**M.L. 2015, Chp. 76, Sec. 2, Subd. 8h Project Abstract**
For the Period Ending June 30, 2019

**PROJECT TITLE: Improving Community Forests Through Citizen Engagement**
**PROJECT MANAGER:** Valerie McClannahan
**AFFILIATION:** Minnesota Department of Natural Resources, Division of Forestry
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**WEBSITE:** www.dnr.state.mn.us
**FUNDING SOURCE:** Environment and Natural Resources Trust Fund
**LEGAL CITATION:** M.L. 2015, Chp. 76, Sec. 2, Subd. 8h; M.L. 2017, Chapter 96, Section 2, Subdivision 18
**APPROPRIATION AMOUNT: $800,000**
**AMOUNT SPENT: $784,770**
**AMOUNT REMAINING: $15,230**

**Sound bite of Project Outcomes and Results**
Twenty communities utilized funds to plant trees and purchase tools for volunteers to maintain planted trees. Communities implemented citizen engagement plans by hosting volunteer planting events, utilizing citizens for small tree pruning, monitoring the health of community trees, and conducting community tree inventory hours garnering a total of 10,518 volunteer.

**Overall Project Outcome and Results**
Many communities are not prepared to adequately address declining canopy in Minnesota's community forests. Without action, community forests in Minnesota will continue to decline, impacting air, water, public health, and the natural environment. This project is a model to protect and improve Minnesota's community forests.

Environment and Natural Resources Trust Funds assisted 20 (Ada, Aitkin, Arlington, Austin, Duluth, Ely, Fridley, Grand Marais, Hermantown, Hill City, Hutchinson, Mankato, Maple Grove, Marshall, North Saint Paul, Rochester, Saint James, Saint Paul, Shakopee, Winona) communities through engaging citizens in their community forest. Communities expended a total $437,035.98 in grant funds provided by Environment and Natural Resources Trust Fund, Minnesota Department of Natural Resources, and the United States Forest Service's Great Lakes Restoration Initiative. Communities utilized funds to purchase tools for volunteers to engage with their community forest, such as pruning shears for small tree pruning and binoculars to monitor for emerald ash borer. Communities also used funds to reforest areas of their communities planting 5,631 trees. These trees, maintained by volunteers for the next five years will intercept 1,328,922 gallons of stormwater and reduce 580,016 pounds of carbon dioxide from the atmosphere. Communities worked with partners to implement citizen engagement plans by hosting volunteer planting events, utilizing citizens for small tree pruning, monitoring the health of community trees, and conducting community tree inventory garnering a total of 10,518 volunteer hours.

| **People** | |
|---|---|
| Attendees at community forestry education and training events | 517 |
| Volunteers at planting events | 2,324 |
| Volunteers at pruning events | 263 |
| Volunteers engaged in tree watering | 782 |

| **Volunteer Maintained Trees** | |
|---|---|
| Trees Planted, Watered, and Mulched | 5,082 |

| | |
|---|---|
| Trees Pruned | 1,344 |
| Trees Monitored for Health | 2,886 |
| Trees Inventoried | 25,459 |

| **Hours** | |
|---|---|
| Volunteer hours planting, mulching, and watering | 8,110.5 |
| Volunteer hours pruning | 904 |
| Volunteer hours tree health monitoring | 596.25 |
| Volunteer hours conducting tree inventory | 907.25 |
| Total volunteer hours | 10,518.00 |

**Project Results Use and Dissemination**

Volunteer engagement training manuals (Appendix B, Appendix C), developed by the University of Minnesota, are tailored to meet the unique community forestry needs of individual communities. These training manuals will continue to be utilized as we expand our community forestry volunteer engagement.

Communities and partners utilized social media, community flyering, a television segment, presenting to community volunteer organizations, and newspaper articles to garner volunteer support and promote community accomplishments. Communities have been provided individual accomplishment and impact reports (Appendix A) to share with their citizens and their community leaders. Project impacts are in the process of being incorporated as accomplishments into the Minnesota Forest Action Plan.

In addition to conducting outreach to garner citizen volunteers and promote project impacts, communities have utilized outreach to provide education about community forests to encourage the care of trees.

# Environment and Natural Resources Trust Fund (ENRTF)
# M.L. 2015 Work Plan Final Report

**Date of Report:** 1/1/2019

FINAL REPORT

**Date of Work Plan Approval:** 6/25/2015

**Project Completion Date:** 6/30/2019

**PROJECT TITLE: Improving Community Forests Through Citizen Engagement**


**Project Manager:** Valerie McClannahan

**Organization:** Minnesota Department of Natural Resources, Division of Forestry

**Mailing Address:** 500 Lafayette Road North

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**Web Address:** www.dnr.state.mn.us


**Location: Statewide**

| **Total ENRTF Project Budget:** | | |
|---|---|---|
| | **ENRTF Appropriation:** | **$800,000** |
| | **Amount Spent:** | **$784,770** |
| | **Balance:** | **$15,230** |

**Legal Citation:** M.L. 2015, Chp. 76, Sec. 2, Subd. 8h
M.L. 2017, Chapter 96, Section 2, Subdivision 18

**Appropriation Language:**
$800,000 the first year is from the trust fund to the Minnesota Department of Natural Resources (DNR) to design and pilot a program to mobilize citizen volunteers to protect, improve, and maintain local forests in communities around the state. Participation is open to any municipality in the state and participating municipalities will be selected through a competitive proposal process that will include representation from both metropolitan and non-metropolitan areas of the state. Trees planted using this appropriation must be species that are native to Minnesota. Any participating municipality must provide a match of not less than 25 percent, up to half of which may be in the form of in-kind support. This appropriation is available until June 30, 2018, by which time the project must be completed and final products delivered.
Carryforward (b) The availability of the appropriations for the following projects are extended to June 30, 2019: (3) Laws 2015, chapter 76, section 2, subdivision 8, paragraph (h), Improving Community Forests Through Citizen Engagement.

**I. PROJECT TITLE:** Improving Community Forests Through Citizen Engagement

**II. PROJECT STATEMENT:**
This project is designed to be a model program for how Minnesota's cities and towns can mobilize citizen volunteers to conduct urban and community forestry activities that would otherwise go undone due to lack of strategic, financial, and/or manpower resources.

Community forests are in decline. Many cities and towns are not prepared to adequately address this crisis. Without decisive action, community forests in Minnesota will continue to decline, impacting air, water, public health, and the natural environment now and into the future. The goal is to protect and improve Minnesota's community forests.

The DNR will conduct this project in collaboration with its partners: MPCA, MDH, Minnesota Nursery and Landscape Association, Hands on Twin Cities, University of Minnesota Department of Forestry Resources, Tree Trust, and Conservation Corps of MN/IA. DNR, together with its project partners, will create a grant program supplying approximately $400,000 to an estimated 8 to 12 Minnesota cities and towns to support urban and community forestry.

Grant funds will be used in concert with technical assistance provided by project partners to conduct activities to strengthen urban forestry, such as planting new trees, creating and maintaining gravel tree beds, watering new trees, recruiting and training citizen volunteers, developing a citywide urban forestry plan, updating tree inventories, pruning trees, and conducting early detection of pests and disease presence in priority areas. This program will begin on or about July 1, 2015 and conclude on or about June 30, 2018.

The $400,000 of grant funds will be made available to all political subdivisions of Minnesota as well as non-governmental organizations. Interested jurisdictions will be invited to respond to a request for proposals (RFP) and we expect to select approximately 8 to 12 cities and towns of various sizes and geographic locations across the state to participate.

ENRTF funds will be used toward:
1. Grant program to support urban and community forests in cities and towns
2. Technical assistance to develop grant work plans and carry out the proposed urban and community forestry activities
3. Quantifying impact of activities by projecting environmental, public health and economic benefits

These are further outlined and discussed in Activities 1, 2 and 3 below.

**III. OVERALL PROJECT STATUS UPDATES:**

**Project Status as of January 1, 2016:** The DNR, in collaboration with its partners, the MN Pollution Control Agency, MN Department of Health, Minnesota Nursery and Landscape Association, Hands on Twin Cities, University of Minnesota Department of Forestry Resources, Tree Trust, and Conservation Corps of MN/IA, created a grant program designed to supply $400,000 to an estimated 8 to 12 Minnesota cities and towns to support urban and community forestry.

Development of the Request for Proposal is detailed under activity 1, but included crafting an accessible application form and list of "Trees Native to Minnesota and the Upper Midwest." See http://www.dnr.state.mn.us/cfgrant/index.html. All project partners participated in final editing of these documents. Of the 4 contracted partners, the University of Minnesota's contract was executed in August and the others are being executed.

The Press Release announcing the program and the web pages were posted December 10, 2015. This departure from the approved November release was due to delays in obtaining DNR Commissioner and Governor's staff

approval. All other means of dissemination were completed successfully. Numerous requests for assistance have been received from potential applicants, particularly from Greater Minnesota.

The Project Manager position in the DNR Division of Forestry has yet to be filled. An approved position description was provided to Human Resources in August, but the position was not posted until December 21, 2015. The Manager will be in place and fully oriented to the project in late January, 2016. They will lead the grant selection and grant agreement administrative processes.

**Amendment Request (04/19/2016)**
Request to change name and contact information for Project Manager. A new Project Manager has been hired and it is in the best interest of the project that this is reflected in the work plan.

Retroactive request to change Activity 1 Budget from $61,090 to $81,680. This subsequently changes the amount spent balance from $61,090 to $77,180.

| **Professional/Technical/Service Contracts** | **Activity 1 Budget** | **Revised Activity 1 Budget** | **Reason for amendment** |
|---|---|---|---|
| MNDNR | $24,180 | $24,180 | No amendment. |
| University of Minnesota | $14,566 | $45,000 | Community needs assessments were budgeted for Activity 2 but took place during Activity 1. |
| Tree Trust | $7,150 | $3,500 | Originally a webinar was going to be made for the RFP process but it was decided that their funds were better used for outreach and planting events which will take place in Activity 2. |
| Conservation Corps of MN/IA | $14,194 | $8,000 | Activity 1 was utilized less during the RFP process than expected. |
| HandsOn Twin Cities | $1,000 | $1,000 | No amendment. |
| **COLUMN TOTAL** | $61,090 | $81,680 | Community needs assessments that were budgeted for in Activity 2 were completed in Activity 1. Once community assessments were completed, budgets were adjusted to reflect community needs. |

Request to change Activity 2 Partner Role for:

- Conservation Corps of Minnesota/Iowa. Community volunteers will be the focus of completing community tree inventories. Conservation Corps of Minnesota/Iowa's focus will be on enabling volunteers through cultivating and planting, and pruning.
- Tree Trust. The University of Minnesota will be conducting all volunteer training, including youth. Tree Trust will work to engage youth in each city for community forestry volunteer events.

Request to change Activity 2 Budget from $699,660 to $688,600. Once community assessments were completed, budgets were adjusted to reflect community needs.

| **Professional/Technical/Service Contracts** | **Activity 2 Budget** | **Revised Activity 2 Budget** | **Reason for amendment** |
|---|---|---|---|
| MNDNR | $84,630 | $84,630 | No amendment. |
| University of Minnesota | $82,301 | $80,100 | Community needs assessments were budgeted for Activity 1 but took place during Activity 2 |
| Tree Trust | $49,550 | $59,500 | Originally a webinar was going to be made for the RFP process but it was decided that their funds were better used for outreach and planting events which will take place in Activity 2. |
| Conservation Corps of MN/IA | $76,679 | $57,870 | After the community needs assessments took place, partner roles for activities are better defined which decreases our need for CCMN for Activity 2. |
| HandsOn Twin Cities | $6,500 | $6,500 | No amendment. |
| Grants to support urban forestry efforts in Minnesota Communities | $400,000 | $400,000 | No amendment. |
| **COLUMN TOTAL** | $699,660 | $688,600 | Once community assessments were completed, budgets were adjusted to reflect community needs. |

Request to change Activity 3 Budget from $39,250 to $29,720. Much of the data collected by partners will be submitted during Activity 2 so there is less need for funding in Activity 3.

| **Professional/Technical/Service Contracts** | **Activity 3 Budget** | **Revised Activity 3 Budget** | **Reason for amendment** |
|---|---|---|---|
| MNDNR | $12,090 | $12,090 | No amendment. |
| University of Minnesota | $10,763 | $17,630 | Data analysis completed by U of M went up due to increase in communities. |
| Tree Trust | $6,300 | $0 | Tree Trust will focus on youth outreach and planting events instead of data analysis of impact. |
| Conservation Corps of MN/IA | $10,097 | $0 | CCMN/IA will focus on on-the-ground activities instead of data analysis of impact. |

| | | | |
|---|---|---|---|
| HandsOn Twin Cities | $0 | $0 | No amendment. |
| **COLUMN TOTAL** | $39,250 | $29,720 | Once community assessments were completed, budgets were adjusted to better reflect community needs. |

Request to change VI Project Budget Summary: B.

- Expand definition of use for DNR cash match to include staff members filling project manager role before one was hired as well as Field Foresters and other staff for the use of grant compliance checks and community outreach.
- Remove "In-kind Services from project partners, non-state", and itemize partners and their offered match. In-kind match from volunteers and other non-grantee partnering organizations will be itemized and added as supplied.

**B. Other Funds**

| Source of Funds | $ Amount Proposed | $ Amount Spent | Use of Other Funds |
|---|---|---|---|
| **State** | | | |
| Cash match, DNR | $120,900 | | DNR Project Manager, Field Forester, and other staff. |
| In-kind services from University of Minnesota (minimum 25%) | $35,682.50 | | Professional/Technical Services Contractors' share in project costs |
| **Non-state** | | | |
| Cash/in-kind match from participating cities and towns (minimum 25%) | $100,000 | | For participating communities to share in costs of implementing local projects |
| In-kind services from Tree Trust (minimum 25%) | $12,600 | | Professional/Technical Services Contractors' share in project costs |
| In-kind services from Conservation Corps MN/IA (minimum ~11.67%) | $7,600 | | Professional/Technical Services Contractors' share in project costs |
| In-kind services from HandsOn Twin Cities (minimum 25%) | $1,875 | | Professional/Technical Services Contractors' share in project costs |
| **TOTAL OTHER FUNDS:** | **$278,657.50** | **$** | Amount decreased based on partner match expectations, additional match will be added in the future to include volunteers and other non-grantee partnering organizations. |

Request to change VII Project Strategy: A. Project Partners: ENTRF Funding. Following the completion of the community needs assessments, partner budgets have been adjusted to better meet community needs.

- University of Minnesota was originally $107,630 and is now at $142,730.
- Conservation Corps of MN/IA was originally $100,970 and is now at $65,870.

*Amendment Approved by LCCMR 4-26-2016*

**Project Status as of July 1, 2016:**

The Project Manager position in the Minnesota Department of Natural Resources Division of Forestry was filled February 29th, 2016. Grant Agreements with Tree Trust, HandsOn Twin Cities, and Conservation Corps of Minnesota and Iowa have now been fully executed and all four partners are able to complete required program tasks. Twelve communities were chosen to be awarded grant funds by a steering committee. Grant Agreements with all communities have been fully executed, but no community grant funds have been paid out.

Technical assistance was provided to communities in the form of a Community Needs Assessment conducted by the University of Minnesota. This included a full review of current capacity and potential obstacles which allowed the University of Minnesota and the Minnesota Department of Natural Resources to develop a work plan tailored for each community.

**Amendment Request (10/31/2016)**
An amendment to extend the availability of funds for an additional year is requested, this extends the deadline to June 30, 2019. The extension is requested to best fulfill the project and its mission. The transition of the project owner from the Minnesota Pollution Control Agency to the Department of Natural Resources required the Department of Natural Resources to create a new position, hire, and train a new employee which cut into project implementation time. Additionally, Minnesota's shorter growing season would prevent project partners from being able to plant trees and submit reimbursements on time before the June 30, 2018 deadline, this allows for only one full growing season for planting. Having an additional growing season makes the tree planting and the tree maintenance more sustainable for participating communities. The DNR, the partners, and the communities have stated that the ability to spread out grant funds through the extension would better allow them to meet their community forestry needs and the mission of the grant.

*Amendment Approved by LCCMR 5/30/2017*

**Project Status as of January 1, 2017:**
With the help of partners, city staff, and invested citizens, projects in all twelve communities are being implemented. Technical assistance is being provided to communities mainly in the form of education for local citizens and city staff, volunteer recruitment, and volunteer planting event management. The University of Minnesota has provided trainings throughout the state to citizens and city staff on prioritized best practices for local community forest needs. Tree Trust has helped communities in need plan and manage volunteer planting event days. Conservation Corps of Minnesota and Iowa has utilized AmeriCorps and youth members to help communities at planting events for site preparation and volunteer leadership. HandsOn Twin Cities has provided resources to communities to aid them in volunteer recruitment.

Grant funds to communities have been paid out in the sum of $86,272 to purchase tree stock, waterbags, tools for volunteer use, and other items to enable volunteers to meet the needs of their urban and community forest.

Data on work plan activities is being tracked and submitted by communities, volunteers, and partners. This data is being used to track project accomplishments and environmental benefits.

**Project Status as of July 1, 2017:**
Community projects are in full swing with partners and city staff working together with volunteers to plant and maintain community trees. Education is being provided to volunteers wishing to be advanced volunteer stewards where they are learning to maintain community trees to increase the health of their community forest. Volunteers are also being engaged in community planting events.

Grant funds to communities have been paid out in the sum of $96,866 to purchase tree stock, waterbags, tools for volunteer use, and other items to enable volunteers to meet the needs of their urban and community forest.

Volunteer and community accomplishments are being tracked as well as their subsequent environmental benefits.

**Project Status as of January 1, 2018:**
Communities are working with partners and city staff to train volunteers to plant and maintain community trees. Training has being provided to volunteers wishing to be advanced volunteer stewards where they are learning to maintain community trees to increase the health of their community forest. Volunteers are being engaged in community planting events.

Grant funds to communities have been paid out in the sum of $221,229 to purchase tree stock, waterbags, tools for volunteer use, and other items to enable volunteers to meet the needs of their urban and community forest.

Volunteer and community accomplishments are being tracked as well as the environmental benefits of the trees being planted and maintained.

**Project Status as of July 1, 2018:**
Communities have worked with partners and city staff to train volunteers. Community trees are being planted and maintained. Training has being provided to volunteers and several have become advanced volunteer stewards where they have learned to maintain community trees to increase the health of their community forest. Volunteers are being engaged in community planting events.

Grant funds to communities have been paid out in the sum of $228,469 to purchase tree stock, waterbags, tools for volunteer use, and other items to enable volunteers to meet the needs of their urban and community forest.

Volunteer and community accomplishments are being tracked as well as the environmental benefits of the trees being planted and maintained.

**Project Status as of January 1, 2019:**
The Department of Natural Resources leveraged funds for this grant to receive an additional $309,962 in grant funds from the U.S. Forest Service from a Great Lakes Restoration Grant. Grant funds are being dedicated to partners and communities to engage citizens in community forestry emphasizing areas that need additional stormwater mitigation. Communities engaged in this grant include Duluth, Grand Marais, Hermantown, and Silver Bay.

Two communities part of the original grant relinquished some of their funds and a second Request for Proposals was released. Four additional communities were added and include Aitkin, Austin, Marshall, and Winona. Contracts with these communities have been executed and supplies are being purchased for spring implementation.

Communities have worked with partners and city staff to train volunteers. Community trees have been planted and maintained. Training has being provided to volunteers and several have become advanced volunteer stewards where they have learned to maintain community trees to increase the health of their community forest. Volunteers are being engaged in community planting events.

Grant funds to communities have been paid out in the sum of $278,893 to purchase tree stock, waterbags, tools for volunteer use, and other items to enable volunteers to meet the needs of their urban and community forest.

Volunteer and community accomplishments are being tracked as well as the environmental benefits of the trees being planted and maintained.

**Overall Project Outcomes and Results:**

Many communities are not prepared to adequately address declining canopy in Minnesota's community forests. Without action, community forests in Minnesota will continue to decline, impacting air, water, public health, and the natural environment. This project is a model to protect and improve Minnesota's community forests.

Environment and Natural Resources Trust Funds assisted 20 (Ada, Aitkin, Arlington, Austin, Duluth, Ely, Fridley, Grand Marais, Hermantown, Hill City, Hutchinson, Mankato, Maple Grove, Marshall, North Saint Paul, Rochester, Saint James, Saint Paul, Shakopee, Winona) communities through engaging citizens in their community forest. Communities expended a total $437,035.98 in grant funds provided by Environment and Natural Resources Trust Fund, Minnesota Department of Natural Resources, and the United States Forest Service's Great Lakes Restoration Initiative. Communities utilized funds to purchase tools for volunteers to engage with their community forest, such as pruning shears for small tree pruning and binoculars to monitor for emerald ash borer. Communities also used funds to reforest areas of their communities planting 5,631 trees. These trees, maintained by volunteers for the next five years will intercept 1,328,922 gallons of stormwater and reduce 580,016 pounds of carbon dioxide from the atmosphere. Communities worked with partners to implement citizen engagement plans by hosting volunteer planting events, utilizing citizens for small tree pruning, monitoring the health of community trees, and conducting community tree inventory garnering a total of 10,518 volunteer hours.

| **People** | |
|---|---|
| Attendees at community forestry education and training events | 517 |
| Volunteers at planting events | 2,324 |
| Volunteers at pruning events | 263 |
| Volunteers engaged in tree watering | 782 |

| **Volunteer Maintained Trees** | |
|---|---|
| Trees Planted, Watered, and Mulched | 5,082 |
| Trees Pruned | 1,344 |
| Trees Monitored for Health | 2,886 |
| Trees Inventoried | 25,459 |

| **Hours** | |
|---|---|
| Volunteer hours planting, mulching, and watering | 8,110.5 |
| Volunteer hours pruning | 904 |
| Volunteer hours tree health monitoring | 596.25 |
| Volunteer hours conducting tree inventory | 907.25 |
| Total volunteer hours | 10,518.00 |

Individual community reports can be viewed in the visual report Appendix A.

**IV. PROJECT ACTIVITIES AND OUTCOMES:**

### ACTIVITY 1: Develop RFP and administer grants to provide up to $400,000 in grant funds to approximately 8 to 12 Minnesota communities to support urban and community forestry.

**Description:**
Project partners will develop a request for proposals (RFP) for a grant program that will provide up to $400,000 as well as technical assistance to help communities conduct urban and community forestry activities. LGUs and non-profit organizations will be eligible to apply. Grant amounts are expected to be

between $30,000 to $50,000 per grant. We expect to fund between 8 and 12 grant projects depending on size and scope of the proposed projects as well as the number of proposals received.

To ensure an adequate number of quality proposals submitted and to optimize program outcomes and impact, designated representatives from project partners will work closely with prospective applicants to develop the grant proposals, including assistance with identifying program activities, goals and projected outcomes. This hands-on assistance will serve as an important first step in building relationships between project partner representatives and prospective communities. ENTRF funds will be used to support this initial investment of time and expertise to develop tailored plans that are suitable for each location as well as for volunteers. An independent review team will be established beforehand to prevent conflict of interest during the selection process. Eligible applicants will include political subdivisions of Minnesota such as cities, towns or counties as well as non-governmental organizations.

The RFP is expected to be released in November 2015 and a press release will accompany the initial announcement. The DNR, along with its urban and community forestry partners, will share the RFP via existing professional networks, email newsletters, and work groups, including University of Minnesota Department of Forestry Resources' existing network of urban forestry professionals (approximately 250 individuals) and Minnesota Shade Tree Advisory Committee members (approximately 500 individuals). These 750 individuals are the most likely candidates to apply for (or identify someone in their community to apply for) this type of grant. In addition, we will share the RFP information with the League of Minnesota Cities, Association of Minnesota Counties, Minnesota Recreation and Park Association, Met Council, and post it on the DNR website. It will also be shared on the Minnesota Council of Nonprofits and Office of State Grants grant databases.

Participating communities will be selected based on demonstrated need of assistance (both financial and technical), local forestry needs, public health priorities, affected populations (e.g. elderly, chronic disease, low-income), readiness to take on a project of this proposed scope and size, ability to provide the required match amount, commitment to sustaining a cadre of citizen volunteers to address local urban forestry needs, and potential impact of the project on the status of urban forestry in the proposed location. It is the intention of the project to work with a diverse mix of Minnesota communities that are of different sizes and geographic locations in order to develop model work plans for a variety of situations and to demonstrate successful utilization of volunteers for urban forestry under various circumstances and in various ways.

Grant funded activities in each community will include some or all of the following: recruit and train volunteers to carry out tree planting, build and maintain gravel holding beds, pruning and other basic maintenance, conduct tree monitoring to detect pests/diseases, and develop/update tree inventories.

**Summary Budget Information for Activity 1:**

**ENRTF Budget: $81,680**
**Amount Spent: $81,680**
**Balance: $0**

| Outcome | Completion Date |
|---|---|
| 1. Write RFP, develop selection criteria | July-October 2015 |
| 2. Issue RFP with open period for 2 months | November-December 2015 |
| 3. Review proposals and select recipients of the grant funds | January 2016 |
| 4. Develop work plans and grant agreements | January-March 2016 |
| 5. Administer grants and ensure compliance with grant agreements | January 2016-June 2018 |

**Activity Status as of January 1, 2016:** Development of the Request for Proposals included crafting an accessible application form and list of "Trees Native to Minnesota and the Upper Midwest." See http://www.dnr.state.mn.us/cfgrant/index.html . All project partners participated in final editing of these documents.

As part of the December grant announcement, the RFP was shared via existing professional networks, provided by the UofM Department of Forestry Resources, the Minnesota Shade Tree Advisory Committee, the League of Minnesota Cities, Association of Minnesota Counties, Minnesota Recreation and Park Association, Met Council, and posting on the DNR website - http://www.dnr.state.mn.us/grants/forestmgmt/index.html . It was also shared on the Minnesota Council of Nonprofits and Office of State Grants grant databases.
UofM and DNR partners began receiving inquiries from a variety of eligible applicants. These include large cities and small towns across the state, county Soil and Water Conservation Districts, a nine-county river basin alliance and professional foresters under contract with various cities.

Project partners are working closely with prospective applicants to develop grant proposals, including identifying program activities, goals and projected outcomes. An independent review team is being established to prevent conflict of interest during the selection process. The proposal evaluation and scoring tool is being developed from a detailed set of project criteria and point system, established by the Project Team in July.

**Activity Status as of July 1, 2016:**
The Request for Proposals remained open for a period of two months during which a total of 25 applications were received. Applications were received from: City of Ada, City of Arlington, City of Austin, City of Buffalo, City of Chanhassen, City of Cottage Grove, City of Edina, City of Ely, Greater Blue Earth River Basin Alliance, City of Fridley, City of Hector, City of Hutchinson, Leech Lake Band of Ojibwe, City of Mankato, Minneapolis Parks and Recreation Board, North Oaks Home Owners' Association, City of North Saint Paul, City of Prior Lake, City of Robbinsdale, City of Rochester, City of Saint James, City of Saint Paul, City of Shakopee, and City of West Saint Paul.

The steering committee was made up of 11 representatives and came from a variety of backgrounds and organizations including the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Minnesota Tree Care Advocate, Tree Trust, the University of Minnesota, University of Minnesota Extension, Sherburne County Soil and Water Conservation District, and the City of Minnetonka.

This steering committee chose a total of 12 communities along with amount of grant dollars awarded based on the demonstrated need of both financial and technical assistance, local forestry needs, public health priorities, affected populations, readiness to take on a project of this scope and size, ability to provide the required match amount, commitment to sustaining volunteers to address local urban and community forestry needs, and the potential impact of the based on its location. These grant agreements have been fully executed, and work plans have been for each community.

| **Communities Awarded LCCMR Grant Funds** | |
|---|---|
| **Community** | **Amount Awarded** |
| City of Ada | $45,000 |
| City of Arlington | $30,000 |
| City of Ely | $30,000 |
| City of Fridley | $36,000 |
| City of Hutchinson | $30,100 |
| City of Mankato | $30,000 |
| City of Maple Grove | $30,000 |
| City of North Saint Paul | $30,000 |
| City of Rochester | $43,900 |
| City of Saint James | $30,000 |

| | |
|---|---|
| City of Saint Paul | $30,000 |
| City of Shakopee | $35,000 |
| **Total Grant Funds Awarded** | **$400,000** |

**Activity Status as of January 1, 2017:**
Each participating community has a tailored work plan to meet their urban and community needs and all are currently in the process of implementing them.

**Activity Status as of July 1, 2017:**
Each participating community has a tailored work plan to meet their urban and community needs and all are currently in the process of implementing them.

**Activity Status as of January 1, 2018:**
Each participating community has a tailored work plan to meet their urban and community needs and all are currently in the process of implementing them.

**Activity Status as of July 1, 2018:**
Each participating community has a tailored work plan to meet their urban and community needs and all are currently in the process of implementing them.

Two United State Forest Service grants were applied for and received from Great Lakes Restoration Initiative funds allowing us to add four communities within the Great Lakes Watershed providing an additional $309,962.00. These four communities include Duluth, Hermantown, Grand Marais, and Silver Bay.

| **Communities Awarded Great Lakes Restoration Initiative Grant Funds** | |
|---|---|
| **Community** | **Amount Awarded** |
| City of Duluth | $175,000 |
| City of Hermantown | $30,000 |
| City of Grand Marais | $30,000 |
| City of Silver Bay | $35,000 |
| **Total Grant Funds Awarded** | **$270,000** |

All additional communities have worked with partners to develop workplans and are in the process of implementing them.

**Activity Status as of January 1, 2019:**
Each participating community has a tailored work plan to meet their urban and community needs and all are currently in the process of implementing them. Two communities part of the original grant, Arlington and St. James, relinquished some of their funds and a second Request for Proposals was released. Four additional communities were added and include Aitkin, Austin, Marshall, and Winona. Contracts with these communities have been executed and supplies are being purchased for spring implementation.

**Final Report Summary:**

| **Communities Awarded LCCMR & Match Grant Funds** | | | |
|---|---|---|---|
| **Community** | **Grant Amount Expended** | **Cash Match** | **In-Kind Match** |
| City of Ada | $19,664.83 | $41,229.63 | $20,125.00 |
| City of Aitkin | $4,389.25 | $250.00 | $473.60 |
| City of Arlington | $19,990.80 | $4,703.51 | $7,102.79 |
| City of Austin | $5,630.00 | $734.94 | $912.43 |

| | | | |
|---|---|---|---|
| City of Duluth | $14,492.34 | $0.00 | $17,023.01 |
| City of Ely | $30,000.00 | $7,931.98 | $21,592.24 |
| City of Fridley | $36,000.00 | $5,521.26 | $48,596.92 |
| City of Grand Marais | $5,629.75 | $0.00 | $3,597.96 |
| City of Hermantown | $12,496.11 | $0.00 | $0.00 |
| City of Hill City | $2,646.63 | $0.00 | $880.67 |
| City of Hutchinson | $30,100.00 | $4,525.92 | $4,772.83 |
| City of Mankato | $42,500.00 | $6,979.79 | $11,882.07 |
| City of Maple Grove | $29,516.18 | $3,750.00 | $3,948.54 |
| City of Marshall | $19,966.28 | $3,106.75 | $5,353.70 |
| City of North Saint Paul | $30,000.00 | $7,170.94 | $10,177.60 |
| City of Rochester | $43,900.00 | $14,264.38 | $23,805.61 |
| City of Saint James | $6,925.68 | $1,721.17 | $7,914.10 |
| City of Saint Paul | $30,000.00 | $4,256.71 | $22,680.40 |
| City of Shakopee | $35,000.00 | $9,432.00 | $5,540.00 |
| City of Winona | $18,188.13 | $3,236.28 | $6,122.50 |
| **Total Grant Funds Awarded** | **$437,035.98** | **$118,815.26** | **$222,474.97** |

Participating communities implemented their tailored work plan to meet their urban and community needs.

**ACTIVITY 2:** Grantees work with their citizen volunteers to carry out urban forestry activities while project partners provide technical assistance and training.

**Description:**
Implement grant work plans as designed by each grantee with technical support from project partners. Grantees recruit and train citizen volunteers. Volunteers in each locality will carry out activities such as planting trees, seasonal watering for newly planted trees, pruning trees, building and maintaining community gravel bed tree nurseries, updating tree inventories, conducting early detection in priority areas. All of this work will be done with the support and guidance of project partners, which will each contribute uniquely as follows:

| Partner | Role |
|---|---|
| Hands on Twin Cities | Provide state-of-the-art guidance to grantees for general volunteer management (recruitment, training, tracking, communication, ongoing engagement/retention, best practices) |
| U of MN Dept. of Forestry Resources | Assist with identifying local needs, developing a tailored work plan and prioritizing grant activities<br>Train volunteers to conduct urban forestry activities<br>Provide ongoing support and knowledge building for volunteers<br>Advise urban forestry professionals in planning and utilization of volunteers to perform community forestry tasks |
| Conservation Corps of MN/IA | On-the-ground direction for cultivating and planting, pruning~~,~~<br>Provide tool library |
| Tree Trust | Focus on youth engagement<br>Event planning and coordination (e.g. Arbor Day, planting events)<br>Outreach strategies and materials to build public awareness of the multiple benefits of the urban forest |
| MN Nursery & Landscape Association | Advise on species selection (using natives and climate-appropriate trees)<br>Provide network of retail partners as resources in grantee communities |

| | |
|---|---|
| MDH | Identify priority focus areas within cities/towns where urban forestry could especially benefit residents based on health factors |
| MPCA | Technical advisor, alignment and leveraging with other statewide urban and community forestry opportunities, e.g. Green Step Cities, MN Green Corps, Minimal Impact Design Standards (MIDS) for storm water management and other low impact development and climate-resilient communities programs. |
| DNR | Overall project management, grants administration, coordinate partners, technical advisor, serve as fiscal agent. Division of Forestry Area staff to monitor local projects, provide technical assistance and perform Compliance Checks on completed projects. |

Program partners will work alongside grantees to provide technical assistance to ensure:

- High quality and realistic work plan development
- Prioritization and triage of grant activities to best address local needs
- Inclusion of citizen volunteers, allowing for recruitment, training, and ongoing engagement
- Use of best practices to conduct urban forestry activities (e.g. tree inventory, tree planting)
- Data tracking throughout the project to develop program metrics and allow for evaluation and quantification of impact

**Summary Budget Information for Activity 2:**

**ENRTF Budget: $688,600**
**Amount Spent: $673,370**
**Balance: $15,230**

| Outcome | Completion Date |
|---|---|
| 1. Urban forests in cities and towns will be protected and improved. Each city and town will be required to include specific language in the work plan to characterize the work, including<br>a. # new trees planted (native and/or climate adaptive, site-appropriate species)<br>b. # newly planted trees receiving seasonal watering<br>c. # trees developed and pruned<br>d. # community gravel bed tree nurseries built and maintained<br>e. # new or updated tree inventories<br>f. # priority areas receiving early detection for pests/disease | April 2016-<br>April 2018 |

**Activity Status as of January 1, 2016:** Grants were awarded February 19. No community grant projects work has begun.

**Activity Status as of July 1, 2016:** Work plans have been fully developed. The University of Minnesota completed a Community Needs Assessment for each community. This involved doing a full review of each community's current capacity and potential obstacles in order to develop tailored programming and a work plan for each community.

The University of Minnesota helped five communities build gravel beds out of re-purposed items in their community. This has enabled communities to have gravel beds at little or no cost. Trainings have been scheduled with all of the communities so that citizen volunteers are well versed in planting, pruning, watering, as well as pest and disease detection, so that they may begin their advanced volunteer stewardship. Training of volunteers has taken place in Arlington, Mankato, and Saint James and hosted a total of 20 volunteers. The

University of Minnesota has begun working with communities on pre-samplings for each of the upcoming tree surveys.

HandOn Twin Cities hosted a volunteer recruitment webinar to help communities strategize their volunteer recruitment. HandsOn Twin Cities has also worked with local businesses to help communities at planting events. A total of 62 trees have been planted and mulched, these trees will all be receiving seasonal watering, small tree structural pruning, and their health will be monitored by the community. These community plantings hosted 75 volunteers who put in a total of 142 volunteer hours prepping the site, digging holes, planting trees, mulching trees, and watering trees.

Tree Trust has reached out to communities and has organizing planting event dates.

**Activity Status as of January 1, 2017:**
Work plans are being implemented by communities with the aid of project partners.

The University of Minnesota has hosted a total of 15 training sessions for volunteers, with city staff invited to attend. Training sessions have taken place at each of the grantee communities throughout the state and have had 192 citizens in attendance and have also included a total of 65 city staff members for a total of 257 community members in attendance. This has culminated in 1,594 hours of training for citizens throughout the state. Trainings have included best planting practices, small-tree structural pruning, best watering practices, and tree health monitoring. A number of volunteers and city staff have looked to increase their urban and community forest understanding by working towards becoming a State Certified Tree Inspector with a total of 45 citizens taking the exam.

| **University of Minnesota Urban and Community Forestry Citizen Education and Training** | |
|---|---|
| Total training sessions offered | 15 |
| Total training session hours | 93 |
| Number of volunteers in attendance | 192 |
| Number of city staff in attendance | 65 |
| Number if State Tree Inspector exams taken | 45 |
| Total attendees | 257 |
| Total training hours | 1,594 |

Training and education is vital to keeping a healthy urban and community forest. The partnership with the University of Minnesota ensures citizens will receive training based on research based best practices. These trained citizens have already begun volunteering for their local communities by planting trees, watering newly planted trees, pruning small trees, and monitoring the health of trees in their urban and community forest.

Tree Trust has worked with communities to organize eight tree planting events for volunteers where a total of 101 volunteers planted a total of 600 trees. These events resulted in a total of 313.5 volunteer hours for the eight communities. Tree Trust helped communities by helping some develop planting plans and layouts based on site evaluations. Tree Trust also helped communities with volunteer recruitment by reaching out to local schools to encourage youth attendance at planting events as well as outreach to local civic organizations.

| **Tree Trust Hosted Planting Events** | | | | |
|---|---|---|---|---|
| City | Number of Trees Planted | Number of Volunteers | Hours | Total Hours |
| Ada | 102 | 25 | 3.5 | 87.5 |
| Arlington | 51 | 24 | 3 | 72 |
| Hutchinson | 75 | 2 | 2 | 4 |
| Mankato | 60 | 9 | 3 | 27 |

| | | | | |
|---|---|---|---|---|
| Maple Grove | 46 | 8 | 3 | 24 |
| North Saint Paul | 90 | 12 | 3 | 36 |
| Saint Paul | 75 | 13 | 3 | 39 |
| Shakopee | 101 | 8 | 3 | 24 |
| Total | 600 | 101 | 23.5 | 313.5 |

The partnership with Tree Trust allows for busy citizens to help their urban and community forest by receiving shortened tutorials on best planting practices. These volunteers then work with and are monitored by people with additional training including Conservation Corps Members as well as experienced volunteers.

Conservation Corps of Minnesota and Iowa worked with Tree Trust and grantee communities to help prepare planting sites for volunteer planting events. Conservation Corps also worked directly with volunteers with in-the-moment training and monitoring volunteers at planting events. Conservation Corps of Minnesota and Iowa utilized a total of 18 Americorps Members for 488 hours and 28 Youth Members for a total of 196 hours.

HandsOn Twin Cities has reached out to grantee communities and has worked with several in helping implement a volunteer recruitment plan. HandsOn has also created a Volunteer Management Resource Guide developed specifically for this grant and is geared toward urban and community forestry volunteer recruitment.

**Activity Status as of July 1, 2017:**
Work plans are being implemented by communities with the aid of project partners.

The University of Minnesota has hosted a total of 26 training sessions for volunteers, with city staff invited to attend. Training sessions have taken place at each of the grantee communities throughout the state and have had 272 citizens in attendance and have also included a total of 71 city staff members for a total of 343 community members in attendance. This has culminated in 2,014 hours of training for citizens throughout the state. Trainings have included best planting practices, small-tree structural pruning, best watering practices, and tree health monitoring. A number of volunteers and city staff have looked to increase their urban and community forest understanding by working towards becoming a State Certified Tree Inspector with a total of 53 citizens taking the exam.

| **University of Minnesota Urban and Community Forestry Citizen Education and Training** | |
|---|---|
| Total training sessions offered | 26 |
| Total training session hours | 150 |
| Number of volunteers in attendance | 272 |
| Number of city staff in attendance | 71 |
| Number if State Tree Inspector exams taken | 53 |
| Total attendees | 343 |
| Total training hours | 2,014 |

Tree Trust has worked with communities to organize eight tree planting events for volunteers where a total of 262 volunteers planted a total of 914 trees. These events resulted in a total of 796.5 volunteer hours for the nine communities. Tree Trust helped communities by helping some develop planting plans and layouts based on site evaluations. Tree Trust also helped communities with volunteer recruitment by reaching out to local schools to encourage youth attendance at planting events as well as outreach to local civic organizations.

| **Tree Trust Hosted Planting Events** | | | | |
|---|---|---|---|---|
| City | Number of Planting Events | Number of Trees Planted | Number of Volunteers | Total Hours |
| Ada | 1 | 102 | 25 | 87.5 |
| Arlington | 1 | 51 | 24 | 72 |

| | | | | |
|---|---|---|---|---|
| Fridley | 2 | 123 | 66 | 198 |
| Hutchinson | 1 | 75 | 2 | 4 |
| Mankato | 2 | 110 | 34 | 102 |
| Maple Grove | 1 | 46 | 8 | 24 |
| North Saint Paul | 1 | 90 | 12 | 36 |
| Saint Paul | 2 | 145 | 43 | 129 |
| Shakopee | 2 | 172 | 48 | 144 |
| Total | 13 | 914 | 262 | 796.5 |

Conservation Corps of Minnesota and Iowa worked with Tree Trust and grantee communities to help prepare planting sites for volunteer planting events. Conservation Corps also worked directly with volunteers with in-the-moment training and monitoring volunteers at planting events. Conservation Corps of Minnesota and Iowa utilized a total of 24 Americorps Members for 796 hours and 28 Youth Members for a total of 196 hours.

**Activity Status as of January 1, 2018:**
Work plans are being implemented by communities with the aid of project partners.

The University of Minnesota has hosted a total of 29 training sessions for volunteers, with city staff invited to attend. Training sessions have taken place at each of the grantee communities throughout the state and have had 328 citizens in attendance and have also included a total of 87 city staff members for a total of 415 community members in attendance. This has culminated in 1,690 hours of training for citizens throughout the state. Trainings have included best planting practices, small-tree structural pruning, best watering practices, and tree health monitoring. A number of volunteers and city staff have looked to increase their urban and community forest understanding by working towards becoming a State Certified Tree Inspector with a total of 71 citizens taking the exam.

| **University of Minnesota Urban and Community Forestry Citizen Education and Training** | |
|---|---|
| Total training sessions offered | 29 |
| Total training session hours | 168.5 |
| Number of volunteers in attendance | 328 |
| Number of city staff in attendance | 87 |
| Number if State Tree Inspector exams taken | 71 |
| Total attendees | 415 |
| Total training hours | 1,690 |

Tree Trust has worked with communities to organize 15 tree planting events for volunteers where a total of 405 volunteers planted a total of 1401 trees. These events resulted in a total of 1253 volunteer hours for the nine communities. Tree Trust helped communities by helping some develop planting plans and layouts based on site evaluations. Tree Trust also helped communities with volunteer recruitment by reaching out to local schools to encourage youth attendance at planting events as well as outreach to local civic organizations.

| **Tree Trust Hosted Planting Events** | | | | |
|---|---|---|---|---|
| City | Number of Planting Events | Number of Trees Planted | Number of Volunteers | Total Hours |
| Ada | 2 | 168 | 50 | 150 |
| Arlington | 2 | 80 | 24 | 72 |
| Fridley | 3 | 181 | 86 | 258 |
| Hutchinson | 1 | 75 | 2 | 4 |
| Mankato | 2 | 110 | 34 | 102 |
| Maple Grove | 2 | 197 | 28 | 84 |

| | | | | |
|---|---|---|---|---|
| North Saint Paul | 2 | 118 | 15 | 45 |
| Saint Paul | 3 | 198 | 68 | 204 |
| Shakopee | 3 | 252 | 78 | 234 |
| Total | 20 | 1379 | 385 | 1153 |

Conservation Corps of Minnesota and Iowa worked with Tree Trust and grantee communities to help prepare planting sites for volunteer planting events. Conservation Corps also worked directly with volunteers with in-the-moment training and monitoring volunteers at planting events. Conservation Corps of Minnesota and Iowa utilized a total of 32 Americorps Members for 1,031 hours and 39 Youth Members for a total of 273 hours.

**Activity Status as of July 1, 2018:**
Work plans are being implemented by communities with the aid of project partners.

The University of Minnesota has hosted a total of 29 training sessions for volunteers, with city staff invited to attend. Training sessions have taken place at each of the grantee communities throughout the state and have had 337 citizens in attendance and have also included a total of 89 city staff members for a total of 426 community members in attendance. This has culminated in 1,720 hours of training for citizens throughout the state. Trainings have included best planting practices, small-tree structural pruning, best watering practices, and tree health monitoring. A number of volunteers and city staff have looked to increase their urban and community forest understanding by working towards becoming a State Certified Tree Inspector with a total of 71 citizens taking the exam.

| **University of Minnesota Urban and Community Forestry Citizen Education and Training** | |
|---|---|
| Total training sessions offered | 31 |
| Total training session hours | 174.5 |
| Number of volunteers in attendance | 337 |
| Number of city staff in attendance | 89 |
| Number if State Tree Inspector exams taken | 71 |
| Total attendees | 426 |
| Total training hours | 1,720 |

Tree Trust has worked with communities to organize 20 tree planting events for volunteers where a total of 385 volunteers planted a total of 11379 trees. These events resulted in a total of 1253 volunteer hours for the nine communities. Tree Trust helped communities by helping some develop planting plans and layouts based on site evaluations. Tree Trust also helped communities with volunteer recruitment by reaching out to local schools to encourage youth attendance at planting events as well as outreach to local civic organizations.

| **Tree Trust Hosted Planting Events** | | | | |
|---|---|---|---|---|
| City | Number of Planting Events | Number of Trees Planted | Number of Volunteers | Total Hours |
| Ada | 2 | 168 | 50 | 150 |
| Arlington | 2 | 80 | 24 | 72 |
| Fridley | 3 | 181 | 86 | 258 |
| Hutchinson | 1 | 75 | 2 | 4 |
| Mankato | 2 | 110 | 34 | 102 |
| Maple Grove | 2 | 197 | 28 | 84 |
| North Saint Paul | 2 | 118 | 15 | 45 |
| Saint Paul | 3 | 198 | 68 | 204 |
| Shakopee | 3 | 252 | 78 | 234 |
| Total | 20 | 1379 | 385 | 1153 |

Conservation Corps of Minnesota and Iowa worked with Tree Trust and grantee communities to help prepare planting sites for volunteer planting events. Conservation Corps also worked directly with volunteers with in-the-moment training and monitoring volunteers at planting events. Conservation Corps of Minnesota and Iowa utilized a total of 32 Americorps Members for 1,031 hours and 39 Youth Members for a total of 273 hours.

**Activity Status as of January 1, 2019:**
Work plans are being implemented by communities with the aid of project partners.

The University of Minnesota has hosted a total of 47 training sessions for volunteers, with city staff invited to attend. Training sessions have taken place at each of the grantee communities throughout the state and have had 340 citizens in attendance and have also included a total of 89 city staff members for a total of 429 community members in attendance. This has culminated in 1,729 hours of training for citizens throughout the state. Trainings have included best planting practices, small-tree structural pruning, best watering practices, and tree health monitoring. A number of volunteers and city staff have looked to increase their urban and community forest understanding by working towards becoming a State Certified Tree Inspector with a total of 71 citizens taking the exam.

| **University of Minnesota Urban and Community Forestry Citizen Education and Training** | |
|---|---|
| Total training sessions offered | 47 |
| Total training session hours | 201 |
| Number of volunteers in attendance | 340 |
| Number of city staff in attendance | 89 |
| Number if State Tree Inspector exams taken | 71 |
| Total attendees | 429 |
| Total training hours | 1,729 |

Tree Trust has worked with communities to organize 21 tree planting events for volunteers where a total of 431 volunteers planted a total of 1,479 trees. These events resulted in a total of 1253 volunteer hours for the nine communities. Tree Trust helped communities by helping some develop planting plans and layouts based on site evaluations. Tree Trust also helped communities with volunteer recruitment by reaching out to local schools to encourage youth attendance at planting events as well as outreach to local civic organizations.

| **Tree Trust Hosted Planting Events** | | | | |
|---|---|---|---|---|
| City | Number of Planting Events | Number of Trees Planted | Number of Volunteers | Total Hours |
| Ada | 2 | 168 | 50 | 150 |
| Arlington | 2 | 80 | 24 | 72 |
| Fridley | 3 | 181 | 86 | 258 |
| Hutchinson | 1 | 75 | 2 | 4 |
| Mankato | 2 | 110 | 34 | 102 |
| Maple Grove | 2 | 197 | 28 | 84 |
| North Saint Paul | 2 | 118 | 15 | 45 |
| Saint Paul | 3 | 198 | 68 | 204 |
| Shakopee | 4 | 352 | 124 | 372 |
| Total | 21 | 1,479 | 431 | 1,291 |

Conservation Corps of Minnesota and Iowa worked with Tree Trust and grantee communities to help prepare planting sites for volunteer planting events. Conservation Corps also worked directly with volunteers with in-the-moment training and monitoring volunteers at planting events. Conservation Corps of Minnesota and Iowa utilized a total of 60 Americorps Members for 1,469 hours and 46 Youth Members for a total of 322 hours.

**Final Report Summary:**

Work plans have been implemented by communities with the aid of project partners.

The University of Minnesota has hosted 38 training sessions for volunteers, with city staff invited to attend. Training sessions have taken place at each of the grantee communities throughout the state and have had 434 citizens in attendance and have also included 83 city staff members for a total of 517 community members in attendance. This has culminated in 2,032 hours of training for citizens throughout the state. Trainings have included best planting practices, small-tree structural pruning, best watering practices, and tree health monitoring. A number of volunteers and city staff have looked to increase their urban and community forest understanding by working towards becoming a State Certified Tree Inspector with 59 citizens taking the exam.

| **University of Minnesota Urban and Community Forestry Citizen Education and Training** | |
|---|---|
| Total training sessions offered | 38 |
| Total training session hours | 212.5 |
| Number of volunteers in attendance | 434 |
| Number of city staff in attendance | 83 |
| Number if State Tree Inspector exams taken | 59 |
| Total attendees | 517 |
| Total training hours | 2,032 |

Tree Trust has worked with communities to organize 24 tree planting events for volunteers where a total of 494 volunteers planted a total of 1,626 trees. These events resulted in a total of 1,442 volunteer hours for the 11 communities. Tree Trust helped communities by helping some develop planting plans and layouts based on site evaluations. Tree Trust also helped communities with volunteer recruitment by reaching out to local schools to encourage youth attendance at planting events as well as outreach to local civic organizations.

| **Tree Trust Hosted Planting Events** | | | | |
|---|---|---|---|---|
| City | Number of Planting Events | Number of Trees Planted | Number of Volunteers | Total Hours |
| Ada | 2 | 168 | 50 | 150 |
| Aitkin | 1 | 25 | 18 | 36 |
| Arlington | 2 | 80 | 24 | 72 |
| Fridley | 3 | 181 | 86 | 258 |
| Hutchinson | 1 | 75 | 2 | 4 |
| Mankato | 2 | 110 | 34 | 102 |
| Maple Grove | 2 | 197 | 28 | 84 |
| North Saint Paul | 2 | 118 | 15 | 45 |
| Saint Paul | 4 | 268 | 93 | 279 |
| Shakopee | 4 | 352 | 124 | 372 |
| Winona | 1 | 52 | 20 | 40 |
| Total | 24 | 1,626 | 494 | 1,442 |

Conservation Corps of Minnesota and Iowa worked with Tree Trust and grantee communities to help prepare planting sites for volunteer planting events. Conservation Corps also worked directly with volunteers with in-the-moment training and monitoring volunteers at planting events. Conservation Corps of Minnesota and Iowa utilized a total of 131 Americorps Members for 2,773 hours and 18 Youth Members for a total of 126 hours.

**ACTIVITY 3: Quantify Environmental, Public Health and Economic Impact**

**Description:**
DNR with its project partners will work with grantees to put in place project baselines and develop performance metrics to track results and measure progress. Outputs and outcomes will be identified, tracked and collected in periodic grant reports.

Final reimbursement payments of grant funds will be made to grantee communities pending completion of grant reports and fulfillment of all other requirements under the grant agreement.

Final grant reports will be collected from each grantee. Outputs and outcomes will be identified and, where appropriate, quantified using tools such as iTree, a state-of- the-art software developed by the US Forest Service to measure the benefits and impact of urban forests.

Activity 3 represents the grant closeout period; we will document tasks and accomplishments performed in each location and by volunteers to identify environmental, public health, and economic value; calculate return on investment.

**Summary Budget Information for Activity 3:**

**ENRTF Budget: $29,720**
**Amount Spent: $29,720**
**Balance: $0**

| Outcome | Completion Date |
|---|---|
| 1. Quantify value of environmental, public health, and economic benefits of work performed: energy conservation, air quality improvement, storm water control, urban heat island mitigation, CO2 reduction and property value increase. | March-June 2018 |
| 2. Calculate return on investment based on ENRTF seed funds | |

**Activity Status as of January 1, 2016:** No community projects have started, so their benefits cannot be quantified at this time.

**Activity Status as of July 1, 2016:**

Total Trees Planted and Mulched: 62
Total number of Volunteer Hours Submitted: 142
Total Value of Volunteer Time: $3,578.40

Total Benefits from Trees Planted

| | Benefits gained this year | Benefits gained in 5 years | Benefits gained in 50 years |
|---|---|---|---|
| Total overall benefits | $26 | $333 | $72,775 |
| Storm water Intercepted | 850 gallons | 11,015 gallons | 2,379,456 gallons |
| Energy (Kilowatt hours of electricity) | | 29.6 | 11,283.30 |
| Energy (Heating fuel in therms) | $0.10 | $1.48 | $798.00 |
| Carbon Dioxide reduced from atmosphere | 316 pounds | 2,953 pounds | 248,851 pounds |

**Activity Status as of January 1, 2017:**

| Total Community Forest Volunteer Submissions | |
|---|---|
| Total Number of Volunteers at Planting Events | 522 |
| Total Trees Planted, Watered, and Mulched | 1,063 |

| | |
|---|---|
| Total Trees Monitored for Health | 1,054 |
| Total Trees Pruned | 160 |
| Volunteer hours Planting, Mulching, and Watering | 1,085 |
| Volunteer hours Pruning | 55.75 |
| Volunteer hours Tree Health Monitoring | 56.25 |
| Total Volunteers Hour | 1,197.5 |
| Value of Volunteer Hours<br>*Volunteer hours are calculated based on information provided by the non-profit Independent Sector. The value of volunteer time in Minnesota was calculated to be $25.20 an hour in 2015.* | $30,177 |

| **Total Benefits from Trees Planted** | | | | |
|---|---|---|---|---|
| | Benefits gained this year | Benefits gained in 5 years | Benefits gained in 30 years | Benefits gained in 50 years |
| Total overall benefits | $647 | $7,018 | $524,400 | $1,711,149 |
| Stormwater intercepted (Gallons) | 15,027.00 | 218,023 | 14,748,771.00 | 50,521,754 |
| Energy (Kilowatt hours of electricity) | 118.30 | 3,599.70 | 272,711.20 | 684,680.50 |
| Energy (Heating fuel in therms) | 20.20 | 404.40 | 46,939.70 | 119,353.70 |
| Carbon Dioxide reduced from atmosphere (Pounds) | 7,227 | 88,924 | 3,758,659 | 9,827,104 |

*Benefits are calculated using the United States Forest Service iTree software.*

**Activity Status as of July 1, 2017:**

| **Total Community Forest Volunteer Submissions** | |
|---|---|
| Total Number of Volunteers at Planting Events | 683 |
| Total Trees Planted, Watered, and Mulched | 1,377 |
| Total Trees Monitored for Health | 1,054 |
| Total Trees Pruned | 160 |
| Volunteer hours Planting, Mulching, and Watering | 1,568.5 |
| Volunteer hours Pruning | 55.75 |
| Volunteer hours Tree Health Monitoring | 56.25 |
| Total Volunteers Hour | 1,932.5 |
| Value of Volunteer Hours<br>*Volunteer hours are calculated based on information provided by the non-profit Independent Sector. The value of volunteer time in Minnesota was calculated to be $26.40 an hour in 2016.* | $51,018.00 |

| **Total Benefits from Trees Planted** | | | | |
|---|---|---|---|---|
| | Benefits gained in 1 year | Benefits gained in 5 years | Benefits gained in 30 years | Benefits gained in 50 years |
| Total overall benefits | $743 | $8,646 | $681,908 | $2,242,786 |
| Stormwater intercepted (Gallons) | 18,451 | 278,661 | 19,513,022 | 67,382,046 |
| Energy (Kilowatt hours of electricity) | 154.20 | 4,579.0 | 326,593.6 | 811,810.8 |
| Energy (Heating fuel in therms) | 20,2 | 472.7 | 54,538.6 | 138,337.3 |
| Carbon Dioxide reduced from atmosphere (Pounds) | 9,360 | 117,486 | 4,882,085 | 12,836,826 |

*Benefits are calculated using the United States Forest Service iTree software.*

**Activity Status as of January 1, 2018:**

| Total Community Forest Volunteer Submissions | |
|---|---|
| Total Number of Volunteers at Planting Events | 1,482 |
| Total Trees Planted, Watered, and Mulched | 2,828 |
| Total Trees Monitored for Health | 1,257 |
| Total Trees Pruned | 423 |
| Volunteer hours Planting, Mulching, and Watering | 4,923.75 |
| Volunteer hours Pruning | 309.75 |
| Volunteer hours Tree Health Monitoring | 197.75 |
| Volunteer hours conducting Tree Inventory | 7 |
| Total Volunteers Hour | 5,438.25 |
| Value of Volunteer Hours<br>*Volunteer hours are calculated based on information provided by the non-profit Independent Sector. The value of volunteer time in Minnesota was calculated to be $26.40 an hour in 2016.* | $143,569.80 |

| Total Benefits from Trees Planted | | | | |
|---|---|---|---|---|
| | Benefits gained in 1 year | Benefits gained in 5 years | Benefits gained in 30 years | Benefits gained in 50 years |
| Total overall benefits | $1,068 | $25,736 | $1,525,479 | $4,911,755 |
| Stormwater intercepted (Gallons) | 43,674 | 715,323 | 43,207,438 | 146,588,513 |
| Energy (Kilowatt hours of electricity) | 568.2 | 17,966.3 | 738,483.7 | 1,948,780.9 |
| Energy (Heating fuel in therms) | 0.0 | 1,982.5 | 114,813.6 | 303,110.9 |
| Carbon Dioxide reduced from atmosphere (Pounds) | 21,622 | 334,492 | 11,456,667 | 29,344,877 |

*Benefits are calculated using the United States Forest Service iTree software.*

**Activity Status as of July 1, 2018:**

| Total Community Forest Volunteer Submissions | |
|---|---|
| Total Number of Volunteers at Planting Events | 1,482 |
| Total Trees Planted, Watered, and Mulched | 2,828 |
| Total Trees Monitored for Health | 1,257 |
| Total Trees Pruned | 423 |
| Volunteer hours Planting, Mulching, and Watering | 4,923.75 |
| Volunteer hours Pruning | 309.75 |
| Volunteer hours Tree Health Monitoring | 197.75 |
| Volunteer hours conducting Tree Inventory | 7 |
| Total Volunteers Hour | 5,438.25 |
| Value of Volunteer Hours<br>*Volunteer hours are calculated based on information provided by the non-profit Independent Sector. The value of volunteer time in Minnesota was calculated to be $26.40 an hour in 2016.* | $143,569.80 |

| Total Benefits from Trees Planted |
|---|

| | Benefits gained in 1 year | Benefits gained in 5 years | Benefits gained in 30 years | Benefits gained in 50 years |
|---|---|---|---|---|
| Total overall benefits | $1,068 | $25,736 | $1,525,479 | $4,911,755 |
| Stormwater intercepted (Gallons) | 43,674 | 715,323 | 43,207,438 | 146,588,513 |
| Energy (Kilowatt hours of electricity) | 568.2 | 17,966.3 | 738,483.7 | 1,948,780.9 |
| Energy (Heating fuel in therms) | 0.0 | 1,982.5 | 114,813.6 | 303,110.9 |
| Carbon Dioxide reduced from atmosphere (Pounds) | 21,622 | 334,492 | 11,456,667 | 29,344,877 |

*Benefits are calculated using the United States Forest Service iTree software.*

**Activity Status as of January 1, 2019:**

| **Total Community Forest Volunteer Submissions** | |
|---|---|
| Total Number of Volunteers at Planting Events | 1,937 |
| Total Trees Planted, Watered, and Mulched | 4,026 |
| Total Trees Monitored for Health | 1,257 |
| Total Trees Pruned | 750 |
| Volunteer hours Planting, Mulching, and Watering | 6,500.25 |
| Volunteer hours Pruning | 569.25 |
| Volunteer hours Tree Health Monitoring | 197.75 |
| Volunteer hours conducting Tree Inventory | 7 |
| Total Volunteers Hour | 7,274.25 |
| Value of Volunteer Hours<br>*Volunteer hours are calculated based on information provided by the non-profit Independent Sector. The value of volunteer time in Minnesota was calculated to be $27.580 an hour in 2017.* | $200,623.80 |

| **Total Benefits from Trees Planted** | | | | |
|---|---|---|---|---|
| | Benefits gained in 1 year | Benefits gained in 5 years | Benefits gained in 30 years | Benefits gained in 50 years |
| Total overall benefits | $1,778 | $34,015 | $2,281,556 | $6,153,021 |
| Stormwater intercepted (Gallons) | 60,213 | 947,423 | 54,574,080 | 182,444,951 |
| Energy (Kilowatt hours of electricity) | 663.5 | 19,767.4 | 831,583.2 | 2,210,982.7 |
| Energy (Heating fuel in therms) | 0.0 | 2,265.1 | 125,270.4 | 328,326.6 |
| Carbon Dioxide reduced from atmosphere (Pounds) | 29,799 | 412,525 | 13,351,783 | 34,528,623 |

*Benefits are calculated using the United States Forest Service iTree software.*

**Final Report Summary:**

| **Total Community Forest Volunteer Submissions** | |
|---|---|
| Total Number of Volunteers at Planting Events | 2,324 |
| Total Trees Planted, Watered, and Mulched | 5,082 |
| Total Trees Monitored for Health | 2,886 |
| Total Trees Pruned | 1,344 |
| Volunteer hours Planting, Mulching, and Watering | 8,110.5 |
| Volunteer hours Pruning | 904 |
| Volunteer hours Tree Health Monitoring | 596.25 |

| | |
|---|---|
| Volunteer hours conducting Tree Inventory | 907.25 |
| Total Volunteers Hour | 10,518 |
| Value of Volunteer Hours<br>*Volunteer hours are calculated based on information provided by the non-profit Independent Sector. The value of volunteer time in Minnesota was calculated to be $28.15 an hour in 2018.* | $291,815.74 |

| **Total Benefits from Trees Planted** | | | | |
|---|---|---|---|---|
| | Benefits gained in 1 year | Benefits gained in 5 years | Benefits gained in 30 years | Benefits gained in 50 years |
| Total overall benefits | $2,369 | $50,901 | $3,059,520 | $8,555,638 |
| Stormwater intercepted (Gallons) | 83,889 | 1,328,922 | 74,537,986 | 253,491,477 |
| Energy (Kilowatt hours of electricity) | 1,108.4 | 33,591.1 | 1,276,523.0 | 3,402,448.2 |
| Energy (Heating fuel in therms) | 26.0 | 4,291.0 | 205,097.7 | 532,377.7 |
| Carbon Dioxide reduced from atmosphere (Pounds) | 38,550 | 580,016 | 18,584,832 | 47,427,053 |

*Benefits are calculated using the United States Forest Service iTree software.*

**V. DISSEMINATION:**

**Description:**

All grantee reports will be integrated into a final project report. This final report will document the impact of the program and feature outputs (# trees planted, # municipal inventories completed, etc.) along with outcomes (improved air quality, storm water management, public health, etc.) Whenever possible these impacts will be quantified using tools such as iTree, a software developed by the US Forest Service for this purpose. The final report will be shared with the LCCMR as well as the League of Minnesota Cities, Association of Minnesota Counties, and Minnesota's urban forestry professional community through the Minnesota Shade Tree Advisory Committee. In addition, work plans and results from this project will be collected and made available to other Minnesota cities and towns for reference as model documents.

It is expected that the project manager will have ongoing opportunities (examples: presenting at a conference, representing the project at meetings of state and/or city government) before, during and after the ENTRF funding period to share information about the project with city officials, forestry professionals and others who are interested in urban and community forestry and the use of citizen volunteers.

This project will also be featured on the DNR and MPCA websites as an important community assistance program.

**Status as of January 1, 2016:** No community grant projects have started. Presentations to date have been limited to promoting the project and RFP to prospective applicants (November 2015 to January 2016).

**Status as of July 1, 2016:** With community grant projects just beginning, we've just begun to build our impacts. A news release has been written to increase engagement with citizens and to promote project goals and benefits. Presentations have been limited to current project status and for volunteer recruitment.

**Status as of January 1, 2017:**

A press release was created for the project and picked up by five local community newspapers in Ada, Fridley, Maple Grove, Walker, and Winona. The press release described the project, the projects benefits, and looked to recruit citizens to participate in local community forestry efforts.

As much of the volunteer recruitment and activities took place during this reporting period, results have only recently been tabulated. A presentation about project results took place for Fridley's City Council. Grant project interim results will be shared will all communities and invested stakeholders such as Minnesota Shade Tree Advisory Committee, Minnesota Pollution Control Agency, and the Minnesota Department of Health.

**Status as of July 1, 2017:**
A total of nine articles have been written by variety of media sources about the Improving Community Forests through Citizen Engagement grant including local newspapers and online media. Additionally, Northwest Community Television produced a short segment about the grant accomplishments and ways to get involved as a volunteer in the community of Maple Grove.

**Status as of January 1, 2018:**
A total of eleven articles have been written by variety of media sources about the Improving Community Forests through Citizen Engagement grant including local newspapers and online media. There has been one television segment about the grant accomplishments and ways to get involved as a volunteer in the community of Maple Grove. Communication efforts have also taken place by means of posting flyers throughout communities and giving presentations at a variety of local community organizations.

**Status as of July 1, 2018:**
A total of eleven articles have been written by variety of media sources about the Improving Community Forests through Citizen Engagement grant including local newspapers and online media. The City of Ely have received donated weekly ad space in The Ely Shopper encouraging folks to volunteer and water trees planted by the grant. There has been one television segment about the grant accomplishments and ways to get involved as a volunteer in the community of Maple Grove. Volunteer recruitment and program promotion have taken place by means of flyers and posters throughout communities and giving presentations at a variety of local community organizations such as Lion's Clubs and Rotary Clubs.

**Status as of January 1, 2019:**
A total of twelve articles have been written by variety of media sources about the Improving Community Forests through Citizen Engagement grant including local newspapers and online media. The City of Ely continues to receive a donated weekly ad space in The Ely Shopper encouraging folks to volunteer and water trees planted by the grant. There has been one television segment about the grant accomplishments and ways to get involved as a volunteer in the community of Maple Grove. Volunteer recruitment and program promotion have continued to take place by means of flyers and posters throughout communities and giving presentations at a variety of local community organizations such as Lion's Clubs and Rotary Clubs. In addition, some communities have collaborated with their local utility company to promote volunteering and tree watering throughout the community.

**Final Report Summary:**
Volunteer engagement training manuals (Appendix B, Appendix C), developed by the University of Minnesota, are tailored to meet the unique community forestry needs of individual communities. These training manuals will continue to be utilized as we expand our community forestry volunteer engagement.

Communities and partners utilized social media, community flyering, a television segment, presenting to community volunteer organizations, and newspaper articles to garner volunteer support and promote community accomplishments. Communities have been provided individual accomplishment and impact reports (Appendix A) to share with their citizens and their community leaders. Project impacts are in the process of being incorporated as accomplishments into the Minnesota Forest Action Plan.

In addition to conducting outreach to garner citizen volunteers and promote project impacts, communities have utilized outreach to provide education about community forests to encourage the care of trees.

**VI. PROJECT BUDGET SUMMARY:**

**A. ENRTF Budget Overview:**

| Budget Category | $ Amount | Overview Explanation |
|---|---|---|
| Personnel: | $ 120,900 | Unclassified, temporary program staff |
| Professional/Technical/Service Contracts: | $ 279,100 | Contract with Tree Trust, University of Minnesota Department of Forestry Resources, Conservation Corps of Minnesota/Iowa, Hands on Twin Cities for volunteer management consulting |
| Other: | $ 400,000 | Grants to LGUs and nonprofit organizations |
| **TOTAL ENRTF BUDGET:** | **$800,000** | |

**Explanation of Use of Classified Staff:** none

**Explanation of Capital Expenditures Greater Than $5,000:** none

**Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation:** 0.5 per year for 3 years for a total of 1.5 FTEs

**Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation:** 1.8 per year for 3 years for a total of 5.4

**B. Other Funds:**

| Source of Funds | $ Amount Proposed | $ Amount Spent | Use of Other Funds |
|---|---|---|---|
| **State** | | | |
| Cash match, DNR | $120,900 | $178,090.73 | DNR Project Manager, Forester, and other staff. Grants to communities. Additional funding to partners |
| In-kind services from University of Minnesota (minimum 25%) | $35,682.50 | $36,198.43 | Professional/Technical Services Contractors' share in project costs |
| **Non-state** | | | |
| Cash/in-kind match from participating cities and towns (minimum 25%) | $100,000 | $341,290.23 | For participating communities to share in costs of implementing local projects |
| Federal match from United States Forest Service grant | | $32,618.20 | Grants to communities in Superior Watershed will total $309,962 by end of grant. |
| In-kind services from Tree Trust (minimum 25%) | $12,600 | $14,335.60 | Professional/Technical Services Contractors' share in project costs |
| In-kind services from Conservation Corps MN/IA (minimum 11.67%) | $7,600 | $20,036.85 | Professional/Technical Services Contractors' share in project costs |

| | | | |
|---|---|---|---|
| In-kind services from HandsOn Twin Cities (minimum 25%) | $1,875 | $5,860.28 | Professional/Technical Services Contractors' share in project costs |
| In-kind services provided by volunteer time | | $291,815.74 | Volunteer services provided by citizens |
| **TOTAL OTHER FUNDS:** | **$278,657.50** | **$920,237.06** | |

**VII. PROJECT STRATEGY:**

**A. Project Partners:**

Simply providing funding for urban and community forestry efforts is not enough: many cities and towns lack adequate staffing capacity and supporting resources to properly develop and urban forestry management plan and to conduct regular and ongoing planting, pruning, and maintenance of their neighborhood trees.

This project will provide funding paired with ongoing access to technical assistance from project partners. Project partners represent a critical piece of this program approach. These partners include: University of Minnesota Department of Forest Resources, Tree Trust, Conservation Corps of MN/IA, and Hands on Twin Cities. Project partners will assist in the initial development of a tailored project work plan for each grantee and remain engaged throughout the grant period to provide ongoing consulting and technical expertise. Services provided by these partners include curriculum and delivery of volunteer training, best practices and guidance on utilization of volunteers to meet local needs in a strategic and sustainable manner, oversight and direction for on-the-ground volunteer activities including tree planting, creating gravel tree holding beds, tree pruning, tree watering, conducting a tree inventory, and monitoring trees for the presence of pests and diseases. Specific project partner roles are outlined in the chart in Activity 2.

Project partners will receive ENTRF funding as follows:

| **Project Partner** | **Total amount of ENTRF funds received** |
|---|---|
| U of MN Department of Forestry Resources | $142,730 |
| Tree Trust | $63,000 |
| Conservation Corps of MN/IA | $65,870 |
| Hands on Twin Cities | $7500 |

**B. Project Impact and Long-term Strategy:**

Urban forests provide many benefits, impacting communities in the following ways:

| **Urban Forest Benefit** | **Project Impact** |
|---|---|
| Improve air quality, reduce ozone & fine particles | Protect vulnerable populations (asthma, lung disease) |
| Mitigate urban heat island effects | Reduce heat stress on residents |
| Control stormwater and soil erosion | Protect homeowners/businesses from flooding |
| Conserve energy (less heating/cooling required) | Save costs for individuals/businesses |
| Sequester carbon | Help MN meet greenhouse gas reduction goals |
| Address climate change | Support community resilience |
| Provide native habitat for animals and pollinators | Strengthen local ecosystems |

This project represents a statewide effort to bolster the capacity of cities and towns in maintaining, sustaining, and growing their urban and community forests.

The long term strategy of this project is to provide successful ongoing citizen volunteer models for urban forestry that can be referenced and replicated by many other cities and towns across the state. DNR and its project partners will work with grantees to put in place long term plans to sustain their citizen volunteer efforts into the future. Results of the project and model program plans will also be shared to communities across Minnesota through urban forestry professional networks, Minnesota Shade Tree Advisory Committee annual conference and/or monthly training meetings, and other conferences/meetings where sharing of best practices occur. The goal is to bolster urban forests in the 8 to 12 grantee communities through the development and activation of citizen volunteers, and to encourage similar efforts in additional cities and towns across Minnesota.

**C. Funding History:** This is a new program which has no prior funding history.

**VIII. FEE TITLE ACQUISITION/CONSERVATION EASEMENT/RESTORATION REQUIREMENTS:**
**Does not apply to this project.**

**IX. VISUAL COMPONENT or MAP(S):** Infographic being updated for handout at June 25, 2015 LCCMR meeting.

**X. RESEARCH ADDENDUM: None**

**XI. REPORTING REQUIREMENTS:**
Periodic work plan status update reports will be submitted no later than January 1, 2016, July 1, 2016, January 1, 2017, July 1, 2017, January 1, 2018, July 1, 2018, and January 1, 2019. A final report and associated products will be submitted between June 30 and August 15, 2019.

**Environment and Natural Resources Trust Fund**
**M.L. 2015 Project Budget**
**Project Title: Improving Community Forests Through Citizen Engagement**
**Legal Citation:** *M.L. 2015, Chapter 76, Section 2, Subdivision 8h*
**Project Manager: Valerie McClannahan**
**Organization: Minnesota Department of Natural Resources**
**M.L. 2015 ENRTF Appropriation: $** 800,000
**Project Length and Completion Date:** 4 Years, June 30, 2019
**Date of Report: 08/15/2019**

| ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET | Revised Activity 1 Budget 4/15/2016 | Amount Spent | Activity 1 Balance | Revised Activity 2 Budget 4/15/2016 | Amount Spent | Activity 2 Balance | Revised Activity 3 Budget 4/15/2016 | Amount Spent | Activity 3 Balance | TOTAL BUDGET | TOTAL BALANCE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **BUDGET ITEM** | | | | | | | | | | | |
| **Personnel (Wages and Benefits)** | $24,180 | $24,180 | $0 | $84,630 | $84,630 | $0 | $12,090 | $12,090 | $0 | $120,900 | $0 |
| *DNR Project Manager, 0.5 FTE per year for 3 years for a total of $120,900. 70% salary, 30% benefits* | | | | | | | | | | | |
| **Professional/Technical/Service Contracts** | | | | | | | | | | | |
| U of MN Dept of Forest Resources: $142,730. For assistance with proposal and workplan development, volunteer curriculum and training sessions in urban forestry work practices, technical expertise for urban forestry planning and management | $45,000 | $45,000 | $0 | $80,100 | $80,100 | $0 | $17,630 | $17,630 | $0 | $142,730 | $0 |
| Tree Trust: $63,000. For on-site volunteer training and tree planting oversight, youth engagement, outreach strategy and materials for educating the public about tree care and the role of the urban forest | $3,500 | $3,500 | $0 | $59,500 | $59,500 | $0 | $0 | $0 | $0 | $63,000 | $0 |
| CC of MN/IA: $65,870. For operationalizing workplan activities, providing in-house AmeriCorps crew members to assist with on-the-ground tree activities such as planting, trimming/pruning, safety protocols, and provision of tool library | $8,000 | $8,000 | $0 | $57,870 | $43,258 | $14,612 | $0 | $0 | $0 | $65,870 | $14,612 |
| Hands on Twin Cities: $7,500. For sharing best practices and conducting training on volunteer management. Providing guidance on tools and strategies for recruiting, training, event signups, tracking, retaining, valuing, and evaluating volunteer contributions | $1,000 | $1,000 | $0 | $6,500 | $6,500 | $0 | $0 | $0 | $0 | $7,500 | $0 |
| **Other** | | | | | | | | | | | |
| Grants (8 to 12 grants @ $30,000 to $50,000 each for a total of $400,000) to support urban forestry efforts in Minnesota communities | | | | $400,000 | $399,382 | $618 | | | | $400,000 | $618 |
| | | | | | | | | | | | |
| **COLUMN TOTAL** | **$81,680** | **$81,680** | **$0** | **$688,600** | **$673,370** | **$15,230** | **$29,720** | **$29,720** | **$0** | **$800,000** | **$15,230** |

University of Minnesota Department of Forest Resources

# Minnesota Tree Care Advocate

People Helping Trees Help Communities

## Minnesota Citizen Pruner

ENVIRONMENT
AND NATURAL RESOURCES
TRUST FUND

Ashley Reichard

*Urban and Community Forestry*

*Volunteer Programs Coordinator*

Updated on April 2019

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# Citizen Pruner Program Overview

## Citizen Pruner Program History

Citizen Pruner is a pilot program to increase local capacity by working with municipalities and engaging citizens in community forestry. Citizen Pruner volunteers are trained in tree identification, biology, and pruning techniques to help maintain tree health and public safety. If this pilot program is successful, Citizen Pruner certification will be valid for three years.

Renewal competency assessments will be available online or through postal mail at no cost. Recertification is issued at the end of each calendar year.

Citizen Pruners are needed now more than ever. As municipal budgets continue to be cut, the aid from citizens becomes increasingly more important to communities. Citizen Pruners are able to manage small branches near the ground while tree care professionals can focus on larger branches higher in the tree canopies. Completing this ground work is vital for clearing sight lines and blocked sidewalks.

## Code of Conduct

Citizen Pruner volunteers serve at the discretion of the Citizen Pruner program. Just as it is a privilege for the Citizen Pruner program to work with volunteers who offer their time and talent, volunteer involvement in the program is a privilege and responsibility, not a right.

The purpose of the standards of behavior is to ensure the safety and well-being of all Citizen Pruner participants (i.e. target audiences, staff, other professionals, volunteers) and to ensure a positive, enjoyable experience for volunteers.

Citizen Pruners will:

- uphold volunteerism as a way to meet the urban forest needs of Minnesota
- represent the program with dignity and respect by being a positive spokesperson for the program and the city
- be courteous, civil, and respectful.

Failure to honor these standards can result in Citizen Pruner status removal. Not honoring these standards must be confirmed. The program director must authorize any termination.

Resolution of the conflict may lead to reinstatement, reinstatement with limitations, reassignment of volunteer duties, or removal from the program.

### Program Staffing

- Gary Johnson - Director: directs and administers the program; oversees development and delivery of education and program operations. Contact: johns054@umn.edu
- Ashley Reichard - Volunteer Program Coordinator: organizes and relays program information to volunteers from the University of Minnesota. Contact: reich343@umn.edu or 612-625-2361

### Communications & Resources

- Tree Care Advocate Website - additional MN tree volunteer programs (www.mntca.umn.edu)
- UMN Trees - additional resources for volunteers (trees.umn.edu)
- UMN Headquarters - 115 Green Hall, 1530 Cleveland Avenue North, St. Paul, MN 55108-6112

## Program Guidelines, Policies and Procedures

### Minimum Age Requirement

Participants in the Citizen Pruner program must be 18 years or older, confirmed with a valid photo I.D. or have signed parental consent.

## Certification and Recertification

### Core Course

New volunteers must complete Core Course education and pass the initial competency assessment by answering 75% of the questions correctly to be a certified Citizen Pruner in active status, and will receive a certificate and membership card. Certification is valid for three years. The Program staff will contact you via info@mntca.org after the initial three year period as an active Citizen Pruner to alert you of recertification. You may also contact citizenpruner@mntca.org with questions and concerns.

# Data Collection

Data collection by Citizen Pruners is crucial. Data is used to generate reports that are given to stakeholders and municipalities. Citizen Pruners are expected to take data on each tree pruned, noting location of each tree pruned, and all aspects of pruning that took place on each tree.

Forms are given to each group of Citizen Pruners at the start of a volunteer event. One volunteer from each group collects data. The data collector should have legible handwriting, and must be accurate and concise.

Once data is collected in the field, one volunteer from each group submits the data online at http://mntca.umn.edu/resources/education-volunteer-hours-reporting. The original paper form is given to the city contact. See the data collection form in Appendix A. To print more data collection forms, go to http://mntca.umn.edu/citizen-pruner .

# Public vs. Private Property

Only trees will be pruned on public property such as parks, rights-of-way, and boulevards. Public property boulevards can vary greatly but, are typically within 10-15 feet of the curb, but this can vary from street to street. If it's questionable whether a tree is on public or private property, ask city staff.

# How To Work with the Public

The public is interested in what volunteers are doing. Provide a courteous explanation about the Citizen Pruner program, and the partnership between the city and the University of Minnesota. Many people are concerned and care deeply about trees, especially if it is right in front of their home. Most people are positive, a few may be negative. It is important to remember that you are an ambassador on behalf of the city and the Minnesota Citizen Pruner program, and you may be able to recruit new volunteers to help care for your public trees.

Show your Citizen Pruner ID to anyone who questions what you are doing and explain that you have taken a course and a competency assessment for certification. Inform them that what you are doing is helping the trees. Emphasize that you have been authorized by your city to prune these tree. Thank them for their concern, as we need more people who are concerned about their street trees. If a citizen exhibits resistance to your pruning activities, discontinue pruning, and move to another location if possible. Note the location you discontinued work and inform your city contact of the interaction.

The public will see you as a source of knowledge and may ask you to look at their own tree. Do not answer questions about private trees because it could be a liability to volunteers and the program, and can infringe on private industry. In a courteous manner explain to them the Citizen Pruner program, and the partnership between the city and the University of Minnesota. Recommend they contact a Certified Arborist and provide them with the Tree Owner's Manual card (see Appendix B).

All questions involving public property, including trees and infrastructure, should be directed to the city. If possible, provide the citizen with the appropriate city contact information.

# Safety

There are a number of safety regulations in place for the safety of volunteers, citizens, and the protection of surrounding infrastructure. Volunteers are expected to follow all of the regulations set by the Citizen Pruner program and by the city. If the Citizen Pruner program discovers that safety precautions are being disregarded by any volunteer, the Citizen Pruner status will be suspended. The volunteer will be immediately placed on temporary inactive status and may be placed on inactive status following decisions made by the city contact and the program director.

Citizen Pruner safety regulations include:

- Only branches within arms reach, while both feet are firm on the ground, may be pruned. Pruning anything above that is prohibited. A rule of thumb is to only prune within 6.5 feet from the ground. Any low hanging branches that require the attention of the city should be reported to Joe Bennett.
- Anything removed from the tree should be around 2 inches in diameter at the branch collar ridge or smaller. A good way to approximate this size is by wrapping a hand around the branch; it is the right size to remove if thumb and fingers touch.
- Electricity can flow through branches, so never prune trees/branches that are within 10 feet of utility lines.
- Never get on a ladder., so if pruning can't be done with both feet on the ground, do not do it.
- Be aware of your surroundings.

  - Sometimes you won't be able to prune things you want to without stepping into the street. If you are on a street that is not busy, you may have a group member watch for cars while you make a good cut.

  - When you are pruning, or others are pruning around you, make sure that you or others stand clear of the branch drop zone. Even seemingly small branches can injure a person.

- Dress code:
    - wear city supplied safety equipment at all times, this includes but is not limited to protective eyewear, helmet, high visibility safety vests, etc.
    - no open toe shoes
    - no offensive clothing, e.g., too revealing, offensive graphics or words

# Safety

Manage brush so it is safe for citizens and convenient for the city. Keep brush cleared from all sidewalks, out of the street, and at least 10 feet away from any fire hydrant. Maintaining brush in a courteous and safe manner is crucial.

Following a volunteer event, the city will haul the brush away. If you are pruning independently, make sure to alert the city immediately of the location of the brush so they can pick it up as soon as possible.

Make as few piles of brush as possible on each boulevard. For ease of handling brush, stack the brush with the pruned end of the material facing the street. If brush is too large to fit with the pruned end of the branch out in the boulevard space provided, cut the brush into smaller pieces or, turn the brush pile parallel with the street while keeping the cut ends together.

# Tools of the Trade

## Tools

Tools will be provided to you at each volunteer event, or you may bring pruning shears and handsaws from home. Please check with your city contact before bringing your own tools or if interested in using larger equipment.

## Types of Tools

Different tools are used for different types of pruning. Tools are usually differentiated by the size of what will be pruned.

**Bypass pruners**

Bypass pruners have curved blades that act like a scissor as they overlap. Properly sharpened bypass pruners leave a smooth, well-defined cut and do not crush plant material. Bypass pruners typically have up to a 1-inch diameter cutting capacity.

**Handsaw**

Pruning saws come in many shapes and sizes. The blade may be curved or straight, and have either fine or coarse teeth. Pruning saws should be used to remove 1-inch to 2-inch diameter branches.

**Pole Pruners**

Pole pruners are very similar to the bypass pruner, in that they act like a scissor to make a cut. Properly sharper pole pruners to make a smooth, well-defined cut that does not crush plant material. Pole pruners typically have up to a 1-inch diameter cutting capacity.

***Image: Pole Pruner***

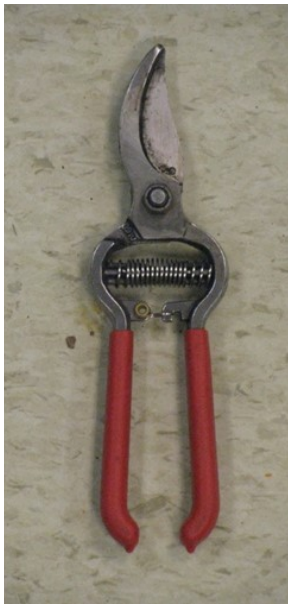


***Image: Bypass pruners***

***Image: Handsaw***

## Tool Cleaning Procedure

Clean tools of all debris and dirt with soap and water after a volunteer shift. Disinfect tools with rubbing alcohol. Dry pruning tools and/or spray the blades with WD-40 before putting them away to prevent rusting. Note: tools need to be cleaned and disinfected before pruning some tree species (See Tree Identification and Pruning Restrictions).

# Tree Identification and Pruning Restrictions

Correctly identifying the type of tree about to be pruned is the first crucial step in pruning trees. Different species of trees are susceptible to diseases at different times of year. Pruning trees at the wrong time can lead to infection.

## Linden

Lindens, also known as basswoods, are a species that commonly produce sprouts and suckers.

Photos: Dave Hanson

**Leaves**: alternate, simple, 4”-8” long, coarsely serrate edges; heart-shaped, unequal base.

**Twigs**: slender, round 2-scaled, reddish bud. **Fruit**: ¼-⅜”, round, under leaf like bract, no ridges.

**Bark**: light gray when young, darkens with age, narrow/shallow flat topped ridges.

## Oaks

Pruning oaks at the wrong time of year can lead to infection by oak wilt, which can result in the tree's death. The safe period for pruning oaks is typically November through March.

Visit www.myminnesotawoods.umn.edu/2010/03/oak-wilt-risk-status-in-minnesota for the current oak wilt infection status. Do not prune oaks from April through October. If pruning is necessary, spray with shellac.

Photos: Dave Hanson

**Leaves**: alternate, simple, 4-7" long, 5-12 shallow rounded lobes, shiny green top, whitish below.

**Fruit**: ¾" to 1¼" paired acorns, 1"-4" stalk. Acorns mature in the autumn.

**Bark**: light brown, papery, scales become blocky and deeply fissured with age.

Photos: Dave Hanson

**Leaves**: alternate, simple, 4-9" long, 7-11 bristle-tipped lobes, sinuses cut ½ way to midrib.

**Fruit**: ⅝" to 1⅛" acorn, shallow cap, scales pubescent, acorns mature autumn of second season.

**Bark**: gray to red-brown, smooth, shiny, becoming grayish flat-topped ridges, deeply furrowed.

# Bur Oak

Code: QUMA

Family: Fagaceae

*Quercus macrocarpa*

Photos: Dave Hanson

**Leaves**: alternate, simple, 4-12" long, 5-9 rounded lobes, center sinuses cut to mid-rib.

**Fruit**: acorn, fringed (bur) cap covers ½ or more of ¾" to 2" acorn, acorns attached direct to twig.

**Bark**: grayish with vertical ridges, deeply furrowed. Bur oak can have corky twigs.

# White Oak

Code: QUAL

Family: Fagaceae

*Quercus alba*

Photos: Dave Hanson

**Leaves**: alternate, simple, 4-9" long, 5-9 rounded lobes, sinuses nearly uniform in depth.

**Fruit**: acorn, ⅜" to 1¼" acorns, cap covers top ¼-⅓, acorn is attached via a ¼" stalk.

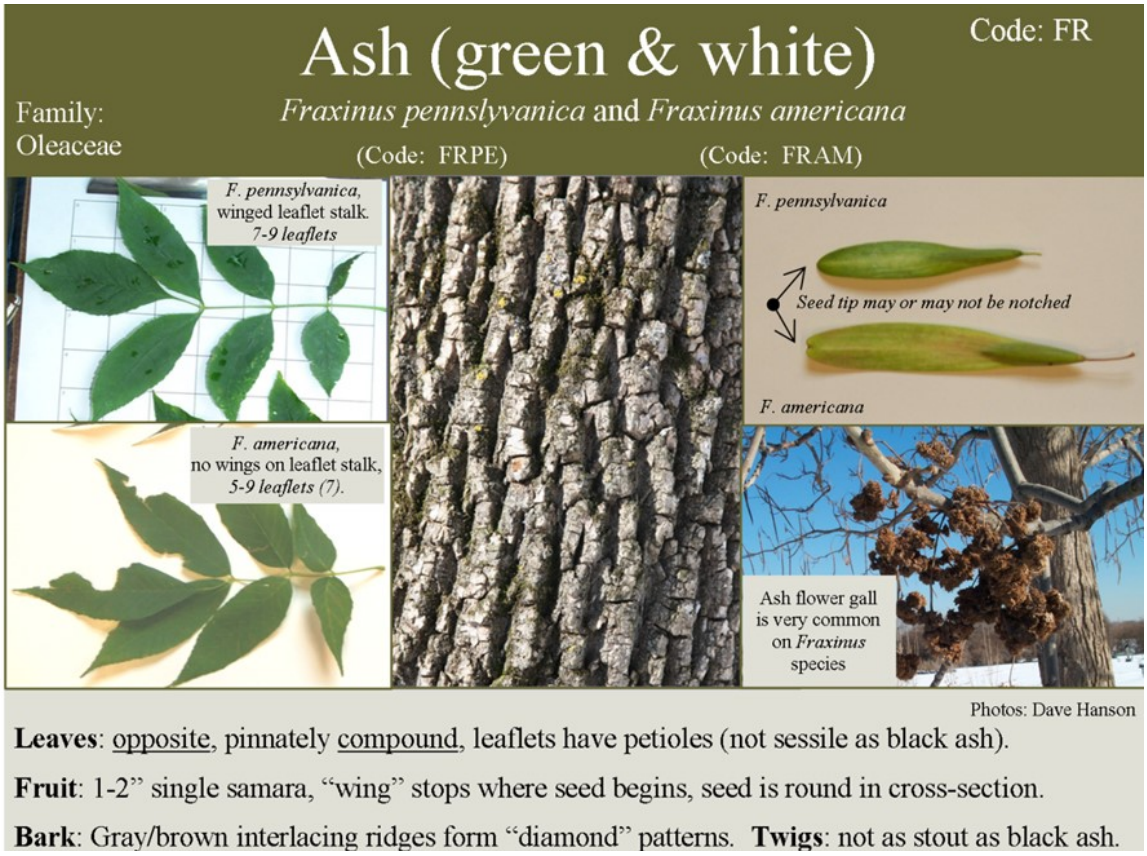
**Bark**: Light ashy-gray, narrow vertical ridges, with age breaks into blocky, irregular shapes.

## Elms

There are a variety of diseases that can affect elm. Whenever possible, elms are best pruned during the dormant season (November to March). If necessary to prune during the growing season, spray wound with shellac.

## Ash

Ash trees infested with Emerald Ash Borers (EAB) shouldn't be pruned during their flight season (beginning of May through end of August). Flight seasons can change depending on spring and fall temperatures. Cold springs delay flight season and warm falls extend flight season. Pruning ash trees during the flight season of the adult insect encourages their movement to other healthy trees nearby.



## Honeylocust

Nectria canker is a disease that spreads when the weather is wet, so pruning Honeylocust in the spring to fall should be avoided. Pruning in the heat of the summer or from the late autumn to late winter is most desirable to avoid spreading diseases. It is also important to thoroughly clean and disinfect tools before pruning a  Honeylocust. Spray or dip the saw or pruners blade in rubbing alcohol and "flame" with a match or lighter.

## Crabapple and Mountain Ash

These trees are all susceptible to fireblight, which can be spread through pruning wounds during spring and early summer. This means crabapples and mountain ashes should be pruned during the late fall or late winter (October through November, and February through early April, respectively).

Photos: Dave Hanson

**Leaves**: alternate, simple, 1-3" long, elliptical-ovate, finely serrated, showy white to red flowers.

**Fruit**: small apple or pome (< 2"), variety of colors, some persist into late winter.

**Bark**: gray/pink thin, scaly/flaky. **Twigs**: moderately thick, foliage/fruit on spur shoots.

Photos: Dave Hanson

**Leaves**: alternate, pinnately compound, 6-10" long, 11-17 sharp, finely-toothed leaflets.

**Twigs**: twig, stout gray-reddish. **Buds**: dark, pointed, resinous, hairy. **Fruit**: small red-orange "berries" in a cluster. **Bark**: grayish, smooth, lenticels in youth - ages to splitting, peeling, rough.

## Birches

There are a variety of problems that can affect birches...none of which are related to pruning. People fear pruning in the spring causes them to bleed and causes problems. Trees don't bleed, they exude sap. No harm done.

Code: BEPA

# Paper Birch

*Betula papyrifera*

Family:
Betulaceae

Photos: Dave Hanson

**Leaves**: alternate, simple, coarse doubly toothed margins, leaf base - symmetrical, rounded.

**Twigs**: reddish-brown with prominent lenticels. Male catkins are often present at twig ends.

**Bark**: young reddish bark, lenticels - matures to white peeling bark, at tree base dark and fissured.

## Maples

Again, there are a variety of problems that can affect maples...none of which are related to pruning. People are even more fearful of pruning maples in the spring that results in "bleeding." Maples don't bleed, they exude sap. Note that people aren't squeamish about pouring maple "blood" on their pancakes.

Code: ACSA2

# Sugar Maple

*Acer saccharum*

Family:
Aceraceae

Autumn maturing double samara

Photos: Dave Hanson

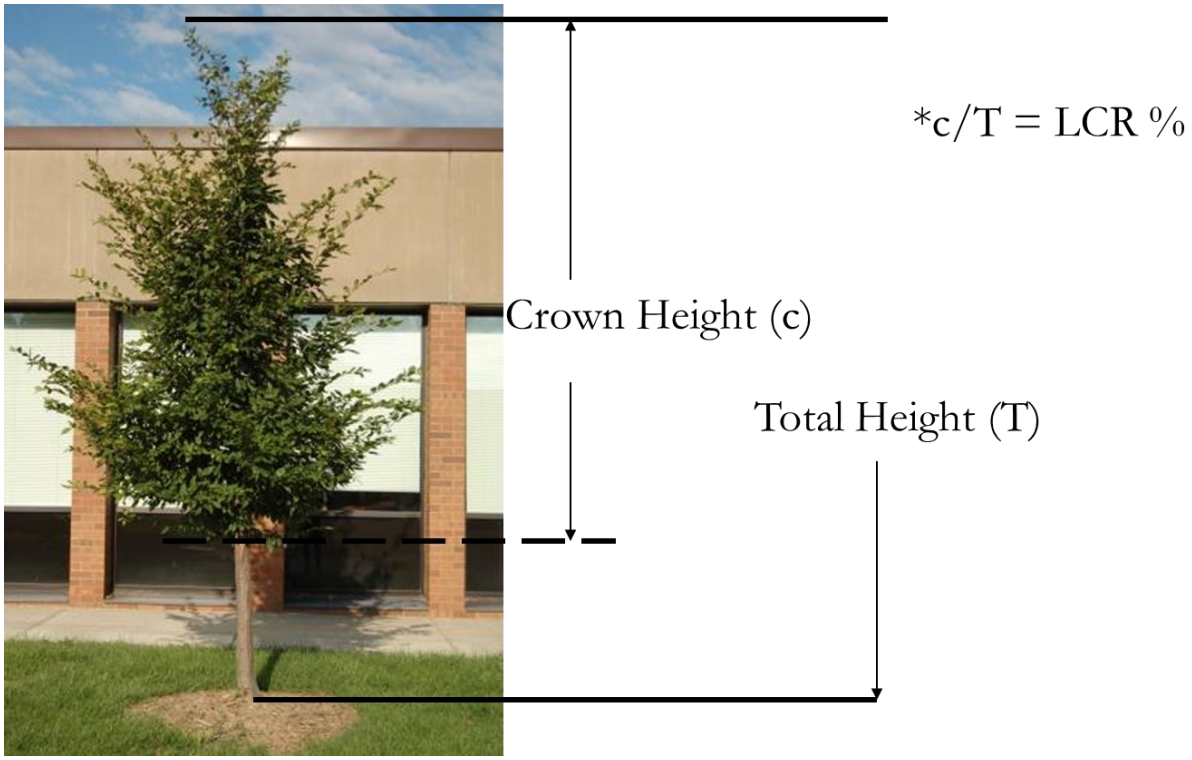
**Leaves**: opposite, simple, 3-6" long, 3-5 pointed lobes; "U" sinuses, coarsely toothed margins.

**Twigs**: brown, pointed buds. **Fruit**: 1-1¼" long, paired; horseshoe shape, green turning brown.

**Bark**: Young gray/brown and smooth; Becomes dark and deeply furrowed when older.

# Fundamentals of Pruning

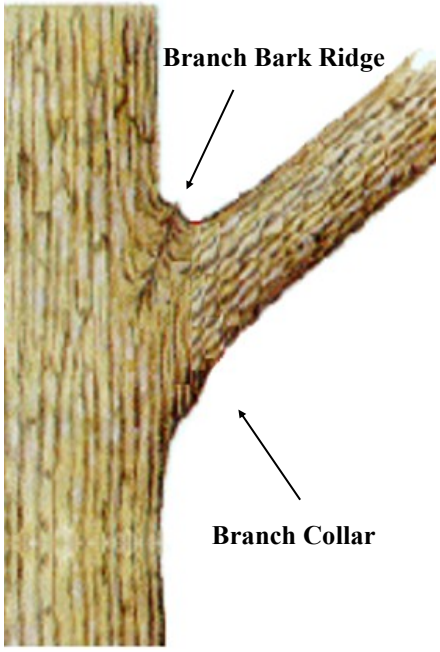
1. Always keep a good Live Crown Ratio. This means that for deciduous trees 60% of the tree should contain a living crown, and for coniferous trees this means 75% should be in Live Crown
2. Never remove more than 25% of the trees Live Crown in one pruning season.
3. When pruning, aim to create a symmetrical canopy.




## Pruning Branch Material

First identify the branch collar, the area of swelling. This may be hard to find with sprouts as they will often swell where there are several small sprouts in one area. The branch collar is more noticeable on a larger branches. Prune sprouts and branches just beyond the branch collar because it makes a smaller, more sealable wound that does not injure the main stems cambium.

Sharp tools make the best pruning cut on a tree. Prune small sprouts and branches with a pruning shear. If the sprout or branch is too large for bypass pruners, use the three-cut method with a pruning saw to prevent bark ripping.



## Pruning Branch Material

**How to prune branch material (sprouts, included bark, etc.) that is less than 1 inch in diameter:**

- Hand support the end of branch away from the tree stem to stabilize the branch as you make your cuts
- Identify branch collar.
- Place pruning shears just outside of branch collar with the sharp end of the blade on the underside of the branch material..
- Apply pressure through squeezing handles.
- Once blades cut all the way through, place branch material in pile facing pruned ends in the same direction.

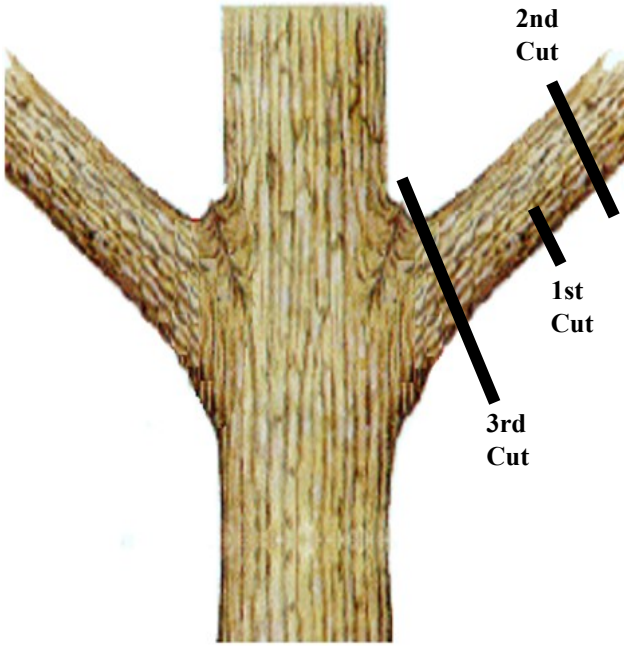
***Image: Sprouts on Ulmus (Elm)***

**How to prune branch material (sprouts, included bark, etc.) that is 1 to 2 inches in diameter:**

- Hand support the end of branch away from the tree stem to stabilize the branch as you make your cuts.
- Identify branch collar.
- Proceed using the Three-cut method.

*Three-cut method:*

1. With your handsaw make a shallow cut on the underside of the branch 1 or 2 feet out from the branch union.
2. Make a top cut all the way through the branch slightly farther out than the first cut to leave a short stub.
3. Remove the stub by cutting just outside the branch collar, perpendicular to the direction the branch is growing



## Pruning Branch Material

**How to prune branch material (sprouts, included bark, etc.) with a pole pruner:**

- Identify the branch you want to prune, making sure it is not too large for the pole pruner. Do not cut anything too large, as doing so may break the pole pruners.
- Identify the branch collar.
- Do not stand directly below the branch that you are cutting. Make sure that you stand off to the side of where you are cutting so the branch doesn't fall on you.
- Place the branch between each shear of the pole pruner.
- Make sure that your placement of the shears will make an appropriate cut for the branch.
- Pull sliding handle or rope towards you to make the cut.
- Review the cut made and amend if needed.

***Image: Pole pruning of a co-dominant leader on Acer (Maple)***

## Reduction Cut

Pruning to a node is used when pruning out deadwood or when making a suppression cut, also known as a reduction cut. A reduction cut shortens the stem back to a lateral branch or to a node. Future growth is forced into the unpruned branches.

**Pruning back to a node**

## Poor Pruning

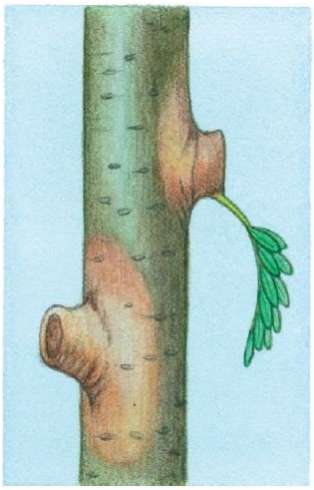
Bark ripping can occur when the three-cut method is not used to remove large branches. This often happens when the pruning cut is made by starting the cut on the top side of the branch. The branch fails because it doesn't have enough support, causing the bark at the base of the branch to tear.

Flush cutting occurs when a pruning cut is made close to the stem and removes part of the stem's living tissue. This inhibits the flow of water and nutrients up the stem, and can affect branch development in the canopy and will lead to decay.

Stub cutting occurs when a branch is pruned too far outside the branch collar. It takes longer for the tree to grow new wood and bark over the wound.

**Bark Ripping**

**Flush Cutting**



**Stub Cutting**

## Compartmentalization of Decay in Trees

Compartmentalization of Decay in Trees (CODIT) is a complex tree process to prevent the spread of decay and disease. Trees do not heal like humans. Instead of healing an injury, a tree will compartmentalize it. Even though pruning is beneficial to the tree, pruning is still considered an injury.

Compartmentalization is a unique way trees plug up their vascular system to prevent the transport of diseases and decay in the stem. This plugging also prevents the transport of water and nutrients. Some trees species are better at compartmentalizing than others.

Pruning a tree leaves an open wound. If pruned correctly, the wound will compartmentalize and new growth will form over the wound quickly.

# Types of Removals from Trees

Citizen Pruner volunteers are tasked with removing sprouts, suckers, deadwood, and leftover tree stem protection systems. It's not only important to correctly identify and remove them, but also know why they form and are used.

## Stem Protection Systems

Tree stem protection systems are used to protect the tree's stem from physical damage. Weed whips, lawnmowers, animals, and herbicides commonly cause physical damage to tree stems.

Even though the intent of tree stem protection systems is to protect the tree, they can be damaging if secured incorrectly or left on too long. Stem protection applied to tightly or left on too long can compress the stem. This can restrict water and nutrient uptake, and constrain normal flow through the stem.

Stem protection systems should be removed when they are tight to the stem. When removing any stem protection systems, keep them separate from the pruning debris.

Remaining string/rope ties and ID tags should be identified and removed within a timely manner. Be sure to check with the city first to ensure that they have recorded the species into their inventory data before continuing.

## Mulch Volcanoes

Mulch volcanoes happen when mulch is piled too close to the stem of the tree to the point where it looks like a volcano. This is not healthy for the tree and can create an environment that promotes stem girdling roots, insects, and diseases.

Mulch should be moved away from the stem so that the mulch is no longer touching the stem. Use your hands to move the mulch so that it creates a ring around the stem like doughnut.

## Sprouts

A sprout (or watersprout) is a fast-growing, often very upright branch that emerges from the tree trunk.

Not only can sprouts block site lines, creating safety issues for drivers or pedestrians, they can also be a disadvantage to the tree. Sprouts form weak branch unions because they are more shallowly attached than branches at a normal branch union. Large sprouts have a greater potential to fail because of their weak branch union attachment.

***Image: Sprouts on Tilia (Linden)***

## Included Bark

Included bark is when bark grows in between a branch union which prevents the branch from attaching correctly to the trunk or another branch.

Since bark is growing between the union, woody material is unable to attach the branch correctly. This creates a weak union which is more likely to fail, causing it to fall.

***Image: Included bark on Malus (Apple)***

## Co-Dominant Leaders

The term co-dominant leader is used to describe two or more main stems that are about the same diameter and emerge from approximately from the same location on the trunk.

The closer in size a branch is to the main stem, the more likely it is to fail. Co-dominant leaders are similar in size and competing for dominance, they are all closer in size to the main stem and are thus more likely to fail.

**Choosing a leader:**

First you must choose which leader to keep. Look for leaders that are central to the stem, and straight in nature. Also be aware of leaders that have the best structure with good branch attachments. Once you've chosen the leader, you do not need to completely remove all of the competing leaders, but the ones you do not remove you should suppress using a reduction cut (see page 22).

***Image: Co-dominant leader on Acer (Maple)***

## Crossing/Rubbing Branches

Crossing or rubbing branches occur when two separate branches begin to collide with one another.

Crossing or rubbing branches can injure bark and other living tissue on the branch, which makes the branch more prone to decay or disease.

***Image: Rubbing branch on Malus (Apple)***

## Good Branch Spacing

The vertical space between branches should eventually be 12 inches for fruit or small stature trees, and 18 inches or more for medium and large stature deciduous trees (this spacing does not apply to coniferous trees).

Good branch spacing is important for future growth of the tree. As branches increase in size, it's more likely they will grow into each other if not properly spaced. Without proper spacing, it's more likely that branches will begin to cross or rub.

***Image: Poor spacing on Malus (Apple)***

## Deadwood

Deadwood occurs for a number of reasons and is easily identified during leaf out. Use either a bypass pruner or pruning saw to remove deadwood at the branch collar. Use the three-cut method if the branch is large.

When pruning branches with deadwood and live wood, prune only deadwood and save as much of the live wood as possible. The deadwood on a live branch should always be pruned back to a node.

**Before**

**After**

## Temporary Branches

Trees grow outwards, not upwards, so branches that you see now will remain at the same height until you or a storm remove them. Trees need to be pruned up to clear space for cars and trucks to drive through. Different streets vary in their requirement of clearance levels, but the average is 14.5 feet in height. Temporary branches can be removed at any point in a trees life. Use your collective group judgment to decide whether temporary branch removal is necessary at this time.

***Image: Temporary branch on Malus (Apple)***

## Suckers

Suckers that form below the soils surface should be pruned as close to and as parallel with the ground as possible. Suckers that form on the base of the trunk should be pruned similarly to sprouts.

Prune small suckers growing out of the trunk's base with bypass pruners just outside the branch collar or area of swelling. If the sucker is large and is growing out of the base of the trunk, use the three-cut method to prevent bark ripping. There is no need to use the three cut method on suckers growing out of the ground because there is no risk of bark ripping. Whenever possible, saw away from the trunk to lower the risk of injuring the stem.

If you come across a pruning cut done improperly and the tree collar has grown along a branch stub, remove only the dead stub that extends beyond the collar.

## Citizen Pruner Field Form

| City Name (of pruning event): | | | | | | | Start Time: | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Group Member Names & CP Numbers: | | | | | | | End Time: | | | |
| | | | | | | | Date: | | | |
| | | | | Please check off if you conducted any of the following removals: | | | | | | |
| Tree # | Address | Species | Location Description (Boulevard, park, etc.) | Materials (wraps, tags, string, etc.) | Mulch | Suckers/ Sprouts | Light Pruning (broken/damaged/ low branches) | Developmental Pruning or Temporary Branches | Deadwood | Crossing/ rubbing branches |
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# Appendix B

Tree Owner's Manual
Download your free copy at:
www.treeownersmanual.info

University of Minnesota Department of Forest Resources

# Minnesota Tree Care Advocate

People Helping Trees Help Communities

# Minnesota Tree Steward

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

**Acknowledgements**

Gary Johnson

Michael Bahe

Calli Cloutier

Sam Graf

Alex Miller

Ryan Murphy

Monica Randazzo

Ashley Reichard

*Urban and Community Forestry*

*Volunteer Programs Coordinator*

Updated on April 2019

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# Tree Steward Program Overview

## Tree Steward Program History

Minnesota Tree Steward is a community-based program designed to increase local capacity by working with municipalities and engaging citizens in community forestry. Tree Steward Program volunteers are trained in a range of topics predetermined by their community. Tree Steward training can include but is not limited to: best planting practices, watering devices and community practices, pruning suckers and sprouts, developmental pruning on young trees, monitoring tree health for disease, defects, and pests.

Renewal competency assessments will be available online or through postal mail at no cost. Recertification is issued every three years to ensure you are up to date on information.

Tree Stewards are an asset to their community in that they are trained to engage in many types of tree care activities within their communities and assist in teaching others within their community these skills. As municipal budgets continue to be cut, the aid from citizens becomes increasingly more important to communities. Tree Stewards are the second pair of eyes in their community.

## Code of Conduct

Tree Steward volunteers serve at the discretion of the Tree Steward Program. Just as it is a privilege for the Tree Steward Program to work with volunteers who offer their time and talent, volunteer involvement in the program is a privilege and responsibility, not a right.

The purpose of the standards of behavior is to ensure the safety and well-being of all Tree Steward participants (i.e. target audiences, staff, other professionals, volunteers) and to ensure a positive, enjoyable experience for volunteers.

Tree Steward volunteers will:

- Uphold volunteerism as a way to meet the urban forestry needs of Minnesota
- Represent the program with dignity and respect by being a positive spokesperson for the program and the city
- Be courteous, civil, and respectful.

Failure to honor these standards can result in Tree Steward status removal. The program director must authorize any termination.

Resolution of the conflict may lead to reinstatement, reinstatement with limitations, reassignment of volunteer duties, or removal from the program.

### Program Staffing

- Gary Johnson - Director: directs and administers the program; oversees development and delivery of education and program operations. Contact: johns054@umn.edu
- Ashley Reichard - Volunteer Program Coordinator: organizes and relays program information to volunteers from the University of Minnesota. Contact: info@mntca.org or 612-625-2361

### Communications & Resources

- MNTCA Website - program specific information and reporting hours (www.mntca.umn.edu)
- UMN Trees - additional resources for volunteers (trees.umn.edu)
- UMN Headquarters - 115 Green Hall, 1530 Cleveland Avenue North, St. Paul, MN 55108-6112

# Program Guidelines, Policies and Procedures

### Minimum Age Requirement

Participants in the Tree Steward program must be 18 years or older, confirmed with a valid photo I.D. or have signed parental consent.

# Data Collection & Reporting Hours

Data collection by Tree Stewards is crucial. Data is used to generate reports that are given to stakeholders and municipalities. Tree Stewards are expected to help collect data at municipal hosted events and to record personal hours dedicated toward Tree Steward activities outside of scheduled events.

Data collection forms are given to each group of Tree Stewards at the start of a volunteer event. One volunteer from each group collects data. The data collector should have legible handwriting, and must be accurate and concise.

Once data is collected in the field, the original paper form will be given to the city contact overseeing the event for them to provide to the program coordinator. See the data collection example in Appendix A.

Tree Steward hour requirements can be fulfilled by any event related to trees. Reporting of volunteer hours is through the Volunteer Hours Reporting Page, available at: http://mntca.umn.edu/resources/education-volunteer-hours-reporting

# Public vs. Private Property

Public property delineation in boulevards are typically within 10-15 feet of the curb, but this can vary greatly from street to street. If it's questionable whether a tree is on public or private property, ask city staff. This applies primarily to pruning and watering trees.

# How To Work with the Public

The public is interested in what volunteers are doing. Provide a courteous explanation about the Tree Steward Program and the partnership between the county and the University of Minnesota. Many people are concerned and care deeply about trees, especially if it is right in front of their home. Most people are positive, a few may be negative. It is important to remember that you are an ambassador for your county and the Minnesota Tree Steward Program. Being in the public's eye allows volunteers the opportunity to share about the program and recruit new volunteers to help care for the public trees.

Show your Tree Steward ID to anyone who questions what you are doing, and explain that you have taken a course and a competency assessment for certification. Inform them that what you are doing is helping the trees and emphasize that you have been authorized by your county to assist in this regard. Thank them for their concern, as we need more people who are concerned about the public's trees. If a citizen exhibits resistance to your activities, discontinue your work and move to another location if possible. Note the location you discontinued work and inform your city contact of the interaction.

The public will see you as a source of knowledge and may ask you to look at their own tree. Do not answer questions about private trees. This could be a liability to volunteers and the program, and can infringe on private industry. In a courteous manner explain to them the Tree Steward Program, and the partnership between the city and the University of Minnesota. Recommend they contact a Certified Arborist and provide them with the Tree Owner's Manual card (see Appendix B).

All questions involving public property, including trees and infrastructure, should be directed to the city. If possible, provide the citizen with the appropriate city contact information.

# Safety

There are a number of safety regulations in place for the safety of volunteers, citizens, and the protection of surrounding infrastructure. Volunteers are expected to follow all of the regulations set by the Tree Steward Program and by the county. If the Tree Steward Program discovers that safety precautions are being disregarded by any volunteer, Tree Steward status will be suspended. The volunteer will be immediately placed on temporary inactive status and may be placed on permanent inactive status following decisions made by the city contact and the program director.

Pruning specific safety regulations:

- Only branches within arms reach, while both feet are firm on the ground, may be pruned. Pruning anything above that is prohibited. A rule of thumb is to only prune within 6.5 feet from the ground. Any low hanging branches that require the attention of the city should be reported to Jen Kullgren.
- Branches removed from the tree should be approximately 2 inches in diameter at the branch collar ridge or smaller. A good way to approximate this size is by wrapping a hand around the branch; it is the right size to remove if thumb and fingers touch.
- Electricity can flow through branches, so never prune trees/branches that are within 10 feet of utility lines.
- Never get on a ladder - if pruning cannot be done with both feet on the ground, do not do it.
- Be aware of your surroundings.
    - Sometimes you won't be able to make pruning cuts without stepping into the street. If you are on a street that is not busy, you may have a group member watch for cars while you make a proper cut.
    - When you are pruning, or others are pruning around you, make sure that you or others stand clear of the branch drop zone. Even seemingly small branches can injure a person.

# Dress Code

- Wear city supplied safety equipment at all times, this includes but is not limited to protective eyewear, helmet, high visibility safety vests, etc.
- No open toe shoes
- No offensive clothing (e.g., too revealing, offensive graphics or words)

# Managing Pruning Brush

Manage brush so it is safe for citizens and convenient for the county. Keep brush cleared from all sidewalks, out of the street, and at least 10 feet away from any fire hydrant. Maintaining brush in a courteous and safe manner is crucial.

Following a volunteer event, the county will haul the brush away.

Make as few piles of brush as possible. For ease of handling brush, stack the brush with the pruned end of the material facing the street or easiest access point. If brush is too large to fit with the pruned ends of the branches facing the street or access point, cut the brush into smaller pieces or, turn the brush pile parallel with the street while keeping the cut ends together.

*Figure 1. Proper brush management.*

# Tree Anatomy

## Basic Tree Anatomy

**Leaves:** Leaves are responsible for carrying out photosynthesis which creates food for the tree and releases oxygen into the air.

**Branches:** Branches and twigs are the support structures for the leaves, flowers, and fruits. They are also responsible for transporting materials between the trunk and leaves.

**Trunk:** The trunk consists of multiple layers: outer bark, inner bark, cambium cell layer, sapwood, heartwood and pith.

**Outer bark:** This is the outer protection that keeps the inner soft wood from damage.

**Inner bark (or phloem):** This is the area in which food is transported throughout the tree.

**Cambium cell layer:** This produces the new bark and new wood of the trunk.

**Sapwood:** This is the new wood of the tree and is responsible for moving water throughout the tree.

**Heartwood:** This is the central, supporting pillar of the tree composed of lignin and cellulose for structural purposes.

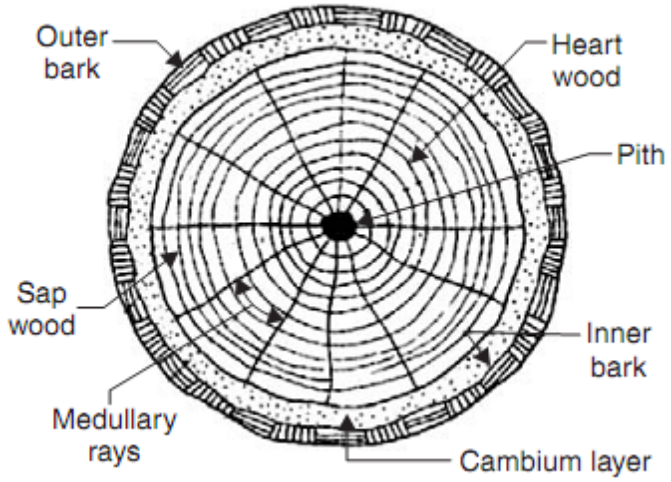



*Figure 2. Cross section details of a tree*

http://signaturetreeservice.blogspot.com/2014/06/anatomy-ofredwood-oak-tree-exogenous.html

**Pith:** This is the central core and oldest part of the tree.

**Roots:** Roots are typically in the top three feet of soil and expand well beyond the dripline (the area two to four times the size of the tree crown). There are two main types of roots:

**Structural Roots:** These roots are larger, woody roots that exist mainly to stabilize the tree and provide structure.

**Fine Roots:** These small roots and primarily utilized by the tree to transport water and nutrients from the soil to the rest of the tree.

# Types of Planting Stock

## Balled and Burlapped Stock

- Often more mature than other stock varieties; always more expensive as well
- Soil ball is encased with burlap and held together by a wire basket and string
- Important to cut and remove as much wire and burlap around the stem as possible before and during planting
- Remove any and all twine and/or string from packaging , especially any touching the trunk of the tree.

*Figure 3. Balled and burlapped tree stock.*

It is important to keep note of whether the burlap is treated or untreated, as you will want to remove as much of the copper treated burlap as possible. Copper treated burlap is used because it is meant to last longer and will not decompose as quickly as traditional burlap. Research conducted at the University of Minnesota found that untreated burlap on average decomposed in 12 weeks, while copper treated burlap on average decomposed in 13 months. Finally take extra care to remove all twine from around the trunk of the tree to allow the plant room for growth and to avoid stem girdling.

*Figure 4. Potted tree stock.*

## Potted/Bagged Stock

- Grown in a container most of its life
- Can be planted any time of the growing season
- Root systems may be deformed due to container restriction resulting in:
  - Stem Girdling Roots: encircling roots around the tree trunk/stem causing stem compression
  - Rootbound Stock: roots growing in a spiral around the soil ball

With many containerized trees, deformed root systems can be remedied by utilizing the box cut method (see page 14). A new technology, the architectural pot or air-pruning pot, is a container that has holes to allow for oxygen to meet the root ball. When the oxygen meets roots that are growing out or around the container, the roots will die off at that location. When you plant the tree, less action will be needed to remedy deformed root systems.

## Bareroot Stock

- Available during their dormant season, typically in early spring before plants have leafed out
- Competitive process to obtain the desired species of bareroot stock due to high demand
- A less expensive stock variety than balled and burlapped and containerized
- Have robust root systems when planted out of a gravel bed
- Lack a soil ball (but utilizing gravel beds can form a healthy root system comprised of many fine roots which help in establishment once planted)

It is important to remember that transplant shock may occur more often for this stock type as removal from gravel beds may cut or tear roots. When transporting this type of stock it is essential to keep the roots moist and protected from the sun and wind, as they come without any soil around the roots. In order to do so, utilize damp burlap or plastic bag and hydrogel substances (see page 19) and plant as soon as possible.

*Figure 5. Bareroot stock samples.*

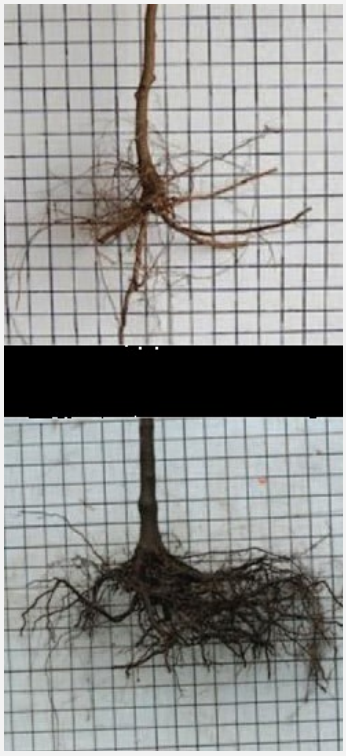


*Figure 6. Pre gravel bed root culture.*

*Figure 7. Post gravel bed root culture.*

# Gravel Beds

A gravel bed is an irrigated bed or pile of gravel where bareroot or washed containerized stock is placed and safely held for up to 3-6 months. This temporary system has been in use at commercial nurseries, municipalities, and universities for over 20 years. There are many communities in Minnesota that have built and are currently using the gravel bed system with great success.

In a gravel bed, the above ground portion of the tree will not grow any faster than normal. The purpose of the gravel bed is to increase the fibrous root system, prepare for planting at a later date and recover poor root systems.

*Figure 8. Plymouth gravel bed.*

*Figure 9. North High School gravel bed in Minneapolis.*

## Advantage of a Gravel Bed

- Gravel beds save the community money as bareroot stock is typically 1/2 the price of containerized trees and 1/4 the price of balled and burlap trees and installment costs are eased with bareroot stock .
- Gravel beds aid in plant health and survival, as increased fibrous root systems formed in the bed allow for an increased intake of water and nutrients which then reduces potential transplant shock.
- Gravel beds allow for fall bareroot planting which then allows tree roots to establish in more favorable conditions.
- Gravel beds increase species availability because there are typically more species available as bareroot stock than in containerized or balled and burlap stock.
- Gravel beds provide great opportunities for community members to get involved in planting. Bareroot trees can be planted by everybody as they are easy to carry and do not require excess manpower or machinery to dig holes.

# Preparing for Planting

## Site Selection

When planting, it is important to select or prepare a proper site in order to provide the best environment for the tree. Some trees do well in sites that may be unfavorable for others. It is important to know what your site is beforehand so that you can pick the best tree for it, or modify the site. More information regarding site selection can be found in the Tree Owner's Manual.

When considering where to plant, keep in mind the following:

- The location:
  - Are there utilities overhead or underground? Contact: http://www.gopherstateonecall.org/
  - Is there enough room for root growth and expansion?
  - It the soil too compacted?
- The cold hardiness zone:
  - Which hardiness zone are you planting in?
- The soil drainage:
  - Does the soil drain slowly or quickly?
- The soil pH:
  - Is the soil more acidic, or more alkaline?
  - Soil testing for lawns & gardens can be done through the University of Minnesota. See: http://soiltest.cfans.umn.edu/testing-services/lawn-garden
- The sun exposure:
  - Is the site fully sunny, partly sunny, mostly shady?
- Compaction:
  - Is the soil a heavy clay or compacted due to equipment/vehicles?
  - You can remedy compaction issues by combining the existing soil with compost to create air space and soil that is easier for roots to penetrate.

## Stock Selection

When selecting a type of stock, keep in mind the pros and cons of each kind of stock, as well as who will be conducting the planting and what equipment will be used.

## Species Selection

When considering which species to plant, it is important to consider the preexisting trees in the area. Diversity in both species and age creates a healthy urban forest as it creates resiliency in the landscape. Planting a variety of species can help protect against widespread loss due to pest, disease, or wind loading events that may affect one species more than another.

## Removing Excess Soil

It is also important to remove excess soil and avoid planting too deep in order to prevent sucker formation and stem girdling roots. A study at the University of Minnesota found that 87% out of 881 balled and burlapped and containerized trees sampled were planted with 2+ inches of excess soil.

If the first main lateral root, or main order root, is not visible, you need to determine how much soil rests on top of it. To find the main order root, you can take a surveyor's arrow or food skewer and poke around the stem of the tree until you find the shallowest root. This is likely the main order root.

Once you find your first main order root, you can remove excess soil to that point either with your hands or by taking a hand saw to shave off the excess soil. Be careful not to injure the tree by cutting into the first main order root or stem as you correct depth.

*Figure 10. Checking first main order root depth.*

*Figure 11. Removing excess soil above roots.*

## Boxing

With many containerized trees, deformed root systems can be remedied by utilizing the box cut method. To perform this method, make vertical cuts on the sides of the ball about one inch toward the stem at the thickest part of the cut to sever the majority of encircling or entangling roots. Additionally, make a criss-cross cut across the bottom of the ball or slice off the very base of the root ball to ensure that there are no additional dysfunctional roots and no J-roots (roots that point downward and then bend back up toward the main stem of the tree) forming that could come in contact with the tree's stem. Performing this cutting method removes roots that may become a problem for the tree as it matures.

*Figure 12. Example of a cut when boxing.*

# Planting & Tree Stock Preparation

## Transporting a Tree

Keeping roots moist is important during transportation as moisture keeps the tree alive and helps the tree establish quickly. Wrap the soil ball or container in a tarp or large plastic bag to trap moisture until planting time. If transporting bareroot trees, the roots should be covered with mulch, sawdust, burlap, or other moisture holding medium (such as hydrogel) and wrapped in a large plastic bag or tarp to trap moisture until planting time. Bareroot trees should be planted as soon as possible after they arrive home to ensure roots do not dry out.

If transporting trees in leaf in the back of an open pickup or trailer, it is recommended that the canopy be wrapped in burlap or an old sheet and tied loosely closed to prevent wind damage to the leaves. You want to prevent further stress on the tree than is necessary.

## Balled and Burlapped trees

1. Cut and remove the wire and burlap from the top of the soil ball and around the trunk to check for excess soil over the first main lateral root; remove excess soil if present.

2. Measure the depth of the tree's soil ball and dig a hole that will fit the soil ball with the first main order root placed at the soil surface. This can be tested by placing the soil ball in the planting hole and laying a shovel over the hole to make sure the first main order root is level with the soil surface.

3. Place the tree in the planting hole. Cut and remove as much of the wire basket and burlap containing the soil ball as possible without allowing the soil ball to fall apart.

5. Begin to backfill, keeping the tree straight and the first main lateral root within 1 inch of the soil surface.

6. Finish filling the hole with soil, watering slowly and intermittently to remove air pockets in the backfill.

*Figure 13. Removing burlap and string.*

https://www.youtube.com/watch?v=bek6ggGIcmU

*Figure 14. Watering intermittently during planting.*

## Containerized trees/shrubs

1.Check the planting depth of the containerized tree to make sure there is no excess soil above the first main order root. If there is excess soil, remove it at this time (see page 14).

2.Check for deformed root system issues (potbound or encircling roots). If there are root issues, correct them at this time (see page 14).

3.Dig a hole that will fit the soil ball with corrections. Measure the distance from the first main lateral root to the bottom of the soil ball to determine the hole's depth and ensure that the first main lateral roots are within 1 inch of the soils surface.

4. Once the planting hole is prepared, remove the tree or shrub from the container by lifting it up by the stem and tapping down on the rim of the container.

5. Begin to backfill, keeping the tree straight and the first main lateral root within 1 inch of the soil surface

6. Finish filling the hole with soil, watering slowly and intermittently to remove air pockets in the backfill.

*Figure 15. Checking main order root depth.*

*Figure 16. Using the container to support box cutting.*

*Figure 17. Checking level of main order root with soil line using a shovel.*

## Bareroot trees/shrubs

1. Keep roots of bareroot trees and shrubs moist and protected at all times prior to planting. Prepare planting hole for each plant before removing it from it's protected, moist site.

2. Prepare a hole that is large enough to spread the roots without crowding and deep enough so the first main lateral root is within 1 inch of the soil surface. Rough the sides of the hole to be sure they are not glazed from digging, which can form a barrier for water and roots.

3. Examine the stock and prune away any diseased or damaged roots or branches.

4. Place the roots in the hole at a level so that the first main order root will be at or within 1” of the soil surface.

5. Backfill the soil into the hole a few inches at a time, firming the soil after each addition. While backfilling, be sure the plant remains vertical and centered, and be careful not to damage roots. Use water to settle the soil around the roots while backfilling. Gently raise and lower the plant while adding soil to eliminate air pockets. In loamy soils, use your foot to press down the soil to eliminate extra air pockets.

6. Finish filling the hole with soil and then water thoroughly.

*Figure 18. Bareroot stock from a gravel bed prior to planting.*

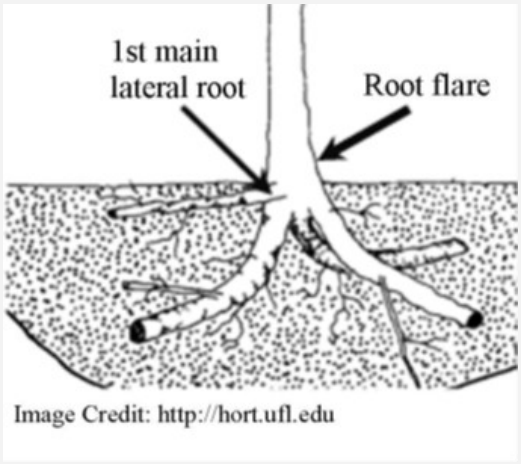



*Figure 19. Bareroot stock from a gravel bed prior to planting.*

*Figure 20. Eliminate air pockets by packing down mid backfill.*

# Additions

## Amendments

In some instances soil amendments, such as compost, composted manure, peat moss, coir, leaf mold, and other plant or animal remains or waste products may be necessary in order to provide a tree with the adequate level of macro and micronutrients and/or water retention. In most instances, this is not necessary when planting a tree. However, soil amendments are a great option when you have poor or compacted soils that need some remediation.

## Fertilizers and Nutrients

Fertilizing is not necessary for all trees, but can be helpful if your tree is experiencing long term issues. The best indicator of whether or not fertilizing is necessary is to conduct a soil test (see page 14). In the absence of a soil test, an examination of shoot growth (the growth occurring in the present year) can be done. When fertilizing, make sure to apply in the early spring before the growing season begins in order to increase the amount of available nutrients for the tree. Fertilizer can be applied uniformly over the surface, and watered in, or uniformly placed in holes around the plants. Phosphorous and potassium can be applied in the fall as they will enhance winter acclimation.

## Hydrogel

Hydrogel can be helpful when planting new trees. Hydrogel is a network of highly absorbent polymers that absorb and retain up to 500 times their weight in water. When transporting bareroot stock, hydrogel can be applied in order to help retain moisture until the new tree is planted. Dipping the roots in a hydrogel “bath” before transporting the trees prevents the roots from dying out.

# Post Planting Care

## Mulch

Adding mulch around the base of the plant is a very important part of plant care that is often overlooked. By mulching plants, a more favorable environment is provided for the tree roots. Mulching allows better infiltration of water, holds soil moisture, limits weed growth, and discourages injury from lawnmowers and weed whips. Make sure to keep the mulch off the trunk, and avoid mulch "volcanoes."

Lay mulch around the tree that is roughly 2-4 inches deep at the widest point, 2-4 inches or more away from the stem and in a doughnut shape. Keep the mulch off of the tree trunk to prevent stem girdling roots from forming and to prevent insects and critters from hiding in the mulch next to the trunk and harming the tree.

*Figure 21. Improper mulching.*

*Figure 22. Proper Mulching.*

## Stem Protection

What does stem protection do?

- Helps prevent unintended damages to the stem
- Provides protection to trees during the harsh winter months
- Deters animals from damaging the stem

There are many materials that can be used as stem protection, but most are plastic tubing that is wrapped around the stem of the tree. The stem protection device should cover the entire circumference of the tree without tightly touching the stem, as this can eventually girdle the tree if left on too long. Finally, make sure the stem protection is on your tree by early to late fall and removed promptly in the spring.

*Figure 23. Improper stem protection that was left on too long.*

## Grow Tubes

Grow tubes may be used when working with seedlings as they act as stem protection while also aiding in tree growth. Grow tubes act as greenhouses as they allow UV light to pass through the tube, giving the seedlings enough sun and warmth for photosynthesis, which then promotes tree growth.

Grow tubes are typically installed with fiberglass stakes (these stakes are flexible, easy to install, and easy to remove) and rubber ties (prevent slipping and provide movement).

Grow tubes are typically used on very young trees and will stay installed for multiple years while the tree builds up enough woody tissue and size to support itself throughout the rest of its life. When the tube outgrows the tube, simply cut it off and recycle it.

*Figure 24. Grow tubes installed on for seedling planting.*

## Stakes

Staking a tree is only necessary if the tree is prone to leaning or falling. If you need to stake your tree, limit the number of stakes used and only keep them on the tree for one growing season, unless it is absolutely necessary to keep on longer. Typically staking is only necessary for trees planted in open, windy sites, in loose soils, or if the stock planted is bare root and has not had time to build up a dense root system in a gravel bed.

When staking, your first attachment and stake should be placed on the windward side of the tree to counter push from the wind. If a second stake is needed, place the second one on the leeward side of the tree to counter movement back and fourth. If more support is needed, a three-stake system can be utilized.

Attachments should be two-thirds of the distance from the ground to the first branch and stakes should be driven deep into the ground for stability. It is best to use wide materials such as canvas burlap or an old bicycle inner tube to loosely attach the stakes to the tree. This allows the tree to move slightly without damaging the bark. Do not use thin string or wire as it can easily damage and girdle the tree.

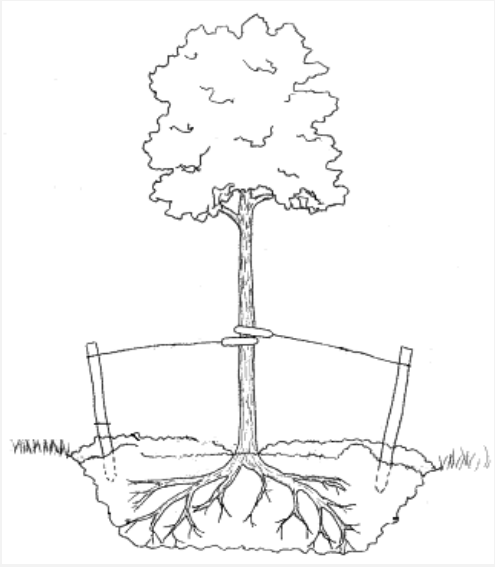


*Figure 25. Proper use of the 2-stake method.*

## Ties and Strings

It is important to remove all ties and strings when planning in order to avoid girdling the stem. Although some ties and strings may break down more quickly than others, and therefore may not cause any long term stem issues, it is best to be proactive and protective, removing all constraints from the start.

*Figure 26. Girdling as a result of string being left on a tree too long.*

## Stem Girdling Roots (SGR)

Stem girdling roots are roots which grow against or around the stem of the tree. As the tree increases in size the roots expand and compress the stem. This is commonly unseen as it is most likely to take place under the soil or mulched surfaces. This compression prevents water and nutrients from being transported through the tree and can cause the tree to decline prematurely. SGR may lead to tree failure during storms or high winds.

*Figure 27. A dysfunctional root system that would eventually grow to girdle the tree.*

### Why are SGRs a problem?

- They can create safety hazards, as a poorly anchored tree is more likely to fail and fall during a wind loading event, which can cause damage to the surrounding homes, sidewalks, or utilities.
- They create economic losses as they require more care and inspections for a property owner, and a failure may create additional and unexpected costs.
- They can reduce the relative health of affected trees, making the trees more susceptible to drought, disease, and pests.

### How do SGRs form?

- Can form due to improper planting depth
- Can form due to genetic predisposition, as is the case in Norway maples, ashes, lindens, other maples, crabapples, and hackberry.

### How to identity SGRs

- Look for unusual leaf color and/or size, scorched leaves or unusual leaf drop.
- Look for early autumn color, dieback, a thinning canopy density, and stagheading in the canopy.
- Look for leaning stems, lack of a stem taper, cracking of the stem or bark, or secondary invaders (wood boring insects or fungal cankers) in the stem.

## Post Planting Care

### How to prevent SGRs?

- Do not plant trees too deep.
- Inspect all containerized, and balled and burlapped trees to make sure they aren't planted too deep.
- Inspect a trees root system that may be growing around the stem and prune them out before planting.
- Box cut trees that are showing signs of a pot-bound or potential girdling situation (see page 15).
- Do not pile mulch against the stem of the tree.
- Continually monitor the stems of your trees (e.g. once a year).

*Figure 28. Girdling roots as a result of a tree planted too deep (see soil line on stem).*

### How to fix established SGRs?

Compared to prevention, there are few choices for treating trees with stem compression from girdling roots. The reality is that prevention is much more effective and successful than treatment of SGRs. If the roots are not yet contacting the stem, simply prune out the roots before they have the chance to cause compression. Removing them now at inspection time with a pruner or saw will prevent those future problems.

If stem compression has already occurred, there is often not much that can be done, depending on the severity of the compression. The tree may live for a long time with the girdling root imbedded in the stem. Removing the girdling root may involve the removal of an extensive branch root and the fine root system and the decline in health could actually be accelerated. If the removal or pruning of SGRs requires more than hand tools, you should seek professional advice before attempting any treatments to the trees.

# Watering Newly Planted Trees

## Tree Watering Needs

Newly planted trees require routine watering. Thoroughly water the tree at the time of planting with approximately 10-15 gallons of water. Continue to water your tree, until established, once or twice a week for a total of 10+ gallons per week. If the tree is receiving an inch or more of rain per week, then watering is not necessary . Stop watering in the fall once the ground freezes and the tree goes dormant.

Examine the soil moisture to a depth of 4-8 inches to determine the need for water. If the soil feels dry or just slightly damp, watering is needed. Soil type and drainage must also be considered. Well-drained, sandy soil will need more water compared to a clay soil that may hold too much water. A slow trickle of the garden hose at the base of the plant for several hours or until the soil is thoroughly soaked is the best method. Short, frequent watering should be avoided as this does not promote deep root growth but rather, the development of a shallow root system that is vulnerable to several environmental stresses.

## Cost of Watering

The overall cost of watering is ultimately dependent on the type or tree, age of tree, placement of planting, and weather and other natural conditions. To find out how much water is necessary for your tree and the overall cost, see http://mntca.umn.edu/resources/reference-materials .

## Devices for Watering

- **Water bags:** Water bags, depending on size, can hold up to 20 gallons of water that slowly release into the soil around the tree. You zip these bags on to secure. However, they must be removed in the winter, so critters do not make a house inside of the water bag. If critters make this home, they will likely eat through the watering bag and they will eat the stem of the tree for food. Bags are typically used for one to two growing seasons and reused on other newly planted trees.
- **Water rings:** Water rings are a fairly new device. They hold 5 gallons of water at one time and slowly release into the soil around the tree. They are simply slid on around the tree. The perks of the rings are that you can bury them within your mulch ring to hide the device. Rings are typically used for one to two growing seasons and reused.
- **Soaker Hose/Drip irrigation:** Cut slits or poke holes into a hose to allow water to seep into ground rather than spraying over the tree and ground. Keep flow rate low to allow for seeping. Commercially produced soaker hoses are available for purchase.
- **Drip tape:** A flat, hose like device, water tape is highly efficient for irrigation. It seeps at a very low rate, only at points of perforations, and is commonly used in nursery operations.
- **Sprinklers:** The least desirable due to high rates of evaporation and low efficiency ratings.
- **Tree Diapers™:** an "irrigation product to combine the functions of slow release irrigation, automatic recharging with natural precipitation, weed control, and protection against extreme weather conditions (winter and summer) into one low-cost package."

https://www.treediaper.com/index.cfm

*Figure 31. Tree Diaper™.*

*Figure 29. Water bag on a young tree.*

*Figure 30. Water ring buried in mulch.*

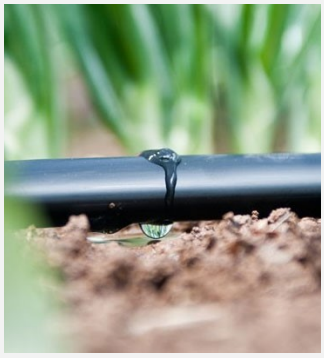


*Figure 31. Drip tape.*

http://en.deere.co.th/common/media/images/product/equipment/water/irrigation_and_water_management/drip_micro_irrigation_emission_devices/drip_tapes/hydrodrip/product_hero_hydrodrip_642x462.jpg

# Pruning Tools

## Tools

When pruning trees, different tools are used for different types of pruning. The tools used are typically chosen based on the size of what is being pruned as some tools work better for smaller diameter cuts while others work better for larger.

## Types of Tools

### Bypass pruners

Bypass pruners have curved blades that act like a scissor as they overlap. Properly sharpened pruners leave a smooth well defined cut and do not crush the plant material. These pruners are typically used for branches 1/2 inch or less in diameter.

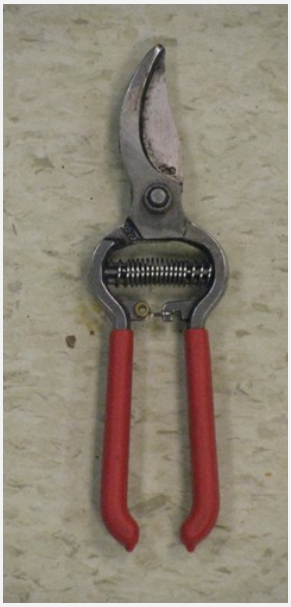


*Figure 32. Bypass pruners.*

### Tricut handsaw

Tricut handsaws come in many shapes and sizes. The blade may be curved or straight and have fine or coarse teeth. Handsaws should be used to remove branches with diameters between 1-inch and 4-inches.

*Figure 33. Tricut handsaw.*

## Types of Tools Continued

### Pole pruner

Pole pruners are similar to a bypass pruner in that they cut like a scissor, however, they are extended on a pole to reach higher into the canopy. Pole pruners should only be used to prune branch material that is unreachable with a bypass pruner or handsaw. Properly sharpened pruners leave a smooth, well-defined cut and do not crush plant material. Pole pruners are best used for cuts of 1 inch in diameter or less. All pole devices should be utilized in conjunction with a hard hat and proper safety clothing such as protective eyewear and gloves.

*Figure 34. Pole pruner.*

### Pole saw

Pole saws are similar to a tricot handsaw, however they are extended on a pole to reach higher into the canopy. The blade may be curved or straight with fine or coarse teeth. Pole saws should be used to remove 1-inch to 2-inch diameter branches. All pole devices should be utilized in conjunction with a hard hat and proper safety clothing.

*Figure 35. Pole saw.*

## Cleaning Your Tools

To clean pruning tools, clear off all debris and dirt with soap and water and disinfect with rubbing alcohol. Make sure to dry them off before storing and spray with WD-40 in order to prevent rusting. It is especially important to clean and disinfect tools with 90%+ rubbing alcohol before pruning some tree species like honeylocust or crabapple in order to prevent the spread of disease.

# Tree Identification and Pruning Restrictions

Correctly identifying the type of tree about to be pruned is the first crucial step in pruning trees. Different species of trees are susceptible to diseases at different times of year. Pruning trees at the wrong time can lead to infection.

## Linden

Lindens, also known as basswoods, are a species that commonly produce sprouts and suckers.

American Basswood

Code: TIAM

Family: Tiliaceae

*Tilia americana*

Photos: Dave Hanson

**Leaves**: alternate, simple, 4”-8” long, coarsely serrate edges; heart-shaped, unequal base.

**Twigs**: slender, round 2-scaled, reddish bud. **Fruit**: ¼-⅜”, round, under leaf like bract, no ridges.

**Bark**: light gray when young, darkens with age, narrow/shallow flat topped ridges.

## Oaks

When pruning oaks, it is important to wait until the proper pruning season, as pruning at the wrong time of year can lead to infection by oak wilt. Oak wilt is caused by a non-native fungus and is spread from diseased to healthy trees either below-ground via connected roots or above-ground by insects. Most new infections are the result of fungus transmission through roots of adjacent trees that have grafted together, but fresh pruning wounds attract the beetles and could start a new infection center. In Minnesota, the disease is currently found in an area bounded on the north by Pine County, on the west by Stearns and Nicollet counties, and south to the Iowa border.

The safest time to prune an oak in Minnesota is typically November through March .

Visit www.myminnesotawoods.umn.edu/2010/03/oak-wilt-risk-status-in-minnesota for the current oak wilt infection status.

### Swamp White Oak

Code: QUBI

Family: Fagaceae

*Quercus bicolor*

Photos: Dave Hanson

**Leaves**: alternate, simple, 4-7" long, 5-12 shallow rounded lobes, shiny green top, whitish below.

**Fruit**: ¾" to 1¼" paired acorns, 1"-4" stalk. Acorns mature in the autumn.

**Bark**: light brown, papery, scales become blocky and deeply fissured with age.

### Northern Red Oak

Code: QURU

Family: Fagaceae

*Quercus rubra*

Photos: Dave Hanson

**Leaves**: alternate, simple, 4-9" long, 7-11 bristle-tipped lobes, sinuses cut ½ way to midrib.

**Fruit**: ⅝" to 1⅛" acorn, shallow cap, scales pubescent, acorns mature autumn of second season.

**Bark**: gray to red-brown, smooth, shiny, becoming grayish flat-topped ridges, deeply furrowed.

### Bur Oak

Code: QUMA

Family: Fagaceae

*Quercus macrocarpa*

Photos: Dave Hanson

**Leaves**: alternate, simple, 4-12" long, 5-9 rounded lobes, center sinuses cut to mid-rib.

**Fruit**: acorn, fringed (bur) cap covers ½ or more of ¾" to 2" acorn, acorns attached direct to twig.

**Bark**: grayish with vertical ridges, deeply furrowed. Bur oak can have corky twigs.

### White Oak

Code: QUAL

Family: Fagaceae

*Quercus alba*

Photos: Dave Hanson

**Leaves**: alternate, simple, 4-9" long, 5-9 rounded lobes, sinuses nearly uniform in depth.

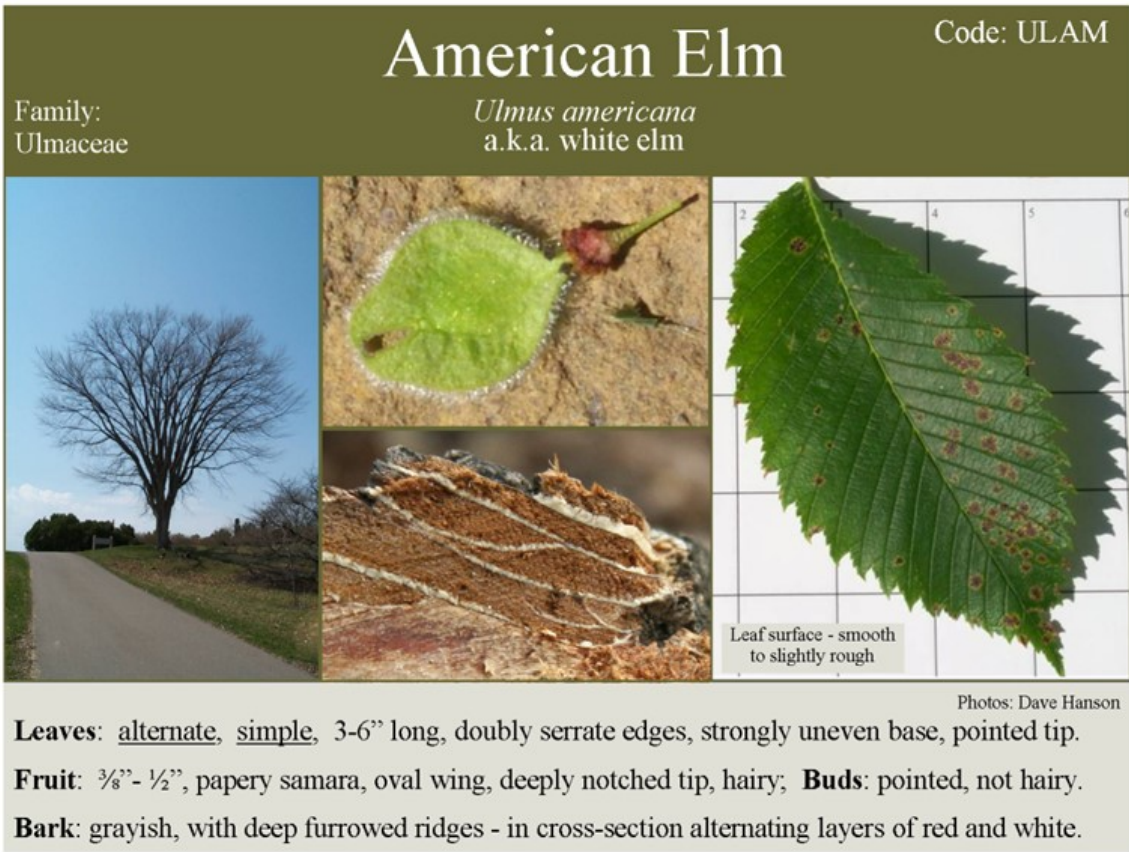
**Fruit**: acorn, ⅜" to 1¼" acorns, cap covers top ¼-⅓, acorn is attached via a ¼" stalk.

**Bark**: Light ashy-gray, narrow vertical ridges, with age breaks into blocky, irregular shapes.

## Elms

There are a variety of diseases that can affect elms, the most common being canker formation and Dutch elm disease. Cankers can form on twigs and branches and can be identified by the reddish-brown infected wood, contrasted by the whiter healthy wood, as well as by the yellowed leaves that fall without wilting. Dutch elm disease (DED) can be identified by the wilting, yellowing, and premature falling of leaves as well as by the streaked sapwood on affected branches.

The safest time to prune an elm in Minnesota is typically in November through March.



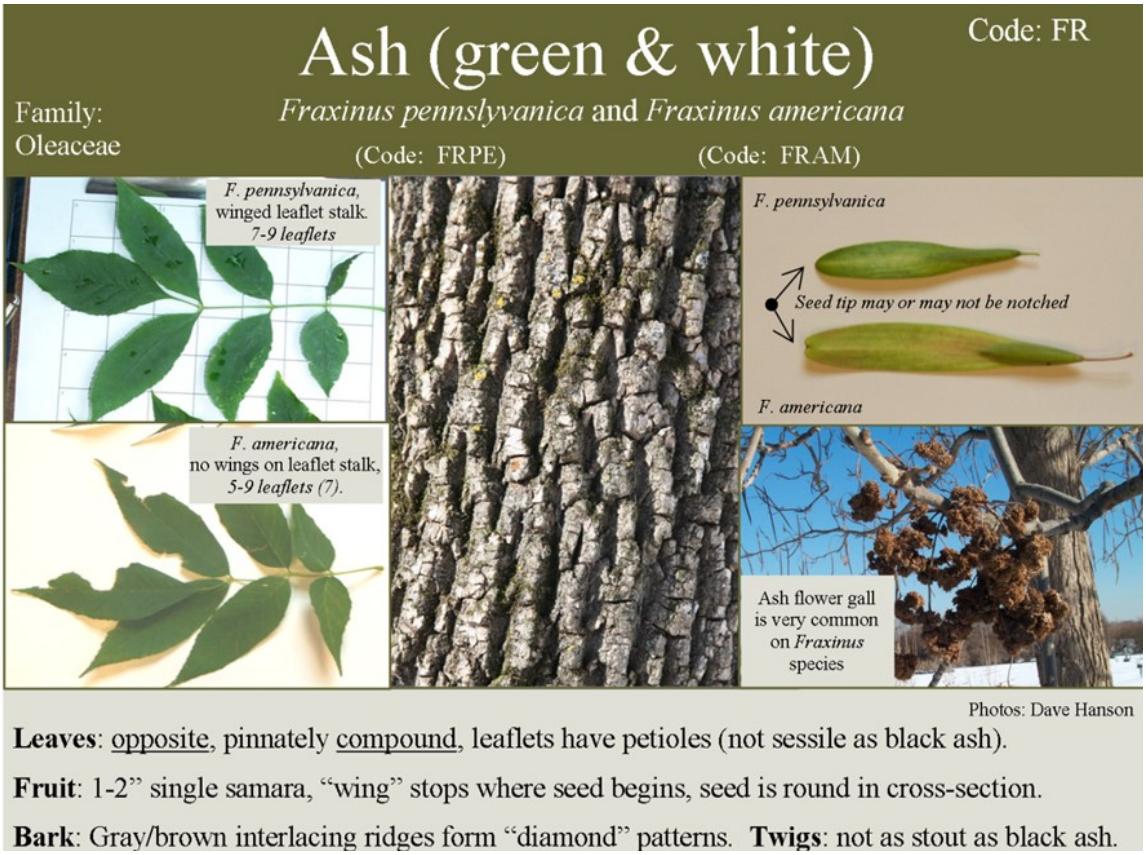
## Ash

When pruning ash trees, it is important to prune only during the dormant flight season of emerald ash borers (EAB). Pruning during flight season encourages the adult insect to move from tree to tree, potentially infecting more trees as a result. Ash trees infected by EAB can be identified by the S shaped galleries, D shaped exit holes, woodpecker holes, and overall health decline of the tree (canopy die back and bark cracking).

Although flight seasons can change depending on spring and fall temperatures (cold springs may delay flight whereas warm falls may extent it), pruning typically ranges from October through April.

For more info about EAB and for the current EAB risk status visit:

http://www.myminnesotawoods.umn.edu/eab-risk/



## Honeylocust

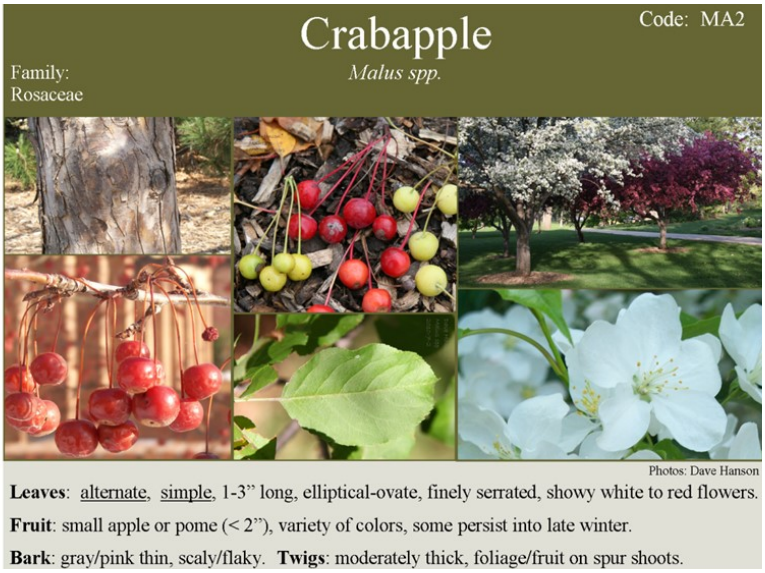
Pruning honeylocust in the spring and fall should be avoided in order to decrease the spread of nectria canker, a disease that spreads during the wetter seasons. Nectria canker is a fungus that causes target-like cankers on the stem of trees and is most severe on stressed trees.

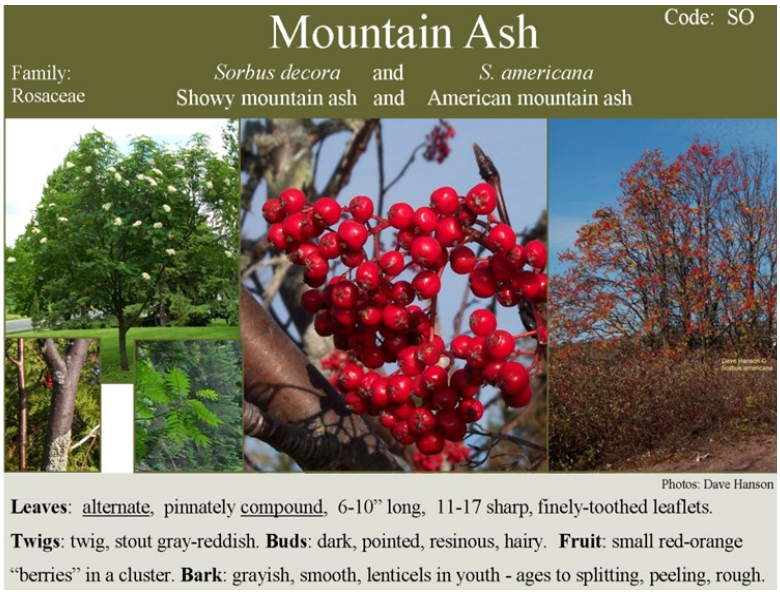
The safest time to prune honeylocust in Minnesota is in the heat of summer or from late fall to late winter. It is also important to remember to clean and disinfect tools before pruning honeylocust in order to prevent the spread of disease.

## Crabapple and Mountain Ash

When pruning crabapples and mountain ash trees it is important to remember that they are susceptible to fireblight, which can be spread through pruning wounds during spring and early summer. Fireblight is caused by the bacterium *Erwinia amylovora* and can be identified by the wilting of flowers, leaves, and shoots and the discoloration of leaves, bark, and branches.

The safest time to prune both crabapple and mountain ash trees is typically October through early April.



## Birches & Maples

There are a variety of problems that can affect birches, none of which are related to pruning. People fear pruning in the spring causes them to bleed and causes problems. Trees don't bleed, they exude sap. No harm done.

Again, there are a variety of problems that can affect maples, none of which are related to pruning. People are even more fearful of pruning maples in the spring that results in "bleeding." Maples do not bleed, they exude sap. Note that people aren't squeamish about pouring maple "blood" on their pancakes.

### Paper Birch

Code: BEPA

Family: Betulaceae

*Betula papyrifera*

Photos: Dave Hanson

**Leaves**: alternate, simple, coarse doubly toothed margins, leaf base - symmetrical, rounded.

**Twigs**: reddish-brown with prominent lenticels. Male catkins are often present at twig ends.

**Bark**: young reddish bark, lenticels - matures to white peeling bark, at tree base dark and fissured.

### Sugar Maple

Code: ACSA2

Family: Aceraceae

*Acer saccharum*

Photos: Dave Hanson

**Leaves**: opposite, simple, 3-6" long, 3-5 pointed lobes; "U" sinuses, coarsely toothed margins.

**Twigs**: brown, pointed buds. **Fruit**: 1-1¼" long, paired; horseshoe shape, green turning brown.

**Bark**: Young gray/brown and smooth; Becomes dark and deeply furrowed when older.

# Types of Removals

## Stem Protection Systems

Tree stem protections are used to protect the tree's stem from physical damage. Even though the intent of the tree stem protection is to protect the tree, they can be damaging if secured improperly of left on too long. Stem protection applied too tightly or left on too long can compress the stem. This can restrict water and nutrient uptake and constrain normal flow through the stem. Stem protection systems should be removed when they are tight to the stem.

*Figure 36. Grow tube method.*

*Figure 37. Fence protection.*

## Mulch Volcanoes

A mulch volcano is a term for an improperly mulched tree, where mulch is piled high against a tree stem. This practice can often be seen in landscapes. Having mulch touch the stem of the tree increases the chances of stem girdling roots.

*Figure 38. Example of mulch volcano.*

*Figure 39. Improper mulching.*

## Sprouts and Suckers

A sprout is a fast growing, often very upright branch that emerges from the trunk of the tree, often developing from stem damage or pruning. It is important to remove sprouts before they become a problem, as they can block sight lines, creating safety issues for drivers and pedestrians. Sprouts can also be a disadvantage to the tree itself as they can create weak branch unions because they are more shallowly attached than branches at a normal union. These weak branch attachments are more likely to fail than strongly attached branches.

*Figure 40. Suckers on a Linden.*

A sucker is a sprout that develops at the base of the trunk off the tree's root system. Suckers can form for a variety of reasons such as improper planting, stress, or simply because they are a species prone to suckering, like apple or linden. It is important to remove suckers as they can block sight lines, sidewalks and streets.

*Figure 41. Close up of suckers.*

*Figure 42. Example of suckers.*

## Included Bark

Included bark is when bark grows in between a branch union which prevents the branch from attaching correctly to the trunk or another branch. This is problematic as bark and the woody branch material cannot graft or grow together which creates a weak union, increasing the likelihood of failure.

**Figure 43. Included bark example.**

## Co-Dominant Leaders

The term co-dominant leader is used to describe two or more main stems that are about the same size in diameter. This branch structure can become a problem as the closer in size a branch is to the main stem the more likely it is to fail. This is because co-dominant leaders are competing for dominance, and with increased size comes an increased chance of splitting and structural failure. In order to prevent damage to the tree, a leader can be chosen and pruned for. In order to chose a leader, look for a leader that is central to the stem and straight in nature. Also, be aware of leaders that have the best structure with good branch attachments. Once you've chosen the leader you do not need to completely remove all of the competing leaders but the ones you do not remove you should suppress using a reduction cut. A reduction cut, or suppression cut, shortens the stem back to a lateral branch or to a node, which then forces future growth into the unpruned branches.

*Figure 44. Co-Dominant leaders and where to remove one of the leaders.*

## Crossing/Rubbing Branches

Crossing or rubbing branches occur when two separate branches begin to collide with one another. Crossing or rubbing branches can injure bark and other living tissue on the branch, which makes the branch more prone to decay or disease.

*Figure 45. Rubbing branches on an apple.*

## Good Branch Spacing

The vertical space between branches should eventually be 12 inches for fruit or small stature trees, and 18 inches or more for medium and large stature deciduous trees (this spacing does not apply to coniferous trees).

Good branch spacing is important for future growth of the tree. As branches increase in size, it's more likely they will grow into each other if not properly spaced. Pruning for proper spacing can prevent this

*Figure 46. Poor spacing on an apple tree.*

## Deadwood

Deadwood occurs for a number of reasons and is easily identified during leaf out. Use either a bypass pruner or pruning saw to remove deadwood at the branch collar. Use the three-cut method if the branch is large.

When pruning branches with deadwood and live wood, prune only deadwood and save as much of the live wood as possible. The deadwood on a live branch should always be pruned back to a node.

*Figure 47. Before pruning.*

*Figure 48. After pruning.*

## Temporary Branches

Trees grow outwards, not upwards, so branches that you see now will remain at the same height until you or a storm removes them. Trees need to be pruned up to clear space for cars and trucks to drive through. Different streets vary in their requirement of clearance levels, but the average is 14.5 feet in height. Temporary branches can be removed at any point in a trees life. Use your collective group judgment to decide whether temporary branch removal is necessary at this time.

*Figure 49. Temporary branch on an apple.*

1. Always keep a good live crown ratio. This means that for deciduous trees 60% of the tree should contain a living crown, and for coniferous trees this means 75% should be in live crown
2. Never remove more than 25% of the tree's live crown in one pruning season.
3. When pruning, aim to create a symmetrical canopy.

*Figure 50. Live crown ratio example and equation.*

## Pruning Branch Material

First identify the branch collar, the area of swelling. This may be hard to find with sprouts as they will often swell where there are several small sprouts in one area. The branch collar is more noticeable on larger branches. Prune sprouts and branches just beyond the branch collar because it makes a smaller, more sealable wound that does not injure the main stem's cambium.

Sharp tools make the best pruning cut on a tree. Prune small sprouts and branches with a pruning shear. If the sprout or branch is too large for bypass pruners, use the three-cut method with a pruning saw to prevent bark rip-

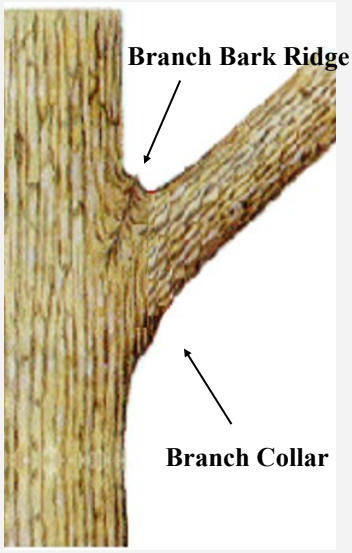



*Figure 51. Branch identification.*

## Pruning Branch Material

**How to prune branch material (sprouts, included bark, etc.) that is less than 1/2 inch in diameter:**

- Hand support the end of branch away from the tree stem to stabilize the branch as you make your cuts
- Identify branch collar
- Place pruning shears just outside of branch collar with the sharp end of the blade on the underside of the branch material
- Apply pressure through squeezing handles
- Once blades cut all the way through, place branch material in pile facing pruned ends in the same direction

*Figure 52. Sprouts on an elm.*

**How to prune branch material (sprouts, included bark, etc.) that is 1/2 to 2 inches in diameter:**

- Hand support the end of branch away from the tree stem to stabilize the branch as you make your cuts
- Identify branch collar
- Proceed using the Three-cut method

*Three-cut method:*

1. With your handsaw make a shallow cut on the underside of the branch 1 or 2 feet out from the branch union
2. Make a top cut all the way through the branch slightly farther out than the first cut to leave a short stub
3. Remove the stub by cutting just outside the branch collar, perpendicular to the direction the branch is growing

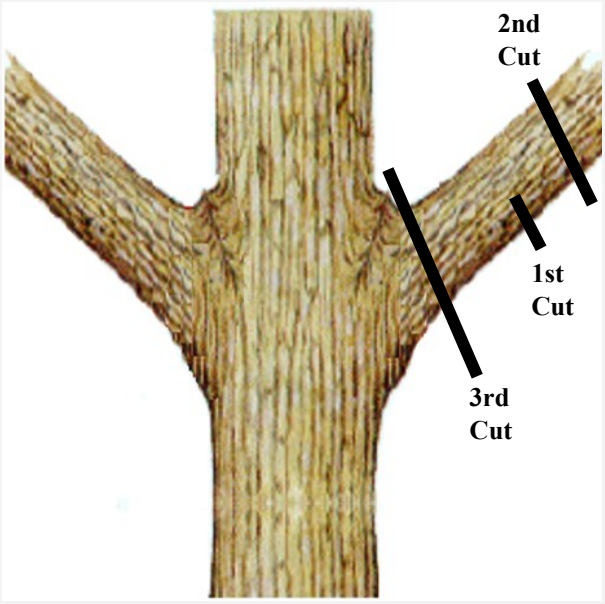



*Figure 53. Three-cut method cut placements.*

## Pruning Branch Material

**How to prune branch material (sprouts, included bark, etc.) with a pole pruner:**

- Identify the branch you want to prune, making sure it is not too large for the pole pruner. Do not cut anything too large, as doing so may break the pole pruners.
- Identify the branch collar.
- Do not stand directly below the branch that you are cutting. Make sure that you stand off to the side of where you are cutting so the branch doesn't fall on you.
- Place the branch between each shear of the pole pruner.
- Make sure that your placement of the shears will make an appropriate cut for the branch.
- Pull sliding handle or rope towards you to make the cut.
- Review the cut made and amend if needed.

*Figure 54. Pole pruning of a co-dominant leader on a maple.*

## Reduction Cut

Pruning to a node is used when pruning out deadwood or when making a suppression cut, also known as a reduction cut. A reduction cut shortens the stem back to a lateral branch or to a node. Future growth is forced into the unpruned branches.

*Figure 55. Pruning back to a node.*

*Figure 56. Incorrect and correct pruning when making a reduction cut.*

## Poor Pruning

Bark ripping can occur when the three-cut method is not used to remove large branches. This often happens when the pruning cut is made by starting the cut on the top side of the branch. The branch fails because it doesn't have enough support, causing the bark at the base of the branch to tear.

Flush cutting occurs when a pruning cut is made close to the stem and removes part of the stem's living tissue. This inhibits the flow of water and nutrients up the stem, and can affect branch development in the canopy and will lead to decay.

Stub cutting occurs when a branch is pruned too far outside the branch collar. It takes longer for the tree to grow new wood and bark over the wound.

*Figure 57. Bark ripping.*

*Figure 58. Flush cutting*

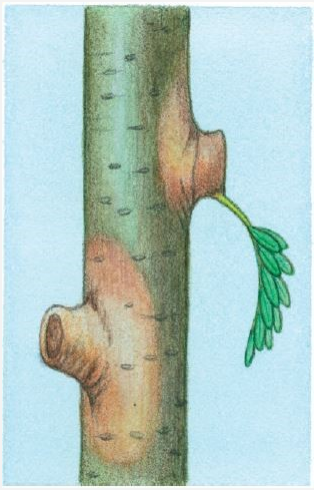


*Figure 59. Stub cutting.*

## Compartmentalization of Decay in Trees

Compartmentalization of Decay in Trees (CODIT) is a complex tree process to prevent the spread of decay and disease. Trees do not heal like humans. Instead of healing an injury, a tree will compartmentalize it. Even though pruning is beneficial to the tree, pruning is still considered an injury.

Compartmentalization is a unique way trees plug up their vascular system to prevent the transport of diseases and decay in the stem. This plugging also prevents the transport of water and nutrients. Some tree species are better at compartmentalizing than others.

Pruning a tree leaves an open wound. If pruned correctly, the wound will compartmentalize and new growth will form over the wound.

*Figure 60. CODIT as dark color in plugged vascular tissue..*

# Tree Health & Structure

## Dieback/Death

Dieback, or canopy decline, can be caused by a variety of factors (e.g. root damage, soil compaction, girdling roots, stress or drought) and can occur quickly or over an extended period of time.

Dieback may vary in appearance or severity but is typically identified by the lack of growth, lack of foliage, slight twig mortality, and premature fall coloration and defoliation.

*Figure 61. Death in a spruce.*

## Leaf Scorch

Leaf scorch is a condition caused by a variety of environmental factors such as high temperatures, dry winds, and low soil moisture.

Scorch symptoms can vary between plant species, but typically appears in July and August as a yellowing between leaf veins and along leaf margins, and a browning on the tips of leaves. In severe cases, entire leaves may curl and wither.

*Figure 62. Leaf scorch example.*

## Trunk Wounds

Trunk wounds can be caused by a number of factors, like lawn mowers or pests, and depending on severity can have lasting effects on a tree's health.

Trunk wounds may resemble scratched, chipped, or removed bark, and depending on the cause may vary in size, location, and severity.

*Figure 63. Trunk wound, often a product of mechanical devices.*

## Leaf Wilt

Wilting can affect both the leaves and branches of a tree and may be caused by a number of factors, such as root damage or water shortage.

Symptoms may occurs at anytime during the growing season and can be acute (wilting, drying, leaf discoloration) or chronic (stunted growth, sparse foliage, branch dieback).

*Figure 64. Wilting on a dogwood.*

http://www.missouribotanicalgarden.org/Portals/0/Gardening/Gardening%20Help/images/Pests/Drought_Stress1921.jpg

## Broken Branches

Broken branches can happen for a number of reasons (wind damage, included bark splitting, vandalism, etc.) and are important to remove as they may lead to further bark ripping and tearing, further and more extensive tree damage, or may become a hazard. For branches high in the canopy or with wide diameters, report them to your city forester or arborist so they may be properly removed.

*Figure 65. Broken branch.*

## Dead Branches/Stagheading

Dead main branches and stagheading are branches that have experienced die off and are still attached to the tree. As you can see from these examples, dead branches can vary from one branch in the canopy to large sections of branches. There are many reasons that branches may die, so further investigation needs to be done to determine why this is happening in a tree and if it can be helped.

*Figure 66. Stagheading example.*

## Stem Girdling Roots

Stem girdling occurs when there is atypical compression to the tree's stem. In the first example, stem girdling roots have encircled the base of the stem. In the second example we see girdling causing tree instability (See page 23 for more information on SGRs).

Existing stem girlding roots (like those pictured) can be fixed later on in a trees life. This typically involved using some sort of wedged tool and a hammer to cut the roots off and relieve the compression issue. If the roots are too large to do this on your own, you can consider having an experienced certified arborist to remove the roots and potentially save your tree.

*Figure 67. Stem girdling roots.*

*Figure 68. Leaning tree.*

## Leaning

Leaning may occur for a number of reasons but is commonly caused by root damage. In some cases, typically in younger trees, attempts can by made to correct leaning by implementing a staking system.

*Figure 69. Storm damage tear out.*

## Storm Damage

Storm damage can cause a variety of damaging effects to a tree ranging from small broken branches to splitting open to the complete uprooting of a tree.

*Figure 70. Vandalism on young tree.*

## Vandalism

Vandalism can appear in a number of forms and is typically identified by the atypical nature of the damage and the location of the tree.

# Reporting Trees of Concern

Often, you will see trees of concern that show examples of the previous tree health and structure issues. As volunteers in your community, you have the ability to alert city staff of these problematic trees so they may address the tree and make management decisions. Course of action is determined by the severity of the issues and more importantly, the safety of the citizens within your community.

## Emerald Ash Borer (EAB)

### The Insect

The Emerald Ash Borer (*Agrilus planipennis*) is an insect native to northeast Asia that specifically targets *Fraxinus* genus trees as habitat and a food source[1].

*Figure 71. Galleries created by the Emerald Ash Borer.*

*Figure 72. Emerald Ash Borer insect.*

http://www.emeraldashborer.info/

### Signs & Symptoms

- Woodpecker damage in the canopy.
- Larvae create S-shaped galleries beneath ash trees' bark.
- Small, D-shaped exit holes from the adult insect on the stem.
- Epicormic sprouts (suckers) at the base of the stem.
- Canopy dieback & thinning of the upper canopy[2].

### Common Misconceptions

- The insect is not a vector for a fungal pathogen! Physical damage from the insect weakens the tree and causes notable symptoms.
- The trees aren't the only ones at risk. Weakening ash trees increases risk of failure in loading events, thus putting people and property at an increased risk of injury, damage, and/or death[1]!

### Implications for Minnesota

- Emerald Ash Borer poses a significant risk to urban communities with many planted ash trees, some communities possessing a 60% ash canopy[2].
- If left unchecked, EAB could spread to northern MN's black ash communities, disrupting native ecosystems.

### Management & Control Considerations

- Do not move firewood or other materials that could contain EAB (nursery materials, etc.).
- Recognize the adult insect and larvae.
- Become familiar with EAB signs and symptoms and report any suspected infestation to your community's forestry department and/or the Minnesota Department of Natural Resources.
- Remove any EAB-infested trees.
- Stay informed on current trends of EAB spread in Minnesota.

**Sources**

1) https://www.mda.state.mn.us/emeraldashborer
2) http://www.dnr.state.mn.us/invasives/terrestrialanimals/eab/index.html

## Dutch Elm Disease (DED)

*Figure 73. Flagging, a prominent sign of a diseased elm.*

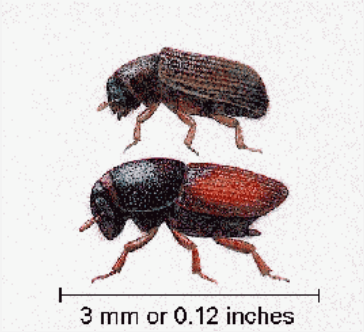



*Figure 74. The native elm bark beetle.*

https://www.na.fs.fed.us/spfo/pubs/howtos/ht_ded/ht_ded.htm

### The Fungi and Insect Vector

Dutch Elm Disease is caused by *Ophiostoma ulmi* or *Ophiostoma novo-ulmi* fungi and spread by the native and European elm bark beetles[1]. All elm species are susceptible, though introduced Asiatic elms and resistant varieties are less susceptible[2].

### Signs & Symptoms

- Leaf wilting and premature drop.
- Brown streaking in sapwood.
- Yellowing and browning of foliage, beginning at the canopy or base depending on site of infection.
- Distinctly-shaped galleries under the bark[1,2].

### Resistant and Tolerant Elms

Many elm varieties demonstrate resistance or tolerance to DED. These include but are not limited to[3]:

- Accolade™
- Cathedral
- Discovery
- New Harmony
- Patriot
- Prairie Expedition
- Triumph™

### Implications for Minnesota

Dutch Elm Disease poses a significant risk to urban communities; an estimated 1 million elms are in urban communities[2].

### Management & Control Considerations

- Use insecticide to kill insect vectors (elm bark beetles).
- Break root grafts between elms.
- Apply fungicidal treatments to elms.
- Prune branches immediately that display symptoms or signs of infection.
- Plant noted resistant or tolerant elm varieties.
- Immediately remove confirmed infected trees to prevent further infection.

**Sources**

1) https://www.na.fs.fed.us/spfo/pubs/howtos/ht_ded/ht_ded.htm
2) http://www.extension.umn.edu/garden/yard-garden/trees-shrubs/dutch-elm-disease/
3) http://www.extension.umn.edu/environment/agroforestry/elm-trees.html

## Oak Wilt

*Figure 75. Oak wilt symptoms on leaves.*

*Figure 72. Oak wilt symptoms in canopy.*

https://www.na.fs.fed.us/spfo/pubs/fidls/oakwilt/oakwilt.htm

### The Fungi and Insect Vectors

*Ceratocystis fagacearum* is the fungus responsible for Oak Wilt and is spread by sap-feeding beetles of the *Nitidulidae* family and oak bark beetles[1]. Oaks in the red oak group are affected more greatly than white oaks[2].

### Signs & Symptoms

- Wilting at the top of tree crown, progressing downward as infection spreads.
- Reddish-brown discoloration of leaves.
- Complete wilting and leaf loss, leading to tree death.
- Fungal mats beneath bark.
- Infected trees can die in as little as 1 to 2 months, but typically within a year.

### Risk of Infection by Time of Year

April--Mid-July: **High**
Mid-July-–October: **Low**
November—March: **Safe**[2]

### Implications for Minnesota

Oak wilt has been particularly destructive in neighboring Wisconsin, where some areas have seen a 50% mortality rate in oaks[1]. Similar death rates could be seen in Minnesota without proper controls in place.

### Management & Control Considerations

- Destroy root grafts between oaks.
- Avoid wounding or pruning oaks in the spring and early summer.
- Do not move firewood from areas with the disease into other areas.
- Remove and destroy infected oaks immediately.

**Sources**

1) https://www.na.fs.fed.us/spfo/pubs/fidls/oakwilt/oakwilt.htm
2) http://www.extension.umn.edu/environment/trees-woodlands/oak-wilt-in-minnesota/

## Bur Oak Blight (BOB)

*Figure 77. Wedge shaped lesions and necrotic lesions.*

*Figure 78. Dead leaves remaining.*

https://hortnews.extension.iastate.edu/2012/9-12/buroakblight.html

### The Fungus

Bur Oak Blight is caused by the fungus, *Tubakia iowensis*, and overwinters in dead leaves that remain on trees[1]. In the Spring, rain carries spores to infect new trees[1]. *Quercus macrocarpa*, bur oak, is the only species affected.

### Signs & Symptoms

- Purple lesions develop in the veins on the underside of leaves.
- Wedge-shaped sections of chlorosis and necrosis form on leaves.
- Dead leaves remain on the tree overwinter.
- Black fruiting structures form on leaf veins[2].

### Positive Identification

Bur Oak Blight shares many symptoms with other biotic and abiotic diseases, so positive diagnosis is important. Samples can be collected and sent to the University of Minnesota Plant Disease Clinic for positive identification[3].

### Implications for Minnesota

There are many old, aesthetically-pleasing bur oak trees in Minnesota that are all susceptible to the disease. Without management and control practices, these trees could succumb to the disease and disrupt Minnesota landscapes.

### Management & Control Considerations

- Apply fungicides to reduce risk of infection.
- Boost tree vigor with regular mulching and watering.
- Be wary of secondary invaders such as Two-lined Chestnut Borer and Armillaria that can infect BOB-affected trees.
- Send samples to the Plant Disease Clinic to ensure proper diagnosis of the disease.

**Sources**

1) http://www.ipm.iastate.edu/ipm/info/plant-diseases/bur-oak-blight
2) https://www.na.fs.fed.us/pubs/palerts/bur_oak_blight/bob_print.pdf
3) https://pdc.umn.edu/

# Appendix A: Field Form Example

## Citizen Pruner Field Form

| City Name (of pruning event): | | | | | | Start Time: | | |
|---|---|---|---|---|---|---|---|---|
| Group Member Names & CP Numbers: | | | | | | End Time: | | |
| | | | | | | Date: | | |
| | | | | Please check off if you conducted any of the following removals: | | | | |
| Tree # | Street Address/Location | Species (optional) | Location Description (Boulevard, park, etc.) | Suckers/sprouts | Light pruning (broken/damaged/low branches, deadwood) | Developmental pruning or low branch removal | Materials (wraps, ties, tags, string, mulch) | Reported to City/Staff? |
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# Appendix B: Tree Owner's Manual Card