Tree caging to prevent deer browse

Project Implementation

(Questions for Site Manager and Cooperating Professionals)

8. Were alterations made to the plan during project implementation? No

No alterations were made.

9. In what ways did alterations change the proposed project outcome? Not applicable.

Site Assessment

Field Review Date: 8/26/2020

Field Visit Attendees: Louis Peterson, Gina Quiram – MN DNR and Mark Pranckus - Cardno

10. Surrounding Landscape Characteristics:

The project site is located in Itasca State Park. The surrounding landscape is primarily forested with a mixture of small lakes, ponds, and wetlands scattered throughout the forested cover. The northern end of Itasca Lake is located approximately 1,000 feet to the east.

11. Site Characteristics:

a. Soil Series:

Sugarbush-Two Inlets complex, 1 to 8 percent slopes Sugarbush-Two Inlets complex, 3 to 15 percent slopes Mooselake and Lupton soils, 0 to 1 percent slopes.

b. Topography:

The topography was generally flat with a few areas of gentle slopes associated with increasing elevation.

c. Hydrology:

The site is a relatively dry upland forest community with limited surface water influence from the surrounding watershed due to the drainage patterns towards Itasca Lake to the east and a wetland to the west of the site.

d. Vegetation: Plant Communities, Dominant Species & Invasives % Cover:

The plant community is classified as MHc26a – Oak – Aspen – Red Maple forest by MN DNR staff. Following the 2012 blowdown and the 2014 salvage logging event, limited closed canopy is present. The site is primarily open with scattered standing dead trees, and a few remaining mature pine, aspen, birch, and spruce trees. The understory is dominated by herbaceous and woody vegetation including a mix of non-native cool season grasses and native woodland grasses, bracken fern, beaked hazelnut, planted pine species, and other sapling trees. Invasive species, not including cool-season grasses were minimal and less than 5% of the total cover, primarily consisting of Canada thistle.

12. Is the plan based on current science? Yes

Tree material stock – All seed stock is sourced from Itasca State Park and grown by a MN DNR nursery. Using local ecotype is a preferred first option for restorations. Using local ecotype tree seed material is also identified in the Itasca State Park management plan.

Establishment and management activities such as reducing competing vegetation through a brush saw release, and bud capping and caging trees to reduce deer browse are common forestry practices.

13. List indicators of project goals at this stage of project:

The initial planting density of trees was 625 seedlings/acre in 2014. In 2016, monitoring indicated an average of 250 trees per acre: 129 red pines/acre, 100 white pines/acre, and 32 jack pines/acre. Deer browse was found on 38% of the trees sampled. Management activities from 2014 through 2019 including annual bud capping, brush saw release, and limited tree caging has allowed planted pines to grow to a height where deer browse will likely have limited impact on tree survival and growth rates.

14. Does the project plan / implementation of the project plan reasonably allow for achieving proposed project goals?

Yes. MN DNR staff has dedicated consistent and appropriate management efforts over the course of several years to allow for obtaining the goal of establishing pines in the open areas resulting from the 2012 blow down.

- **15.** Are corrections or modifications needed to achieving proposed goals? None at this time.
- 16. Do proposed or planned future steps, including long term management, appear practical and reasonable? Were or are there any opportunities to improve project goals/outcomes? What are the potential challenges or limitations?

All proposed and planned future steps are practical and reasonable for establishing pines in the Schoolcraft West project area. Planting occurred in 2014 and 2019, which creates two age classes initially, but over time, the tree will essentially be very similar in age. Additional plantings to diversify the age classes may be required in the future to provide both structural and age composition diversity. Future potential challenges and limitations include the potential impact of climate change and disease to forest stands. Because the site is located within Itasca State Park, local land use will likely remain the same.

17. Do any of the project activities, planned or implemented, likely detract from existing or potential habitat? Explain.

No.

18. Are follow-up assessments by the Restoration Evaluation Program needed? Explain.

No. The site is progressing on a trajectory that indicates success. MN DNR is actively engaged in managing the site.

19. Additional comments on the restoration project.

MN DNR staff mentioned they have observed a longer lasting beneficial impact of conducting a brush saw release when completed in the fall. This is likely because woody vegetation hasn't transferred nutrients from aboveground production into the root system yet. Based on their observations, the effect of a fall brush saw release can be two or more years in reducing competition for the target species. For the park this work is contracted and is done primarily in the spring. Consideration should be given to exploring contracting options that allow completing the work when it will have the longest-lasting benefit

Tree planting occurred in 2014 and used local ecotype seed. Currently, there is a debate within the ecological restoration community on the importance of seed source location in the face of climate change. In situations such as forest restorations where it will take decades to potentially achieve the desired outcomes, it may be valuable to consider alternative approaches such as mixing genotypes from surrounding ecotypes or assisting migration by selecting species that may be more appropriate for future climatic conditions.

Project Evaluation

Projects can be designated as likely to not meet proposed outcomes, minimally meet proposed outcomes, meet proposed outcomes, or exceed proposed outcomes with a low, medium or high degree of confidence in the determination.

20. The project has:

Achieved the stated goals.

21. The project will:

Meet proposed outcomes. *Confidence of outcome determination:* High.

22. Provide explanation of reason(s) for determination.

During the assessment, many planted pine trees were observed to be at a growth stage above the herbaceous and shrubby vegetation in the open area where the blow down and subsequent salvage logging occurred. Many trees are at a height that the impacts to deer browse will be limited.

23. Site Assessor(s) Conducting Review:

Mark Pranckus, Cardno

Site Maps, Project Plans or Vegetation Tables



Figure 36-1 Aerial photograph of the project site from 2017, approximately 5 years after the blowdown and subsequent logging. The yellow line represents the meander survey path taken to assess the plant community. (Source: Clearwater County, Minnesota GIS interactive map accessed September 23, 2020 https://map.co.clearwater.mn.us/link/jsfe/)



Figure 36-2 Aerial photograph of the project site from 2008, approximately 4 years before the blowdown and subsequent logging (Source: Clearwater County, Minnesota GIS interactive map accessed September 23, 2020 <u>https://map.co.clearwater.mn.us/link/jsfe/</u>)



Figure 36-3 Map of forest restoration work completed at Itasca State Park in 2014 by MN DNR staff. Schoolcraft West site is highlighted in "black" circle.

 Table 36-1 List of plant species observed on 8/26/20 during a meander survey through the project area.

Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
Abies balsamea	balsam fir	1-5%	No	native
Achillea millefolium	common yarrow	1-5%	No	native
Agrostis gigantea	redtop	5-10%	No	non-native
Anaphalis margaritacea	pearly everlasting	1-5%	No	native
Apocynum androsaemifolium	spreading dogbane	1-5%	No	native
Aralia nudicaulis	wild sarsaparilla	1-5%	No	native
Asclepias syriaca	common milkweed	1-5%	No	native
Avenella flexuosa	crinkled hair grass	5-10%	No	native
Betula papyrifera	paper birch	1-5%	No	native
Brachyelytrum aristosum	bearded shorthusk	5-10%	No	native
Bromus kalmii	arctic brome	1-5%	No	native
Carex pensylvanica	common oak sedge	5-10%	No	native
Cirsium arvense	Canada thistle	1-5%	No	non-native
Cirsium vulgare	bull thistle	1-5%	No	non-native
Cornus racemosa	gray dogwood	1-5%	No	native
Corylus cornuta	beaked hazelnut	10-25%	No	native
Danthonia spicata	poverty danthonia	5-10%	No	native
Diervilla lonicera	northern bush- honeysuckle	5-10%	No	native
Elymus trachycaulus	slender wheat grass	1-5%	No	native
Eragrostis spectabilis	purple love grass	1-5%	No	native
Eurybia macrophylla	big-leaved aster	5-10%	No	native
Fallopia convolvulus	black-bindweed	1-5%	No	non-native
Festuca arundinacea	reed fescue	1-5%	No	non-native
Fragaria virginiana	thick-leaved wild strawberry	1-5%	No	native
Galium trifidum	northern three- lobed bedstraw	1-5%	No	native
Geum canadense	white avens	1-5%	No	native
Hieracium pilosella	mouse-ear hawkweed	1-5%	No	non-native
Liatris aspera	lacerate blazing-star	1-5%	No	native
Maianthemum canadense	Canada bead-ruby	1-5%	No	native
Physalis virginiana var. virginiana	lance-leaved ground-cherry	1-5%	No	native
Picea glauca	white spruce	1-5%	No	native
Pinus resinosa	red pine	1-5%	Yes	native
Pinus strobus	eastern white pine	1-5%	Yes	native
Scientific Name	Common Name	Cover Range	Species Planted/Seeded	Species Status
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Poa pratensis	Kentucky bluegrass	10-25%	No	non-native
Populus tremuloides	aspen	1-5%	No	native
Potentilla recta	rough-fruited cinquefoil	1-5%	No	non-native
Prunus pumila	sand cherry	1-5%	No	native
Prunus serotina	wild black cherry	1-5%	No	native
Prunus virginiana	chokecherry	1-5%	No	native
Pseudognaphalium obtusifolium	cats-foot	5-10%	No	native
Pteridium aquilinum	Bracken fern	1-5%	No	native
Quercus macrocarpa	bur oak	1-5%	No	native
Rubus allegheniensis	Allegheny blackberry	1-5%	No	native
Rubus idaeus	American red raspberry	5-10%	No	native
Rubus pubescens	dwarf red raspberry	1-5%	No	native
Solidago canadensis	Canadian goldenrod	1-5%	No	native
Solidago speciosa	showy goldenrod	1-5%	No	native
Thalictrum dioicum	early meadow-rue	1-5%	No	native
Trientalis borealis	American starflower	1-5%	No	native
Verbascum thapsus	common mullein	1-5%	No	non-native
Vicia americana	American vetch	1-5%	No	native

Site Photographs



Photo 36-1 Example of pine plantings, approximately 4 to 8 feet in height, that have been released through a brush saw cut, protected with tree cages, and/or bud capped (Itasca State Park, photo taken during site visit 8/26/2020 by Mark Pranckus, Cardno).



Photo 36-2 Example of the pine planting in an area with more dense herbaceous and woody vegetation that provides competition for the planted pine tree, which is barely above the 3 to 4 feet tall vegetation (Itasca State Park, photo taken during site visit 8/26/2020 by Mark Pranckus, Cardno).



Photo 36-3 Example of two different types of tree cages used to protect pine seedlings from deer browse. The one on the left is an earlier version using heavier gauge wire with large gaps and rebar stakes. The one on the right is a newer version using lighter fencing with tighter gaps and lightweight step-in fence posts (Itasca State Park, photo taken during site visit 8/26/2020 by Mark Pranckus, Cardno).



Photo 36-4 Example of pine seedling that was been bud capped (white paper material stapled around the terminal buds of seedlings) to protect deer browse and allow the tree to grow vertically (Itasca State Park, photo taken during site visit 8/26/2020 by Mark Pranckus, Cardno).