

# ***Pine River Watershed Landscape Stewardship Plan***

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***Cass SWCD***

***Cass County Environmental Services***

***Crow Wing SWCD***

***Crow Wing County Environmental Services    Crow Wing County Board of Commissioners***

***Pine River Watershed Alliance***

***Whitefish Area Property Owners Association***

# What is Landscape Stewardship?

Effective landscape conservation is a compelling challenge across the United States. Declining water quality, climate change, forestland conversions, wildfires, and invasive species are among many threats to our Nation's forests and the ecosystem services they provide. Forestlands cover roughly 42 percent of the Midwest and Northeast states, with 77 percent of those forests in private ownership. There are nearly 5 million private forest landowners in these 20 states. With over one-quarter of the Nation's forests, and nearly half (43%) of the Nation's population in this region, conserving our forests is not a luxury, it is a necessity. Landscape stewardship is the process established by the US Congress through policy directives in the 2008 Farm Bill to face these challenges.

Leadership from the USDA Forest Service and the Northeastern Area Association of State Foresters (NAASF) developed a vision for landscape scale conservation to address these threats. They recognized the public and private benefits that planning and managing forestlands across boundaries are best addressed through integrated local based partnerships with supporting resources. In 2011, they published the document, "*Landscape Stewardship Guide*" to help state and local partners establish their landscape stewardship programs.

Recognizing the critical linkages between forests and water quality, the Minnesota Department of Natural Resources (DNR) and the Minnesota Board of Water and Soil Resources (BWSR), together with local partners and private landowners, have teamed up to develop watershed-based landscape stewardship plans across the forested regions of the state.

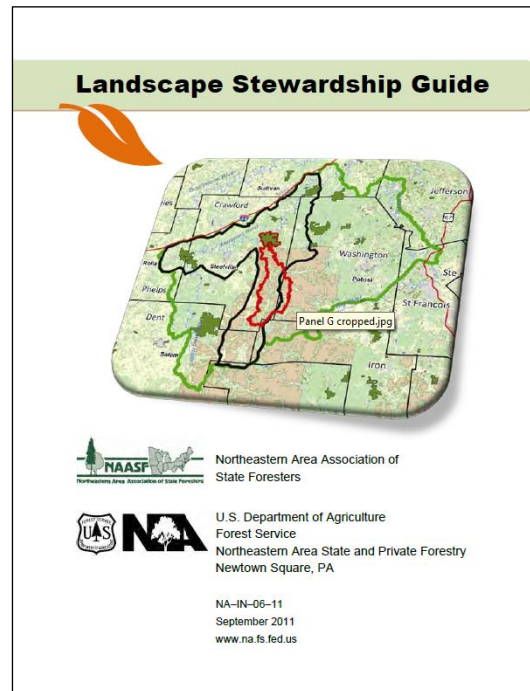
## Credits

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# Table of Contents

<b>Introduction.....</b>	<b>1</b>
Purpose and Scope.....	1
Forest and Water Resources Context.....	1
Linking Landscape Stewardship and Local Water Planning.....	2
Partners and Process.....	2
<b>Part 1: Analysis of Forest and Water Resources .....</b>	<b>3</b>
Introduction .....	3
Resource Context.....	3
Risk/Quality Assessment .....	10
Forest Conservation Opportunity Areas .....	11
Key Observations and Conclusions .....	12
Forest Land Protection – Current Status.....	13
Private Forest Stewardship – Current Status .....	13
<b>Part 2: The Vision.....</b>	<b>15</b>
Mission.....	15
Vision .....	15
Major Watershed Forestry Goals .....	15
Coordinated Roles to Increase Forest Land Protection and Stewardship .....	15
Goal 1: Forest Land Protection .....	16
Goal 2: Promote Private Forest Stewardship .....	17
Vision Summary.....	18
Subwatershed Guidance .....	18
Minor Watershed Methodology and RAQ Scoring .....	25
<b>Part 3: Making it Happen .....</b>	<b>27</b>
Coordination Strategies.....	27
Demonstration Projects .....	36
 <b>Appendix</b>	
Project Partners	
Bibliography	
Pine River Resource Inventory (HUC 8)	
Subwatershed Analyses (HUC 10)	
Ecological Pathway to Sustainable Forest Management	

June 2020



Minnesota Department of Natural Resources  
Division of Forestry  
500 Lafayette Road  
St. Paul, Minnesota 55155

June 2020

Dear Citizens of the Pine River Major Watershed:

We are pleased to present you the approved Pine River Watershed Landscape Stewardship Plan. This plan was developed by a group of conservation professionals working in your watershed that deliver natural resource services.

The primary purpose of this plan is to empower your team of service providers to work together with private landowners and land managers to protect working forest lands and promote private forest stewardship. This plan identifies and prioritizes opportunities for private landowners to engage in forest land protection and sustainable forest management, including timber harvesting. It is your choice as to which level of forest land protection and management works for you and your family.

This plan also provides an array of forest resource recommendations on a watershed basis to support the implementation of the Mississippi Headwaters Watershed One Watershed One Plan (1W1P). It provides useful information and recommendations on sustainable forest management that will help protect water quality, enhance wildlife habitat, promote healthy forests and address climate change issues while supporting the forest-based economies of tourism and timber.

This plan was developed with federal funding through the Landscape Stewardship Program established by the 2008 Farm Bill. As envisioned by the USDA Forest Service and the National Association of State Foresters (NASF), landscape stewardship plans are “living” documents and should be enhanced as new information becomes available. At a minimum, this plan should be revised every ten years. If you have any suggestions for improving this effort or corrections to information that has been presented, please be sure to contact members of the Local Forestry Technical Team. Please consult your soil and water conservation district website for their contact information.

Thank you for your continued efforts in managing the forests of the Pine River Major Watershed. We look forward to working together with you.

Sincerely,

A handwritten signature in black ink, appearing to read 'Gary Michael'.

Gary Michael  
Cooperative Forest Management Unit Supervisor  
Minnesota Department of Natural Resources – Division of Forestry

## Introduction

Forests play a critical role in keeping water clean by absorbing and filtering water, preventing erosion through soil stabilization, and allowing for groundwater recharge. The National Association of State Foresters recognized the connection of healthy forests to clean water with its policy statement: *“Water, in all its uses and permutations, is by far the most valuable commodity that comes from the forest land that we manage, assist others to manage, and/or regulate.”*

## Purpose and Scope

Recognizing the critical linkages between forests and water quality, the Minnesota Department of Natural Resources (DNR) and the Minnesota Board of Water and Soil Resources (BWSR), together with local partners and private landowners, are teaming up to develop watershed-based landscape stewardship plans across the forested regions of the state.

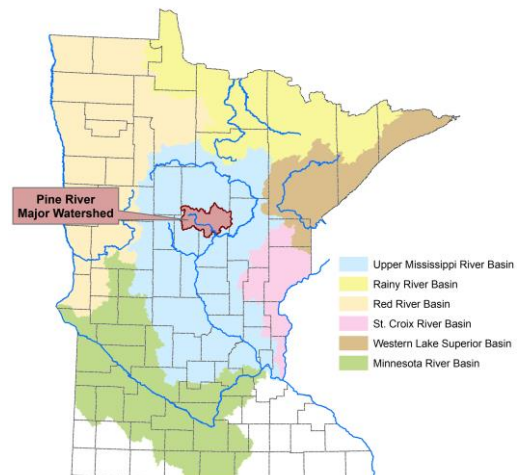
The Pine River Major Watershed in North Central Minnesota is a lake rich watershed and among the first major watersheds to feed into the Mississippi River. Research of over 1,300 lakes by DNR Fisheries revealed impacts of land use disturbance in a watershed and importance of protecting private lands. There are few places better to advance the protection and management of working forest lands on a landscape level than this watershed.

The Pine River Watershed Landscape Stewardship Plan (LSP) is a 10-year tactical plan focused on guiding the protection and management of working forests on private lands on a watershed basis. The goal of this plan is to empower teams of service providers to work together with private landowners and land managers to strategically protect working forest lands and promote private forest stewardship to enhance both private and public benefits that forests provide. Investing resources for private forest management in the parts of the watershed where the public benefits can be stacked (e.g., tourism, timber, habitat, etc.) provides the greatest return on investment for the citizens of Minnesota.

## Forest and Water Resources Context

The Pine River Major Watershed is in the heart of Minnesota’s lake country. An assessment of the resources in the watershed described in the first part of this plan found that:

- Land ownership is split between many different public and private entities and is among the most complex land ownership patterns in the United States.
- Forests and wetlands are largely intact, except in the area around the city of Pine River in the southwest quarter of the watershed, which has significant agricultural land uses.
- Management activities over many years have converted forests from conifer-dominated to deciduous-dominated cover types.
- High-quality water resources provide abundant recreation opportunities and source water for major populations centers downstream (St. Cloud and the Twin Cities). Water quality is dependent on maintaining significant levels of forest land cover across the watershed.



## Linking Landscape Stewardship and Local Water Planning

Landscape stewardship is an “all lands” approach to forest management. Created by the US Forest Service, it addresses multiple conservation challenges through the practical application of science and collaboration. It is based on five working principles: 1) Invest in priority areas, 2) Build a collaborative network of service providers that effectively work together to serve more landowners, 3) Appeal to interests of both landowner and service providers, 4) Manage for results, and 5) Encourage flexibility at all levels to be more adaptive and cooperative in serving customers. Watershed based landscape stewardship plans analyze the critical contexts between land cover and water quality in ways useful to local water planning.

The One Watershed One Plan (1W1P) Program administered by BWSR in partnership with local units of government across the state develop plans at the major watershed (HUC 8) scale. As described in Minnesota Statutes §103B, these plans must address: 1) surface water and ground water; 2) storage and retention systems; 3) groundwater recharge; 4) flooding and water quality problems; 5) wetlands; 6) riparian zone management and buffers; and 7) fish and wildlife habitat and water recreational facilities.

Setting priorities is the first step in BWSR’s strategic “Prioritize-Target-Measure” (PTM) approach to water resource planning and conservation. In managing watersheds, it is essential to recognize that not all valued resources and issues can be addressed at the same time. Prioritizing public and private investments through forest land protection down to the minor watershed level is a critical function in the LSP process. The second step is to target action towards more specific areas and issues within the priority watersheds. Through landscape stewardship plans, targeting is done down at the specific parcel level within priority minor watersheds. To measure is the ability to demonstrate progress towards the achievement of management goals over time. After landowners decide what actions to take and implementation occurs, landscape stewardship plans provide guidance on monitoring.

## Partners and Process

This plan was developed by a team of resource professionals working in the watershed. The list of project partners is provided in the [Appendix](#). Data, maps, and reports detailing land cover, hydrology, and an array of natural resource topics developed by the project staff were provided to the LSP planning team. The team reviewed and discussed this material at three meetings as a basis to help shape this plan. This planning process was funded by a grant from the US Forest Service.

## Plan Content – Using this Plan

The primary audience of this plan are the service providers who work with the thousands of private forest landowners in the Pine River Major Watershed. Service providers include soil and water conservation districts, consulting foresters, DNR, NRCS and conservation organizations. This Plan is generally organized into three parts including: 1) analysis of forest and water resources, 2) vision and goals, and 3) guidance for implementing the plan. The [Appendix](#) provides additional background information designed to be actively used by the team of service providers to help them work more effectively together to serve greater numbers of landowners on a consistent basis.

Ultimately it is the landowner’s choice as to which level of forest protection works for them and how active they want to manage their woods. This plan seeks to help service providers increase their intentionality together to increase the strategic delivery of services to landowners and provide a full suite of forest management options to them.



## Analysis of Forest and Water Resources

# Introduction

The first part of this plan provides background information on the setting of the Pine River Major Watershed and the conditions of its forest and water resources. It also introduces concepts to help increase the ability of service providers to deliver private forest management services.

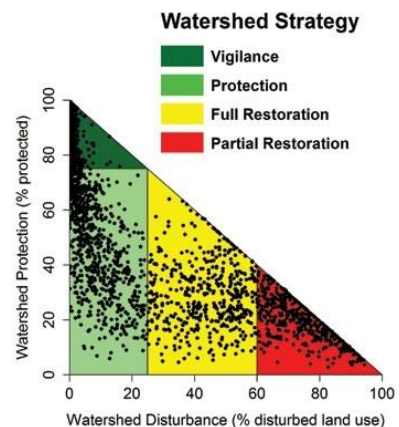
## Resource Context

The Pine River Major Watershed is in the north-central part of the Upper Mississippi Basin and near the headwaters to the Mississippi River. The Basin starts in Lake Itasca and ends at Lock and Dam Number 2 near Hastings. It covers about 20,100 square miles and is the only major drainage basin located entirely in Minnesota. The Upper Mississippi Basin is the most important source water in Minnesota – supplying both St. Cloud and the Twin Cities – as well as a contributor of source water for every major population center along the Mississippi River.

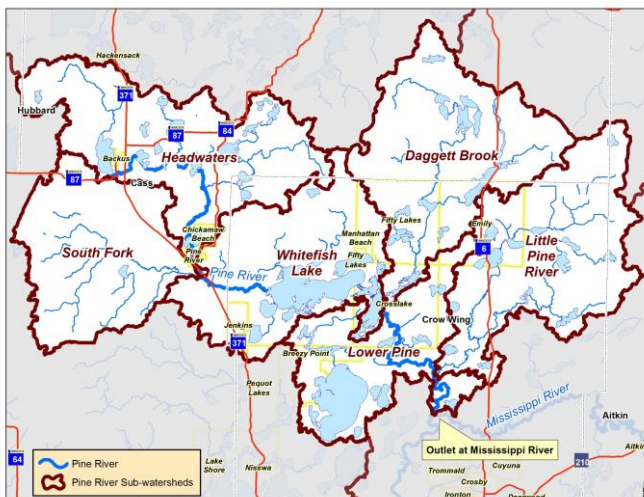
As its name implies, the Pine River Major Watershed is home to the Pine River, whose headwaters are in Pine Mountain Lake and outlet in the Mississippi River. The Pine River Major Watershed drains about 783 square miles and is composed of six HUC 10 subwatersheds (Fig 2) which correspond to major streams and lakes in the region. The subwatersheds are further subdivided into 69 minor watersheds (HUC 14), each averaging 11.3 square miles.

Smaller than minor watersheds are catchments, which is the area between pour points, and it is also the level at which watersheds can be classified to a protection or restoration strategy as defined by the [MN DNR Fisheries Lake Habitat Framework](#) – see Fig 1 and Fig 3. Most of the catchments in the Pine River Major Watershed fall into the “Protection” categories, with a few “Vigilance” and “Full Restoration” catchments.

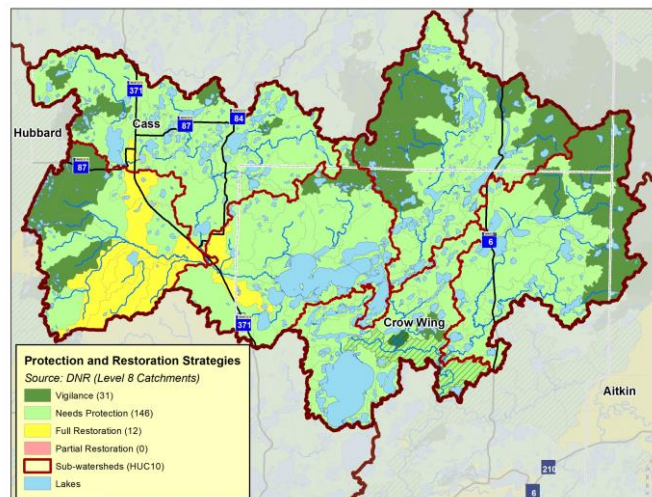
**Fig 1. Watershed categorization framework.**



**Fig 2. Pine River major and subwatersheds.**



**Fig 3. Protection/Restoration classifications.**

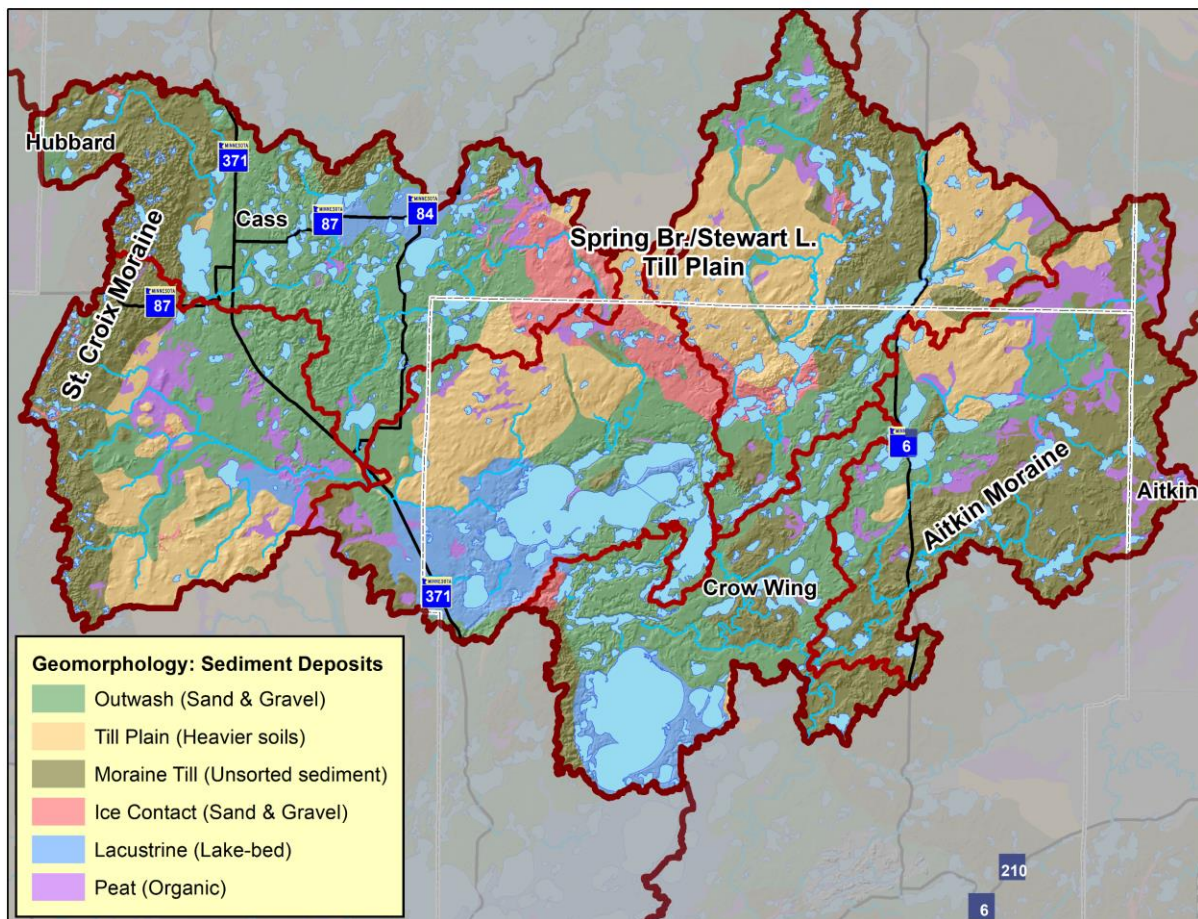


## Geomorphology

The Pine River Major Watershed has a diverse geomorphology. As shown in the map below, much of the central part of the landscape is outwash / lacustrine with the hilly St. Croix moraine on the left making up the western boundary of the watershed and moraine features from the tip of Superior lobe form the boundary on the east. Till plains are also found in the northern part of the watershed.

Surface deposits have a strong impact on vegetation development. In general, fire-dependent communities are present on the coarse sand and gravel soils of outwash plains or localized deposits of sand and gravel within moraines and till plains. In contrast, mesic hardwood forests are usually found on heavier soils with impermeable layers that can perch snow melt or rainfall. These soils are often associated with moraines and till plains, or occasionally glacial lake sediments. The peatlands forests developed on level, poorly drained areas - such as glacial lake beds - while wet forests systems are found in areas with periodically saturated soil.

**Fig 4. Geomorphology of the Pine River Major Watershed.**





## Land Cover

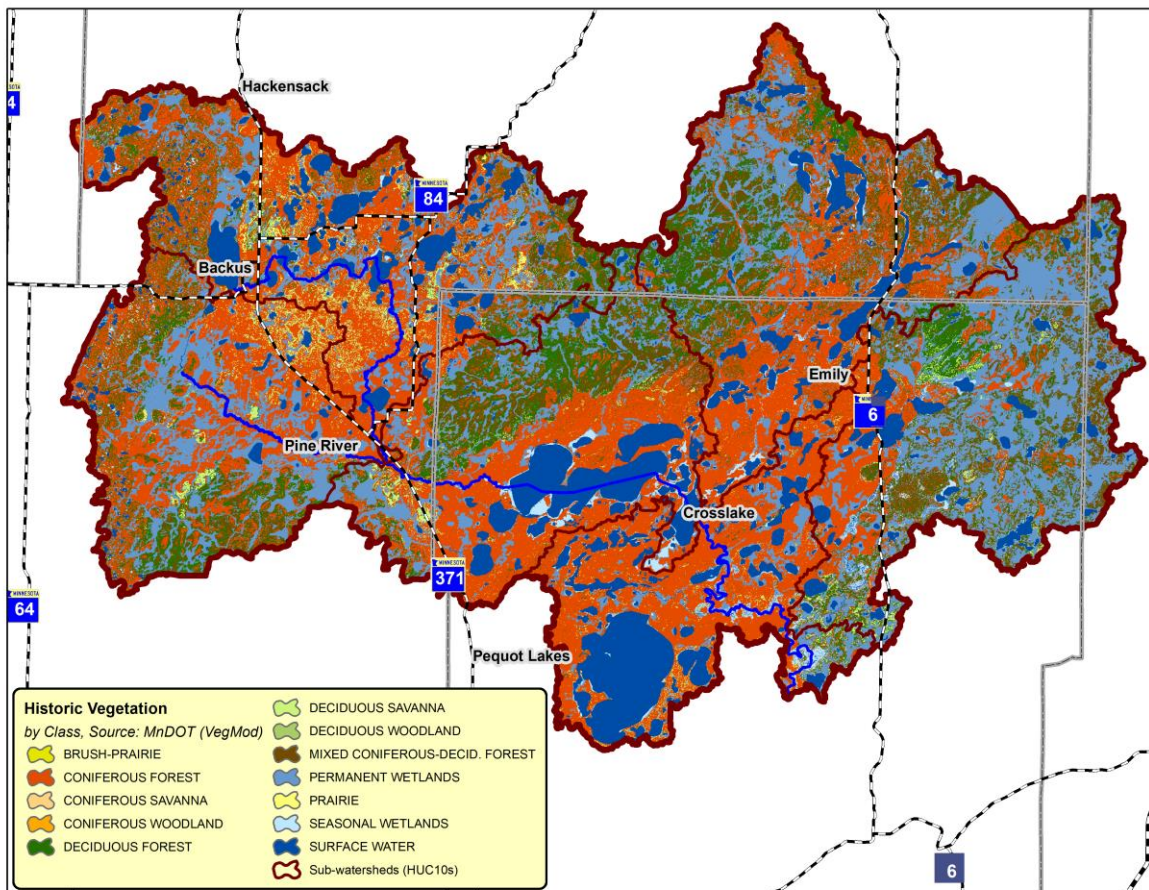
Prior to European settlement, the Pine River Major Watershed was covered by forests, wetlands, and lakes (Table 1 and Fig 5). Today, the landscape remains 68% forested with significant amounts of wetlands and open water, along with a moderate amount of agriculture and low levels of development. Overall, the land cover has been most modified on the western side the watershed, and particularly around the city of Pine River where much of the forest has been converted to agriculture (Fig 6). Conversely, the eastern side of the watershed remains largely intact and has abundant forest, wetland, and water resources.

**Table 1. Historic and current land cover comparison.**

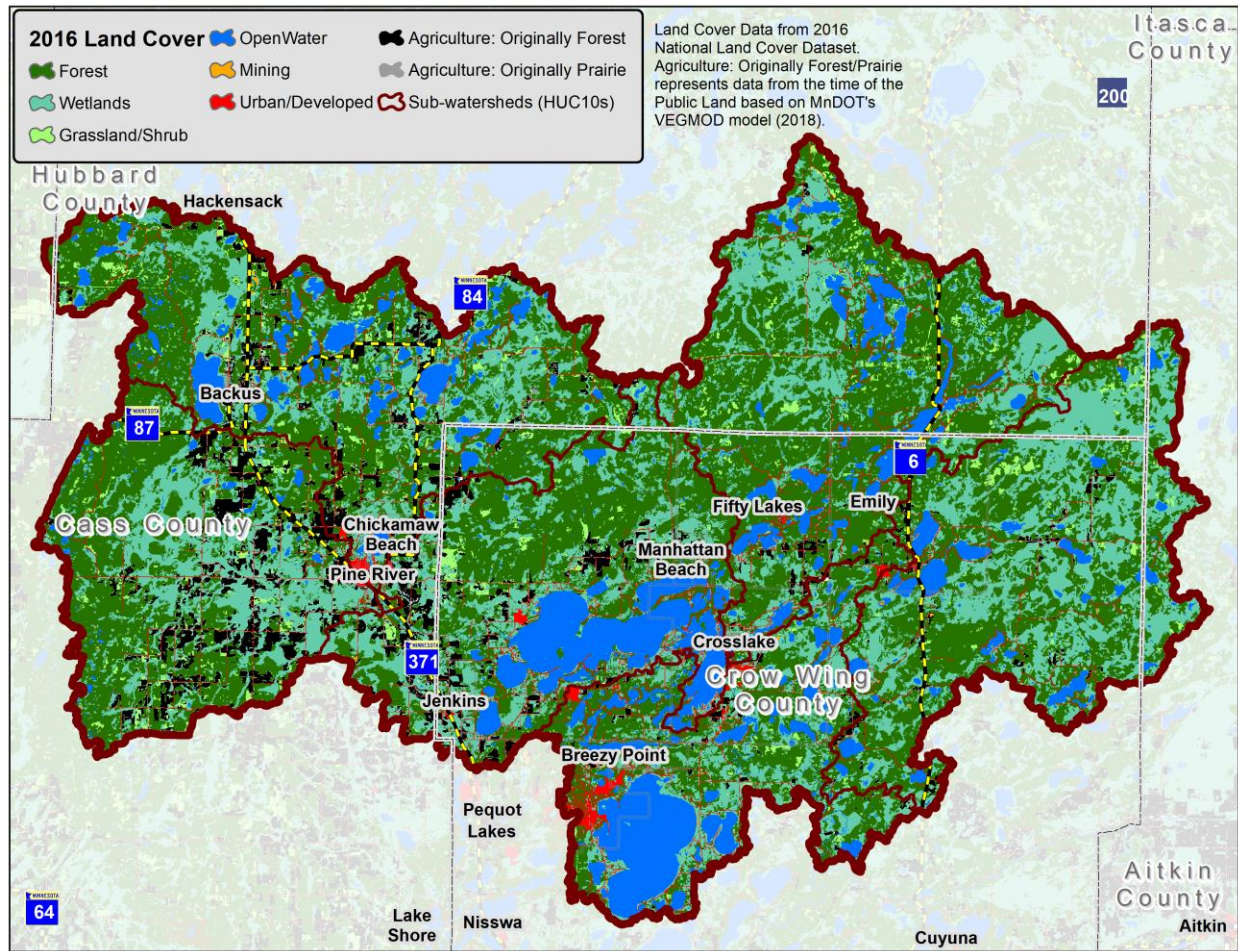
Land cover description	Pre-European settlement		2016	
	Acres	%	Acres	%
Urban and rural development	0	0%	17,089	3%
Cultivated land	0	0%	6,811	1%
Prairie – Hay/pasture/grassland	15,168	3%	28,128	6%
Forest	405,528	81%	341,072	68%
Upland shrub	0	0%	7,710	2%
Water	63,709	13%	58,596	12%
Bog/marsh/fen	16,472	3%	41,184	8%
Mining	0	0%	289	0%

Source: MnModel Historical Vegetation Model and National Land Cover Database.

**Fig 5. Historic vegetation in the Pine River Major Watershed.**



**Fig 6. Current vegetation and areas of historic forest loss.**



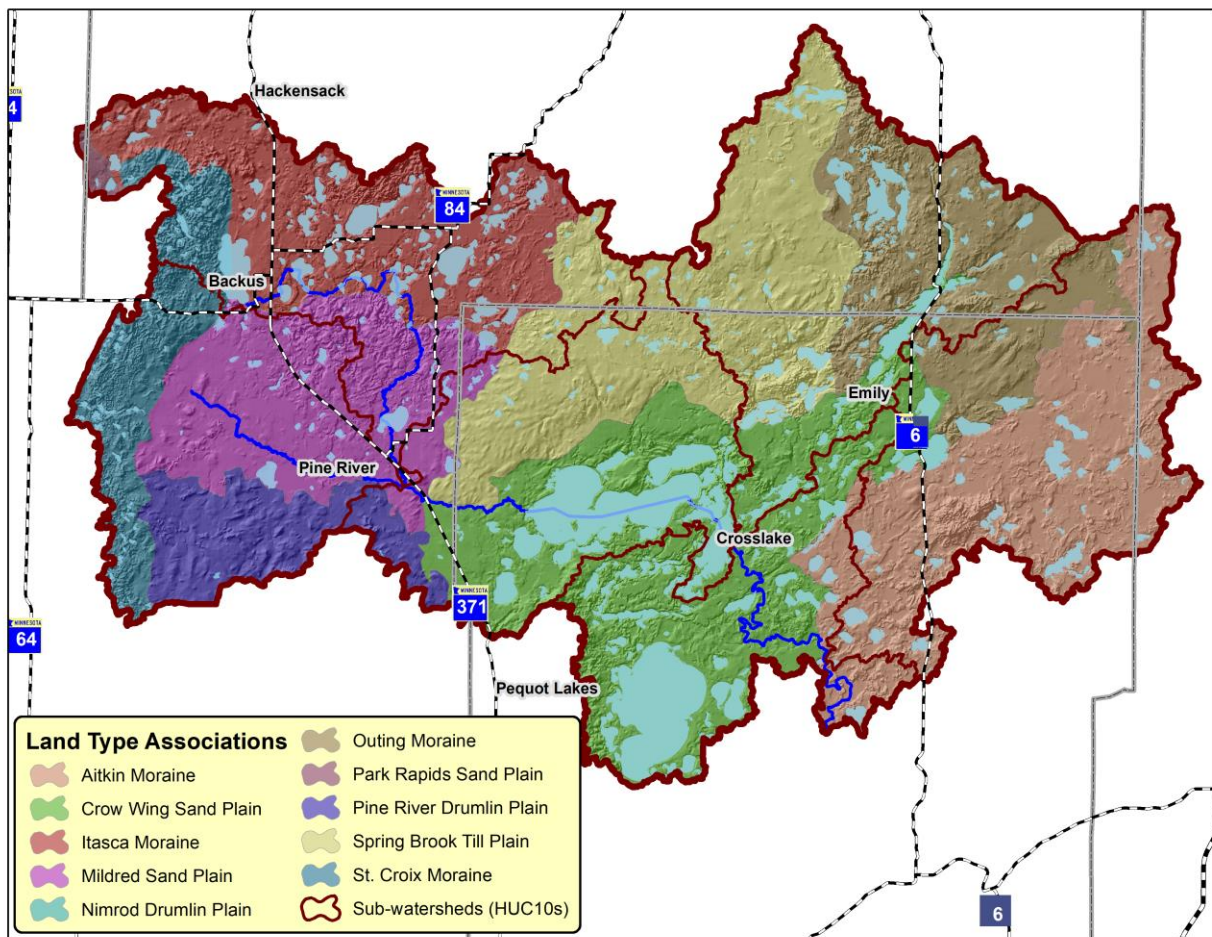


## Ecological Setting

The Pine River Major Watershed is uniquely situated at the western edge of the Laurentian Mixed Forest Province and the historical extent of the great white pine forest that stretched from eastern Maine to western Minnesota. This region is located entirely in the Minnesota Drift & Lake Plains ECS Section and mostly in the Pine Moraines & Outwash Plains ECS Subsection, although about 16% of the watershed on its eastern side is in the St. Louis Moraines ECS Subsection.

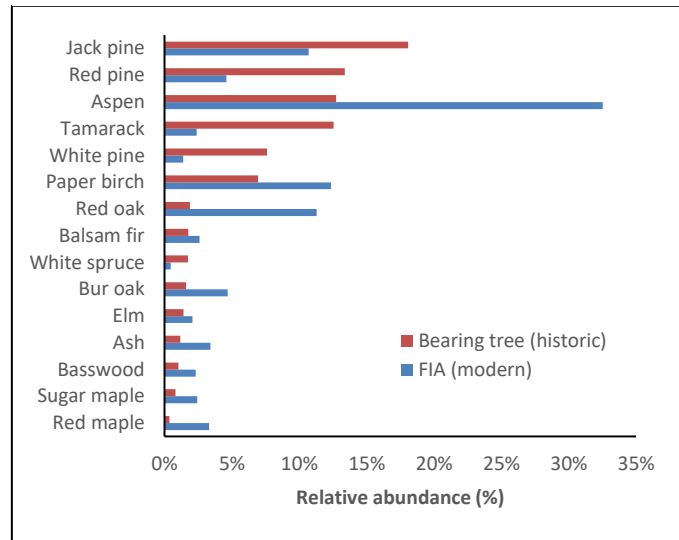
The next level below the ECS Subsection is the Land Type Association (LTA). LTA's are units within Subsections that are defined using glacial landforms, bedrock types, topographic roughness, lake and stream distributions, wetland patterns, depth to ground water table, soil parent material, and pre-European settlement vegetation. The Pine River Major Watershed has portions of 10 LTAs (Fig 7), although half of the area is covered by only three of them: the Crow Wing Sand Plain (22% of watershed), Spring Brook Till Plain (16%), and Aitkin Moraine (16%).

**Fig 7. Land Type Associations (LTAs) of the Pine River Major Watershed.**



Prior to European settlement the vegetation was a mixture of conifer and deciduous forests. Dry-mesic red pine-white pine forests occupied the rolling to steep end moraines. Mixed hardwood-conifer forests of aspen, birch, and white pine, as well as mesic hardwood forests, were also present on the moraines and till plains in areas protected from fire due to irregular topography, wetlands, and large lakes. Dry and dry-mesic forests of jack and red pine, possibly in mix with oak, were common on the excessively drained portions of broad outwash plains. Most of the lowland vegetation was conifer swamps and bogs, which were particularly prevalent in the Aitkin Moraine LTA where they occupied kettles and linear depressions in the pitted outwash and moraines.

**Fig. 8. Relative abundance of species in the Pine River Major Watershed – historic and modern.**



As a result of the logging of northern Minnesota's forests in the late 1800's and early 1900's, along with subsequent forest management practices, the composition of the forest has changed dramatically. In the area around the Pine River Major Watershed the forest shifted away from conifers and towards deciduous species (Fig. 8). Aspen is now the most common trees species and is found in both pure and mixed stands throughout the watershed.

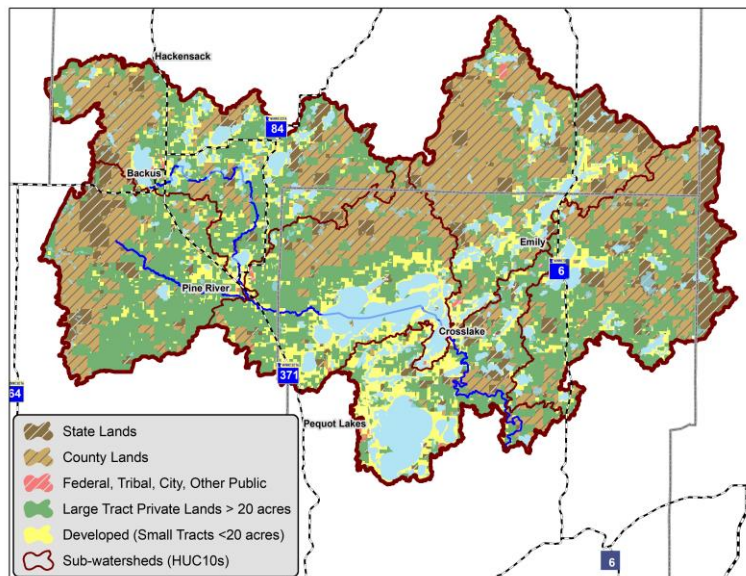
## Land Ownership

Land ownership in the Pine River Major Watershed is split between many different public and private entities. About 47% of the area is privately owned and 53% is under state or county management.

The Pine River Major Watershed and much of the forested north-central Minnesota landscape has one of the most complex land ownership patterns in the United States. There is significant private development along the shoreline of the larger recreational lakes and large blocks of public lands in the headwaters of most of the subwatersheds where lakes are scarcer. The rest is a patchwork of public and private lands intermixed with the numerous lakes in the watershed.

Despite the subdivision over the last half-century, there remains abundant land in large-tract status (parcels > 20 acres), which represent lands where forest land protection and management is the most viable.

**Fig 9. Private and public land ownership.**





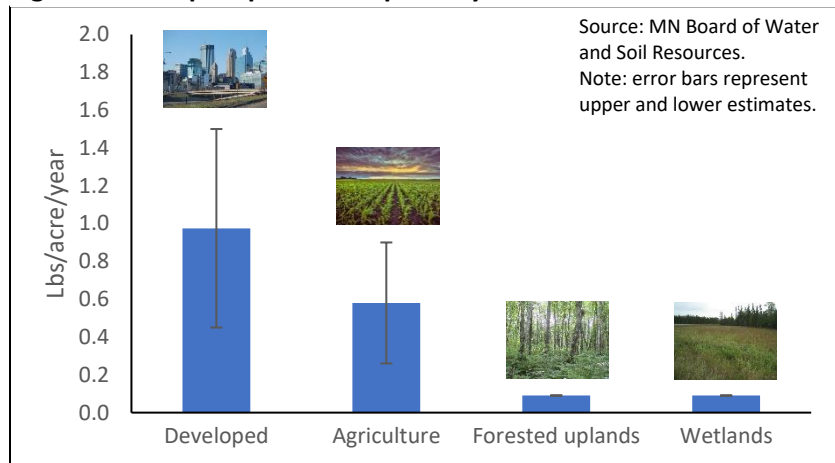
## Social and Economic Context

Census data from 2010 estimates that the population of all minor civil divisions in the Pine River Major Watershed is 25,574, or 0.5% of Minnesota's population. Despite its relatively low population, the Pine River Major Watershed provides outsized social and economic services.

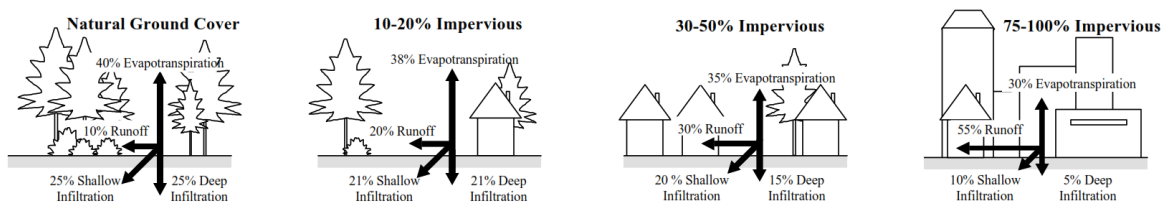
The Pine River Major Watershed is in the heart of Minnesota's lake country, and every year thousands of tourists and seasonal residents flock to the cabins, campgrounds, resorts, and other recreational sites that accompany the watershed's 500+ lakes and 330 miles of streams. The Pine River Major Watershed is also unique in that it receives input only from precipitation, which is first filtered by the forests and wetlands, and then goes on to supply drinking water for major population centers in the rest of the state. The [Forests, Water, and People](#) study by the Forest Service, the Pine River Major Watershed was rated as the state's top ranked watershed at risk for development pressure on forests important for public drinking water supply.

To continue producing high quality drinking water, the forests and wetlands in the Pine River must be protected. In general, forests and wetlands export much less phosphorous – which is a key determinant of water quality – than development or agriculture (Fig 10). Furthermore, natural cover greatly promotes infiltration and reduces runoff of sediment and potentially pollution-laden runoff (Fig 11).

**Fig 10. Annual phosphorous exports by land use.**



**Fig 11. Effects of imperviousness on runoff and infiltration.**



Source: Adapted from Arnold and Gibbons, 1996.

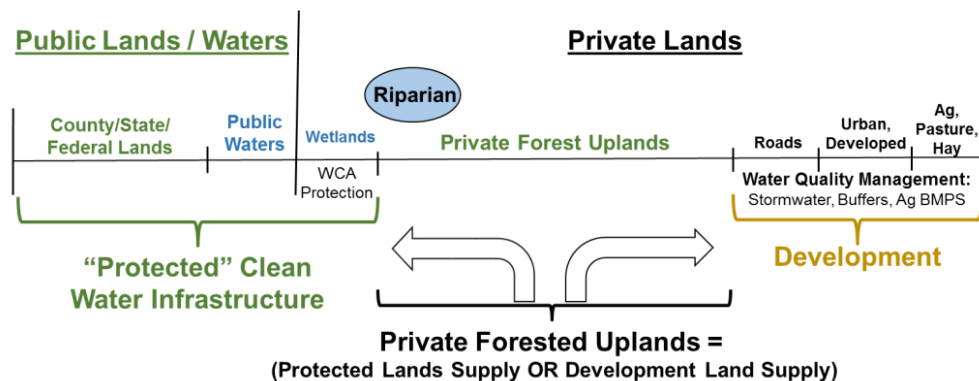
## Risk/Quality Assessment

*“Priority is at the intersection of risk and quality”*

*- Pete Jacobson, MNDNR Fisheries*

### What is Protection?

One of the most important concepts in landscape stewardship is that of ‘protection’. In the context of this plan, the parts of a landscape that are protected are those areas that are not likely to be converted from an intact natural ecosystem (e.g., forest, wetland, lakes, etc.) to an open or disturbed state (e.g., agriculture, development, or mining). Protected land is commonly defined as public lands (local, state, federal), public waters (lands & streams), wetlands on private lands, and perpetual conservation easements on private lands. The *Generalized Land Protection Model*, shown below, illustrates the details of what in the landscape is protected and what is at risk.



**Fig 12. Generalized Land Protection Model.**

### What is Priority?

The view that protection efforts should focus on areas that have high quality habitat but are at risk of being lost is one of the guiding principles of landscape stewardship in Minnesota. Generally, the greatest risk occurs on private lands because that is where conversion of natural ecosystems to agriculture and development is the most likely to occur. Other potential indicators of risk include lake water quality trends, lake phosphorous sensitivity, point source pollution, land disturbance, slope, and road development. Conversely, measures of quality include prioritized lakes (e.g., wild rice, tullibee, trout), lakes of biodiversity significance, forest cover, Forests for the Future score, terrestrial biodiversity ranking (Minnesota Biological Survey), Wildlife Action Network score, and others. At the first meeting of the Pine River LSP Planning Team, participants reviewed these indicators for each minor watershed and determined the drivers of quality and risk in each. A summary of these drivers for each subwatershed is provided in the table below.

**Table 2. Drivers of quality and risk in the Pine River Major Watershed.**

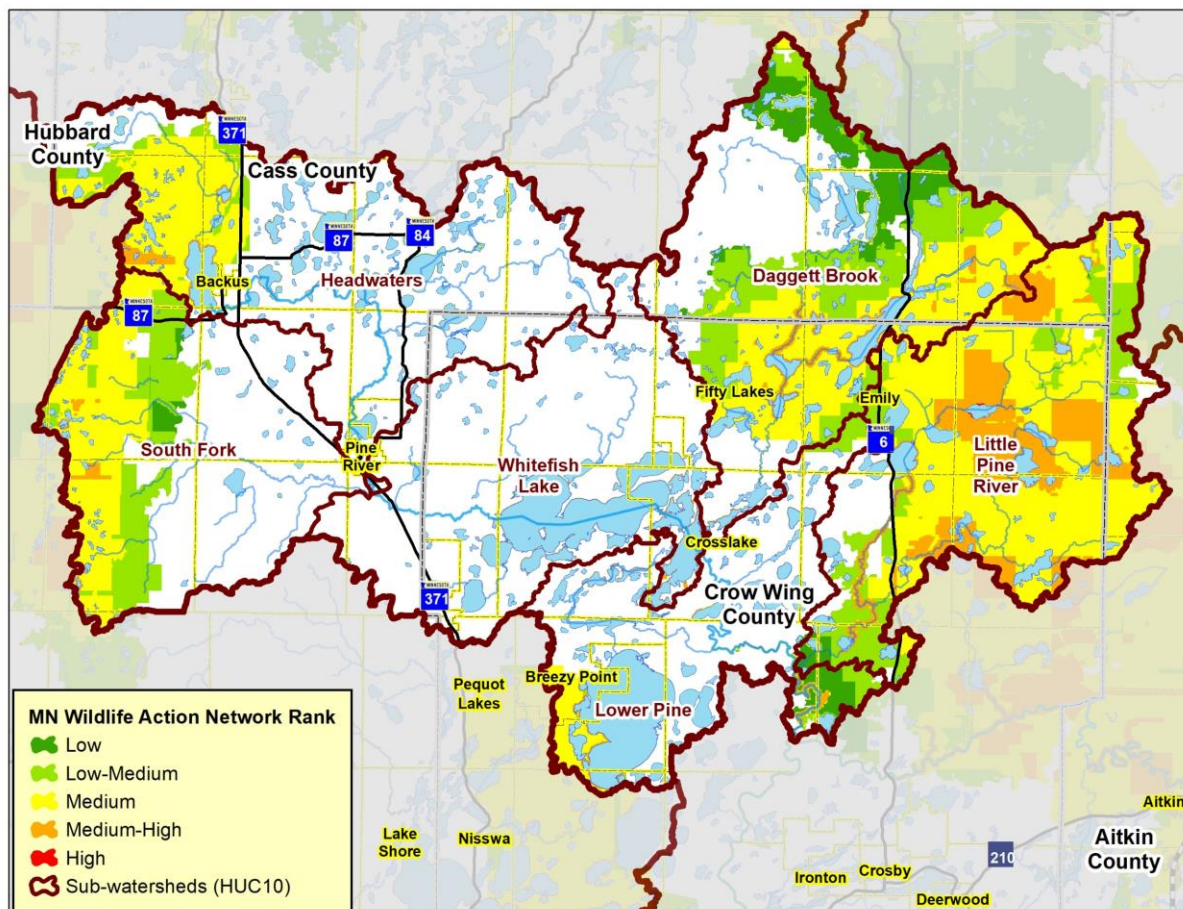
Subwatershed name	Drivers of quality	Drivers of risk
Headwaters Pine River	Numerous small-medium sizes lakes with abundant fish and wildlife (+ wild rice)	Development of remaining large tracts or conversion to open lands
South Fork Pine River	High quality hardwood forests on moraine	Grazing
Daggett Brook	High quality lakes (all sizes) & forests	Development
Whitefish Lake	Very high quality lakes	Residential development, grazing
Little Pine River	High terrestrial biodiversity & Forests for the Future Scores	Development
Lower Pine River	Numerous small to mid-size high quality lakes	Residential development

## Forest Conservation Opportunity Areas

The following list of existing conservation priorities in the Pine River Major Watershed have been identified by various state agencies and environmental organizations. As noted previously, these resources were consulted by the Pine River LSP Planning Team in helping to determine private forest land protection priorities. As this plan is implemented, project partners are encouraged to consult these priority efforts and seek to support their concurrent implementation. For more information on these priorities, please refer to the [Appendix](#).

- Minnesota DNR Wildlife Action Network – DNR EWR (shown below)
- Important Forest Resource Areas (IFRA) – DNR PFM Program, US Forest Service.
- Forests for the Future Analysis – DNR Forestry Forest Legacy Program, US Forest Service.
- Minnesota Biological Survey – DNR EWR.
- Pine River Watershed Restoration and Protection Strategies – MPCA.
- 25-Year Lessard-Sams Outdoor Heritage Council (LSOHC) Forest Habitat Vision – MFRC and MFRP.
- Zonation Model – DNR and TNC.

**Fig 13. MN DNR Wildlife Action Network.**



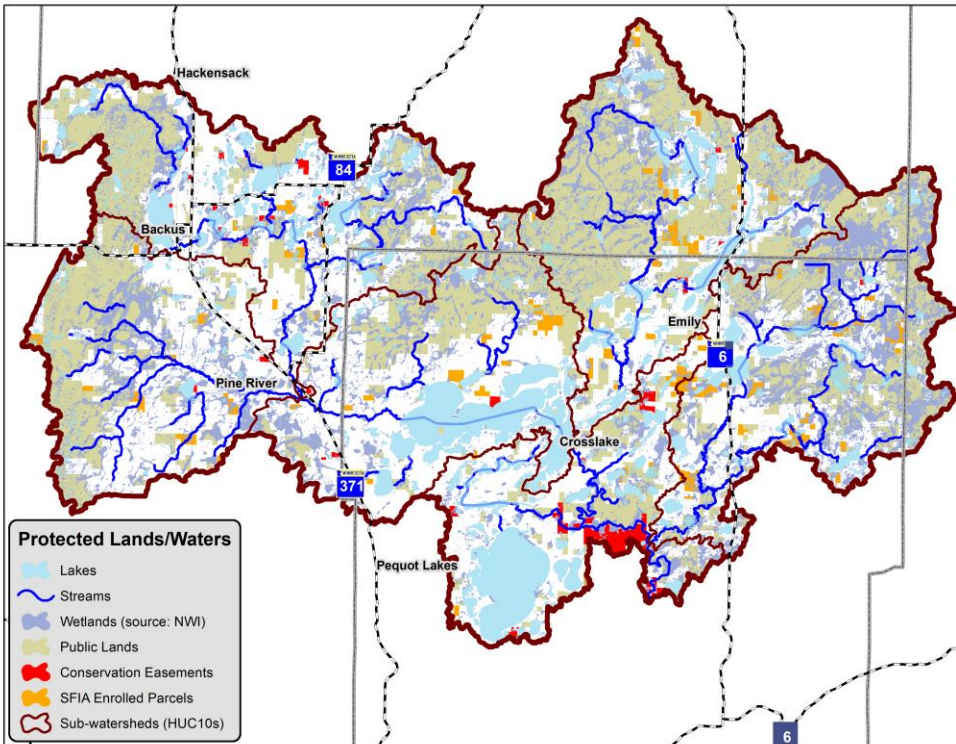
## Key Observations and Conclusions

The following key observations and conclusions are based on the information gathered during the planning process for this landscape stewardship plan:

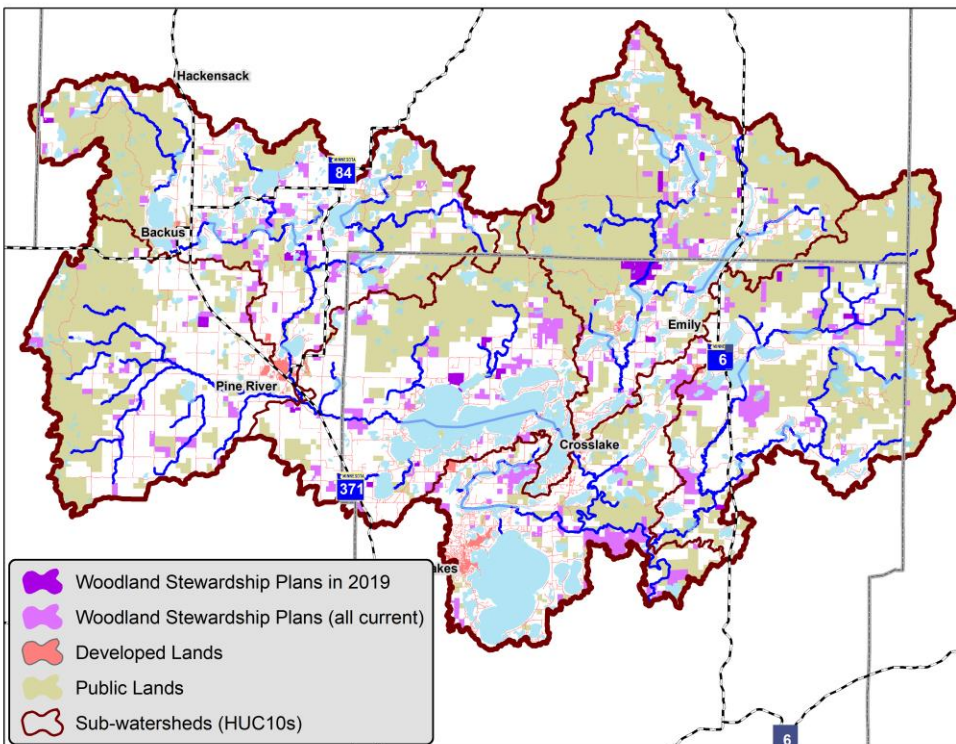
- The Pine River Major Watershed has some of the finest freshwater lakes in the country with good water quality thanks to an abundance of well drained soils, high forest cover, intact wetlands, flat slopes, and mostly natural (not channelized) streams.
- There is significant potential for loss of private forest lands and an increase in landscape disturbance in the south-central central part of the watershed where development and population growth are increasing.
- Many excellent conservation tools and programs are already in place, and PFM is the key program through which we can reach out to and serve private landowners. Outreach should be conducted through public/private partnerships with state, local government, and private forest consultants.
- Outreach efforts should be focused on parcels and properties with high RAQ scores, particularly in priority minor watersheds. This gives the best return on investment for available time and money.
- PFM is key in many minor watersheds, although some minors and lakes will be BMP orientated – e.g., reducing nutrient and sediment runoff with practices such as riparian buffers.
- No major forest industries are located within this watershed although several smaller stationary sawmills and businesses are in operation, such as Christensen Forest Products. Nearby mills that may procure timber from inside the Pine River Major Watershed include Savannah Pallets, Norbord, Cass Forest Products, Rajala, Lonza, Nelson Wood Shims, and Blandin Paper Company. These industries use a mix of conifer and deciduous species. Forest industries like these provide key markets to utilize forest resources creating jobs and economic growth while supporting opportunities to increase the sustainable management of the forest lands.
- Well managed forests are important carbon sequestration. Utilizing ecosystem-based forest management will improve carbon sequestration and storage.
- This watershed supports the move towards managing for ECS / NPC based forest management including long lived conifers while at the same time supports an array of upland and lowland deciduous species. Managing for native plant communities and healthier forests benefits the hydrologic functions of the watersheds. In addition, the mix of forest industries creates opportunities to support the sustainable management of all forest cover types in the watershed.
- The North Central Landscape Plan approved by the Minnesota Forest Resources Council (MFRC) provides useful guidance for forest vegetation management based on native plant communities across the 10-county region including this watershed. The Council's site level guidelines provide detailed guidance for forest management activities on a site level. Combined, the landscape and site level guidance provide excellent foundations for service providers in advising private landowners on ways to sustainably manage their woodlands.



## Forest Land Protection – Current Status



## Private Forest Stewardship – Current Status



For more information – see the [Appendix](#) and the LFT Workbook.

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## The Vision

### Mission

To empower teams of service providers to work together with private landowners and land managers in the Pine River Major Watershed to protect and manage working forest lands to increase both the private and public benefits that forests provide.

### Vision

In ten years, the Pine River Major Watershed will have:

- Protected Water Resources – landowners and project partners that recognize together healthy working forests are key to protecting good water quality and quantity.
- Healthy and Sustained Forests – forests in the major watershed will be healthy and managed in an ecologically appropriate manner.
- Multiple Uses of Forest Resources – a full range of public and private benefits from timber to tourism will be produced by forests in the watershed.
- Collaborative Management – service providers and partners will work together to achieve the goals set forth in this plan.

### Major Watershed Forestry Goals

#### Goal 1: Increase Forest Land Protection Levels

- Major watershed level (HUC 8): Current level – 65%. Goal – 75%.
- Subwatershed levels (HUC 10): Current levels range from 56% to 79%. Goal – all subwatersheds 75%, except for South Fork Pine River and Whitefish Lake subwatersheds – 65%.
- Minor watershed levels (HUC 14): Protection goals recommended by the LSP Planning Team. See [Appendix](#) and the LFT Workbook.

#### Goal 2: Promote Private Forest Stewardship

- Coordinate the work of service providers.
- Target outreach to private landowners.
- Increase number/acres of stewardship plans.
- Promote integration of NPC based forest management goals and strategies developed in the North Central Landscape Plan (MFRC).
- Increase number/acres of practice plans and implementation projects.
- Increase targeted investment of NRCS, DNR and Legacy funding based on MWA/RAQ.

### Coordinated Roles to Increase Forest Land Protection and Stewardship

#### Goal 1: Increase Forest Land Protection Levels

- DNR + BWSR: administrative lead.
- SWCDs: local lead, outreach, implement.
- DNR CFM: project coordination, reporting.
- DNR FL: target larger tracts.
- NGOs: bring partner resources, advocate.
- Landowners: they choose.

#### Goal 2: Promote Private Forest Stewardship

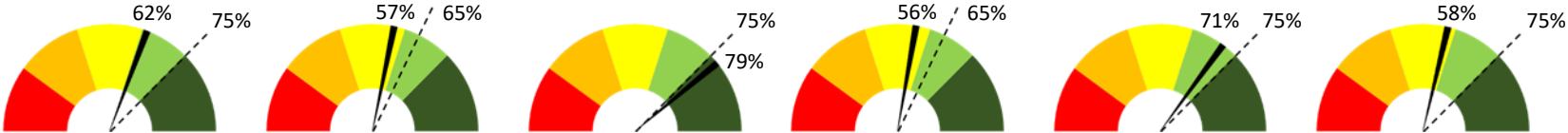
- DNR + BWSR: administrative lead.
- DNR CFM: PFM program coordination.
- SWCDs: local lead, outreach, plans, 1W1P.
- Consulting foresters: plans, timber sales.
- Loggers/vendors: forest management.
- Landowners: Its their land.

Goal 1: Forest Land Protection

To draw some conclusions for management priorities and to help compare each subwatershed with the others on each given resource issue, the resulting calculations of the key assessments were placed into a table format. The table below summarizes the results of the calculations made for each subwatershed through the subwatershed assessment process.

	Subwd. No 1 (HUC 701010501)  Headwaters Pine River	Subwd. No 2 (HUC 701010502)  South Fork Pine River	Subwd. No 3 (HUC 701010503)  Daggett Brook	Subwd. No 4 (HUC 701010504)  Whitefish Lake	Subwd. No 5 (HUC 701010505)  Little Pine River	Subwd. No 6 (HUC 701010506)  Lower Pine River
Area	95,510 ac	74,074 ac	95,494 ac	83,980 ac	90,743 ac	61,086 ac
Natural Factors						
Presettlement forest cover	76%	90%	86%	77%	88%	66%
Current forest cover*	69%	65%	79%	58%	74%	60%
Lakes	143 lakes; 13%	70 lakes; 3%	125 lakes; 11%	60 lakes; 20%	48 lakes; 8%	68 lakes; 25%
Wetlands	24%	30%	26%	26%	39%	24%
Forest Land Protection Assessment						
Public waters	12,632 ac; 13%	2,500 ac; 3%	11,007 ac; 12%	16,993 ac; 20%	7,900 ac; 9%	15,940 ac; 26%
Public lands	36,244 ac; 38%	30,040 ac; 41%	57,384 ac; 60%	21,162 ac; 25%	43,182 ac; 48%	11,386 ac; 19%
Private wetlands	7,885 ac; 8%	8,859 ac; 12%	4,662 ac; 5%	6,775 ac; 8%	11,094 ac; 12%	4,676 ac; 8%
SFIA	877 ac; 0.9%	1,091 ac; 1.5%	2,183 ac; 2.3%	1,574 ac; 1.9%	1,903 ac; 2.1%	795 ac; 1.3%
Easements	1,270 ac; 1.3%	98 ac; 0.1%	473 ac; 0.5%	236 ac; 0.3%	470 ac; 0.5%	2,360 ac; 3.9%
Total protected area	59,155 ac; 62%	42,588 ac; 57%	75,709 ac; 79%	46,741 ac; 56%	64,548 ac; 71%	35,157 ac; 58%
Protection priority	High	Medium	Low	High	Medium	High
Forest Land Protection Cost Analysis						
Protection goal	75%; 12,478 ac to goal	65%; 5,560 ac to goal	75%; 0 ac to goal	65%; 7,846 ac to goal	75%; 3,509 ac to goal	75%; 10,658 ac to goal
Potential to protect	19,958 ac; 21%	17,251 ac; 23%	10,538 ac; 11%	19,059 ac; 23%	20,381 ac; 22%	12,234 ac; 20%
Average land value	\$2,178/ac	\$1,659/ac	\$2,952/ac	\$2,641/ac	\$1,699/ac	\$3,274/ac
Protection cost†	\$16,040,093	\$6,281,970	\$0	\$11,175,769	\$4,006,822	\$17,204,724
Forest Land Protection Priorities						
Quality Protection Factors						
Cisco lakes	1 lake; 0%	0 lakes; 0%	4 lakes; 4%	9 lakes; 15%	0 lakes; 0%	5 lakes; 16%
Trout lakes	1 lake; 0%	0 lakes; 0%	6 lakes; 2%	1 lake; 2%	0 lakes; 0%	2 lakes; 0%
Lakes of biodiversity significance (outstanding & high)	12 lakes; 4%	1 lake; 0%	8 lakes; 5%	12 lakes; 16%	10 lakes; 2%	7 lakes; 16%
Priority shallow lakes	10 lakes; 2%	5 lakes; 1%	8 lakes; 1%	4 lakes; 1%	6 lakes; 2%	10 lakes; 2%
Priority wild rice lakes	9 lakes; 4%	2 lakes; 0%	4 lakes; 3%	3 lakes; 1%	3 lakes; 0%	5 lakes; 2%
Trout steams	0 mi	16 mi	4 mi	3 mi	0 mi	0 mi
FFF mean composite score	97.6	89.9	98.6	91.7	100.7	86.1
Terrestrial biodiversity (MBS) (outstanding and high)	6,835 ac; 7%	7,637 ac; 10%	11,937 ac; 13%	58 ac; 0%	47,234 ac; 52%	2,259 ac; 4%
Wildlife Action Network (high & medium-high)	4,004 ac; 4%	602 ac; 1%	5,476 ac; 6%	13,479 ac; 16%	20,020 ac; 22%	7,782 ac; 13%
Risk Management Factors						
Lake phosphorous sensitivity (highest & higher)	15 lakes; 6,347 ac	0 lakes; 0 ac	15 lakes; 5,791 ac	11 lakes; 13,537 ac	10 lakes; 2,521 ac	19 lakes; 12,957 ac
Water quality trend (declining)	2 lakes; 644 ac	0 lakes; 0 ac	2 lakes; 387 ac	5 lakes; 9,721 ac	2 lakes; 969 ac	0 lakes; 0 ac
Land use disturbance	17,319 ac; 18%	25,975 ac; 35%	8,172 ac; 9%	19,481 ac; 23%	8,079 ac; 9%	7,729 ac; 13%

Protection Levels and Goals‡



\*Includes woody wetlands.  
†Protection cost assumes 50% conservation easement and 50% SFIA.  
‡Solid lines represent current level of protection, dashed line is the goal.



Goal 2: Promote Private Forest Stewardship

The second major goal of this Landscape Stewardship Plan is to promote private forest stewardship and consideration of native plant communities (NPCs) in management activities. The map on the right displays the potential NPC system for private lands in the Pine River Major Watershed. The yellow circles indicate priorities for forest land management identified by the Pine River Forestry Technical Committee.

It is important to note that this map displays the potential NPC of private lands only, and it includes lands that are not currently forested. This map is a vision for all private lands, including nonforested lands, because it reflects what the private landscape can potentially be if the land is managed in accordance with its biological potential.

The tables on the right side of this page compares Public Land Survey (PLS; ca. 1846-1908 AD) and Forest Inventory and Analysis (FIA; ca. 1990 AD) growth-stage data for common NPC classes in the Pine River. These tables are from the Silviculture Interpretations developed by MN DNR Division of Forestry, Ecological Land Classification. Additional information on NPCs and their management can be found in the [Appendix](#) and the [North Central Landscape Ecological Pathway](#).

The goals listed below for each subwatershed are for increased forest management through stewardship plans and acres as well as for cost share practices over the next ten years.

Forest Management Goals

**Subwd 1 – Headwaters Pine River**  
49% private, 51% public  
1,643 parcels > 20 ac  
71,981 ac > 20 ac  
48 fsps; 4,474 ac

**10 Yr PFM Goals:**  
137 fsps; 15,506 ac

**Subwd 2 – South Fork Pine River**  
56% private, 44% public  
949 parcels > 20 ac  
67,953 ac > 20 ac  
26 fsps; 2,844 ac

**10 Yr PFM Goals:**  
63 fsps; 7,156 ac

**Subwd 3 – Daggett Brook**  
28% private, 72% public  
1,712 parcels > 20 ac  
76,757 ac > 20 ac  
46 fsps; 4,738 ac

**10 Yr PFM Goals:**  
31 fsps; 3,481 ac

**Subwd 4 – Whitefish Lake**  
55% private, 45% public  
1,382 parcels > 20 ac  
53,755 ac > 20 ac  
51 fsps; 5,377 ac

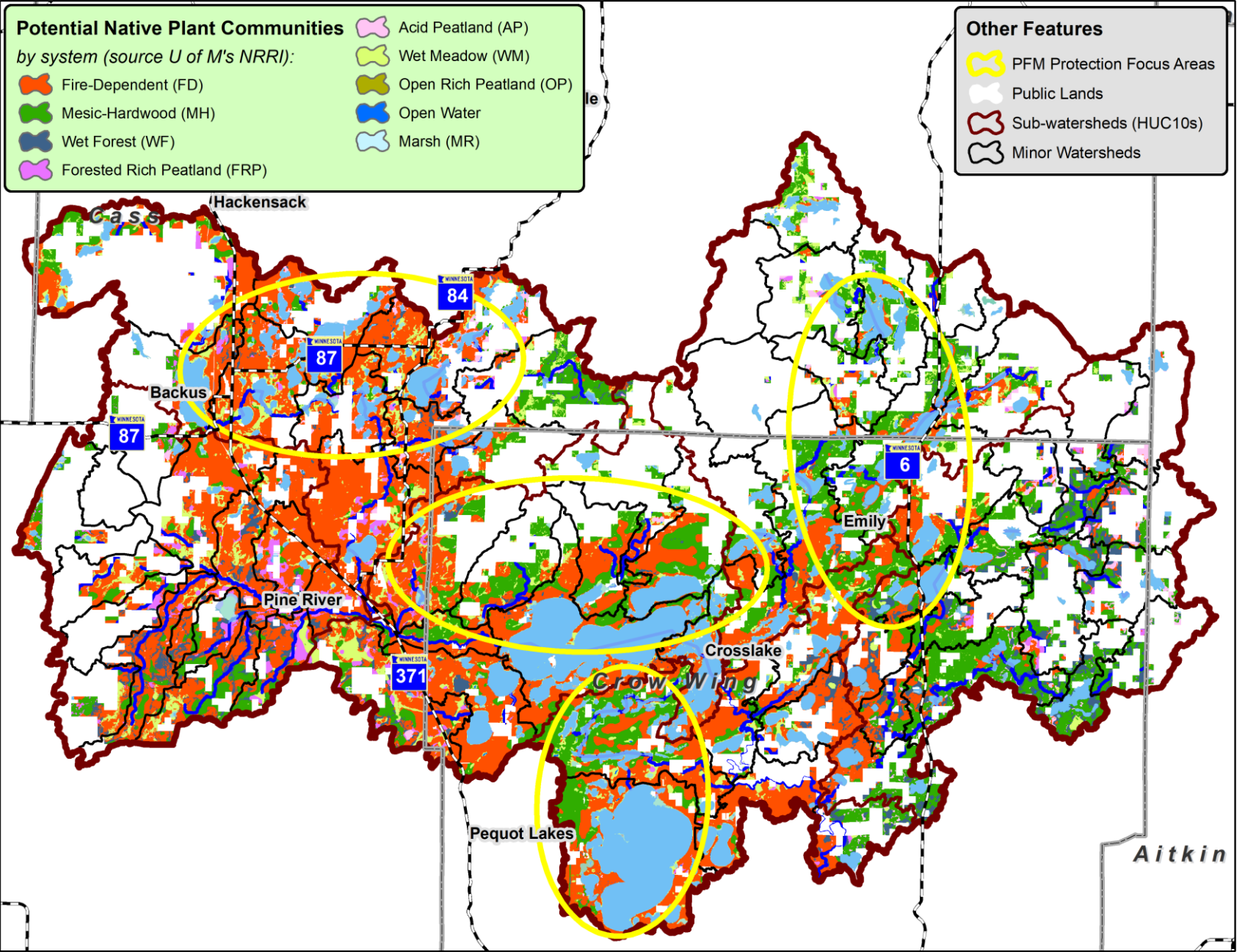
**10 Yr PFM Goals:**  
87 fsps; 9,842 ac

**Subwd 5 – Little Pine River**  
44% private, 56% public  
1,850 parcels > 20 ac  
78,470 ac > 20 ac  
25 fsps; 4,442 ac

**10 Yr PFM Goals:**  
63 fsps; 7,142 ac

**Subwd 6 – Lower Pine River**  
55% private, 45% public  
788 parcels > 20 ac  
29,431 ac > 20 ac  
31 fsps; 3,753 ac

**10 Yr PFM Goals:**  
128 fsps; 14,449 ac



Growth Stage and Composition for Common Private Land NPCs

FDn33: Northern Dry-Mesic Mixed Woodland

Dominant Trees	Forest Growth Stages in Years					
	0 - 35	35 - 55	55 - 125	~ 125	> 125	
	Young	T1	Mature	T2	Old	
Quaking (Big-toothed) Aspen	40%	79%		9%	48%	7% 37%
Jack Pine	15%	-		7%	-	2% -
Red Pine	17%	1%		27%	1%	16% 1%
Paper Birch	16%	5%		19%	26%	14% 18%
Balsam Fir	1%	7%		4%	11%	5% 15%
White (Black) Spruce	-	1%		5%	1%	13% 1%
White Pine	-	0%		19%	1%	30% 19%
Red Maple	-	4%		1%	9%	2% 0%
White Cedar	-	0%		2%	1%	2% 8%
Miscellaneous	11%	3%		7%	2%	9% 1%
Percent of Community in Growth Stage in Presettlement and Modern Landscapes	14%	30%	27%	30%	44%	39% 15% 1%

Natural growth-stage analysis and landscape summary of historic conditions is based upon the analysis of 6,807 Public Land Survey records for section and quarter-section corners. Comparable modern conditions were summarized from 2,615 FIA subplots that were modeled to be FDn33 sites.

MHn35: Northern Mesic Hardwood Forest

Dominant Trees	Forest Growth Stages in Years					
	0 - 55	55 - 95	95 - 205	205 - 295	> 295	
	Young	T1	Mature	T2	Old <sup>2</sup>	
Paper Birch	38%	9%		28%	7%	12% 0%
Quaking Aspen	20%	22%		6%	4%	4% 0%
Red Oak	10%	6%		5%	11%	1% 0%
Balsam Fir	5%	4%		3%	2%	1% 0%
Basswood	6%	9%		9%	19%	6% 0%
White Spruce <sup>1</sup>	1%	1%		13%	0%	- 0%
Sugar Maple	11%	24%		14%	32%	29% 50%?
White Pine	1%	0%		7%	1%	31% 0%
American Elm	3%	2%		2%	3%	0% 0%
Red Maple	-	9%		-	4%	0% 0%
Ironwood	1%	7%		1%	7%	1% 0%
Bur Oak	1%	1%		2%	3%	0% 50%?
Miscellaneous	3%	6%		10%	7%	15% 0%
Percent of Community in Growth Stage in Presettlement and Modern Landscapes	39%	29%	51%	52%	8%	18% 1% 1% 1% 0%

Natural growth-stage analysis and landscape summary of historic conditions is based upon the analysis of 5,887 Public Land Survey records for section and quarter-section corners. Comparable modern conditions were summarized from 3,470 FIA subplots that were modeled to be MHn35 sites.

1. Important historically, white spruce is no longer a significant component of MHn35 forests and is not covered in the accounts of potential crop species.

2. Just 4 FIA trees contributed to the old growth-stage and the results are unreliable.

## Vision Summary

The following points summarize the vision and the two major goals for the Pine River Major Watershed.

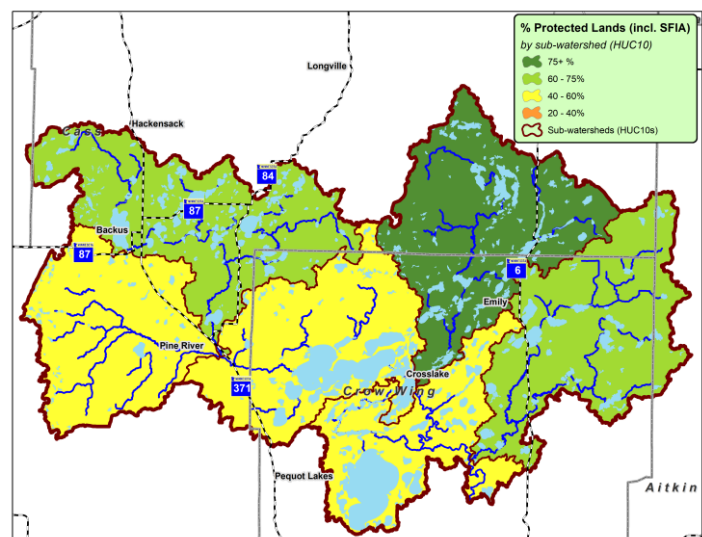
- Private land covers approximately half of the Pine River Major Watershed and is intermixed with public lands in some areas but dominates the landscape in others. The Pine River LSP Planning Team selected priority focus areas across the Pine River Major Watershed (see map with Goal 2 narrative and lists in the following Subwatershed Action Plans) to focus forest land protection / forest stewardship efforts and identified specific minor watersheds to concentrate landowner outreach efforts.
- Public lands dominate the Daggett Brook Subwatershed where most of the land is managed by the state or county land departments. This subwatershed is beyond the 75% forest protection goal as stated in Goal 1, and therefore is not priority for private forest management because few private forest acres are available.
- One of the aims of Goal 2 (Promote Private Forest Stewardship) is to at a minimum have an updated forest stewardship plan (FSP) on every acre that is or will be protected by a conservation easement or SFIA. Consequently, larger areas of existing conservation easements or SFIA and higher forest land protection goals equate to higher FSP goals in this plan.
- The Pine River Major Watershed has significantly fewer conifers than it had under natural conditions. Long-lived conifers, including white pine and white spruce, made up a much larger components of both fire-dependent and mesic-hardwood forests across the major watershed historically.
- Contemporary forest management strategies tend to favor shade intolerant hardwoods such as aspen. This combined with high populations of deer, fire suppression, and reliance on winter harvests have increased the amount of aspen over time. NPC based silvicultural actions could help to restore conifer components in many of these stands.
- Private forest lands can help restore the upland native plant communities to older growth stages across the landscape if private landowners choose to manage for longer live conifers as a component in their forest stewardship plans.

## Subwatershed Guidance

The purpose of the following nine narratives provide service providers and resource managers with a detailed description of subwatershed-level conditions and recommendations.

These ‘subwatershed action plans’ are intended to help service providers and managers identify and prioritize specific areas in the Pine River Major Watershed so they can more effectively work together to implement activities that are likely to improve water quality, increase forest management, and achieve other public and private benefits.

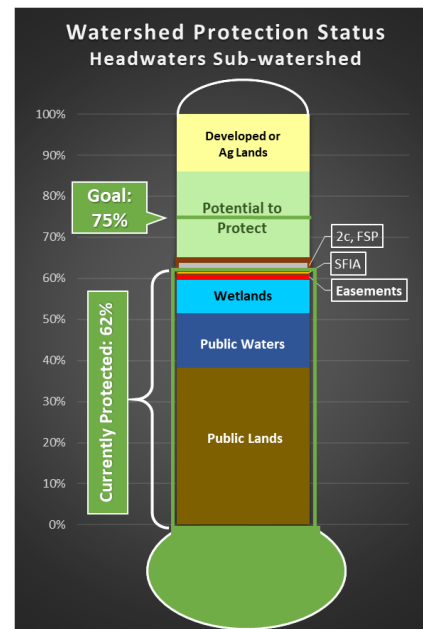
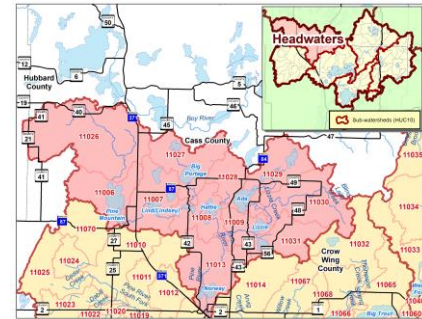
**Fig 14. Subwatershed (HUC10) protection levels.**



## Subwatershed No. 1 Headwaters Pine River (HUC 701010501)

### Goal 1: Forest Land Protection Guidance

- High forest and woody wetland cover, 69%.
- Home to numerous small-medium sizes lakes with abundant fish, wildlife, and wild rice.
- Has many small, charming, and high-quality recreation lakes with low impact.
- With 143 lakes in the subwatershed a lot of settling of suspended solids occurs.
- High Forests for the Future scores.
- At risk from development of remaining large tracts or conversion to open lands.
- Home two 'yellow' minors (40-60% protected) with many smaller tracts.
- Home to two 'orange' minors (20-40% protected). Norway Lake in minor watershed 11013 is the last lake in the subwatershed and is highly developed.
- The middle of the watershed is about 18% disturbed, mostly from hayfields.
- High priority for forest land protection.
- Forest land protection goal is 75%, current subwatershed protection is 62%. Goal is ambitious but doable because of the availability of large tracts for protection.



### Goal 2: Forest Stewardship Guidance

- The St. Croix Moraine dominates the upper reaches of the subwatershed and outwash plains cover most of the remaining area. A portion of the eastern corner is covered by ice contact deposits and till plains.
- Fire-dependent forests are likely to be supported on the sandy outwash plains, while mesic hardwood forests have greater potential on the moraines and till plains. Most of the wetland areas have the potential to support wet meadow NPCs.
- The current forest cover is primarily in the aspen-birch cover type, although some stands of pine and lowland conifers are also present.
- See the Fire-Dependent and Mesic Hardwood vegetation management goals from the 2<sup>nd</sup> Generation North Central Landscape Plan.
- Forest stewardship plan goal – 137 plans, 15,506 acres.

**Table 3. Minor watershed info.**

Minor wshd #	Acres	Current % protected	Protection goal %
11006	7,696	75.2%	75%
11007	8,457	43.9%	75%
11008	5,895	70.0%	75%
11009	4,087	46.8%	75%
11013	10,617	32.0%	75%
11026	20,541	73.2%	75%
11027	8,642	61.3%	75%
11028	3,909	33.4%	75%
11029	8,771	72.1%	75%
11030	10,745	70.6%	75%
11031	6,151	75.7%	75%

### Priority Minor Watersheds

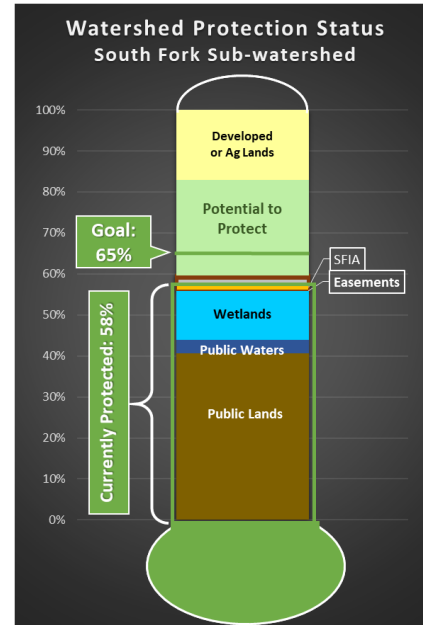
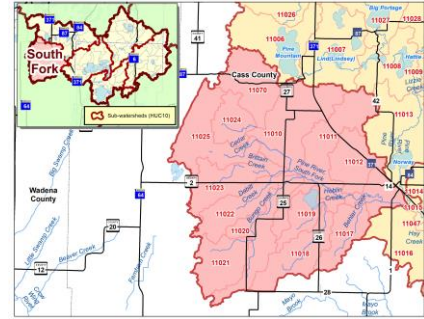
- Priority minor watersheds for protection are 11007, 11027, and 11029.



## Subwatershed No. 2 South Fork Pine River (HUC 701010502)

### Goal 1: Forest Land Protection Guidance

- High forest and woody wetland cover, 65%.
- Largely stream based watershed with relatively few lakes.
- Tributary to the Whitefish Chain of Lakes.
- Home to several trout streams.
- High quality hardwood forests on moraine.
- Has agricultural and recreational hunting landowner interests.
- Has the most land use disturbance any subwatershed in the major watershed, about 19%. A lot of reforestation efforts will be required to meet subwatershed goals.
- This subwatershed has heavier loading than the Headwaters Pine River Subwatershed into the Whitefish Chain of Lakes.
- Has an abundance of sod bound soils in the pasturelands.
- Water quality at risk from grazing.
- Medium priority for forest land protection.
- Current forest land protection is 57%, the base subwatershed protection goal is 65% and the stretch goal is 70%.
- Priority focus is to maintain and improve water quality for the receiving waters downstream of the subwatershed.
- Recommend promoting existing forest land into SFIA, reforesting open lands, and promoting practices to reduce sediment settling.
- Protection goal can be met with a combination of SFIA and reforestation efforts. MDH source water and carbon programs can help make the 70% stretch goal more realistic.



### Goal 2: Forest Stewardship Guidance

- Moraines dominates the upper reaches of the subwatershed and rest is mostly covered by outwash and till plains. Outwash deposits are more common in the northern half while till plains are more common in the southern half of the subwatershed.
- Fire-dependent forests are likely to be supported on the sandy outwash plains, while mesic hardwood forests have greater potential on the moraines and till plains. The wetland areas have the potential to support wet meadow, wet forest, or forested rich peatland NPCs.
- The current forest cover is largely deciduous and in the aspen-birch cover type.
- See the Fire-Dependent, Mesic Hardwood, Wet Forest, and Forested Rich Peatland vegetation management goals from the 2<sup>nd</sup> Generation North Central Landscape Plan.
- Forest stewardship plan goal – 63 plans, 7,156 acres.

### Priority Minor Watersheds

- Priority minor watersheds for protection are 11010 and 11020.

**Table 4. Minor watershed info.**

Minor wshd #	Acres	Current % protected	Protection goal %
11010	8,988	44.1%	75%
11011	11,191	36.1%	75%
11012	4,386	31.4%	75%
11017	3,783	47.8%	75%
11018	5,422	33.8%	75%
11019	3,206	47.4%	75%
11020	6,001	33.8%	75%
11021	4,778	72.4%	75%
11022	4,648	85.5%	75%
11023	5,589	74.4%	75%
11024	3,145	100.0%	75%
11025	7,034	86.7%	75%
11070	5,902	87.8%	75%



## Subwatershed No. 3 Daggett Brook (HUC 701010503)

### Goal 1: Forest Land Protection Guidance

- Very high forest and woody wetland cover, 79%.
- Home to numerous small and mid-size high quality lakes.
- High Forests for the Future scores.
- At risk from development.
- Low priority for forest land protection. Subwatershed is already highly protected.
- Subwatershed forest land protection goal is 75%, current protection is 79% - subwatershed goal met!
- Enhance protection at the minor watershed level with SFIA on parcels that will have a good return on investment.

### Goal 2: Forest Stewardship Guidance

- The geomorphology in this subwatershed is a mix of till plains, end moraines, and outwash plains. The till plain and moraine deposits are generally located closer to the middle of the subwatershed while the outwash deposits are at the northern and southern end.
- Most of the upland area has the potential to support mesic hardwood forests, although parts of the areas covered by outwash deposits may support fire dependent forests. The wetland areas have the most potential to wet meadow NPCs.
- The current forest cover is largely deciduous and in the aspen-birch cover type. A higher concentration of pine forests occurs near Roosevelt Lake.
- Promote forest stewardship plans which complement the management approach of the nearby public lands.
- See the Mesic Hardwood vegetation management goals from the 2<sup>nd</sup> Generation North Central Landscape Plan.
- Forest stewardship plan goal – 31 plans, 3,481 acres.

### Priority Minor Watersheds

- Priority minor watersheds for protection are 11040 and 11041.

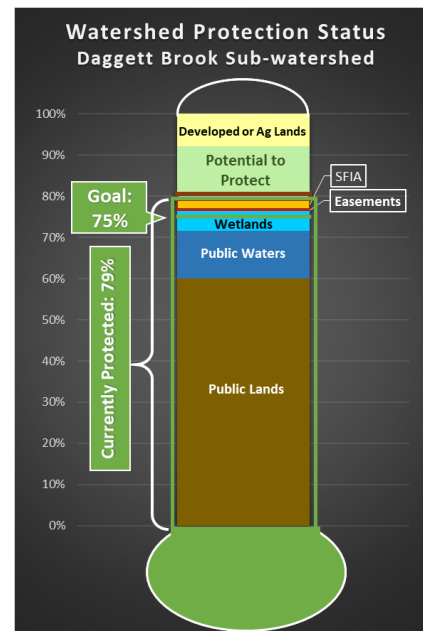
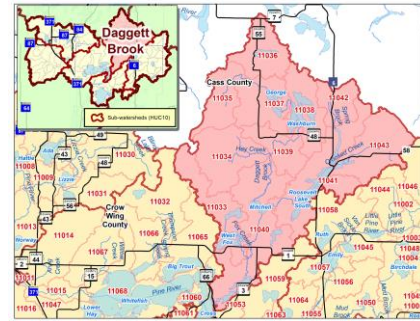


Table 5. Minor watershed info.

Minor wshd #	Acres	Current % protected	Protection goal %
11033	8,592	85.3%	75%
11034	9,317	99.7%	75%
11035	5,923	99.6%	75%
11036	6,736	84.1%	75%
11037	7,481	90.7%	75%
11038	7,405	82.4%	75%
11039	5,370	88.9%	75%
<b>11040</b>	<b>16,968</b>	<b>52.8%</b>	<b>75%</b>
<b>11041</b>	<b>13,588</b>	<b>67.3%</b>	<b>75%</b>
11042	4,264	86.4%	75%
11043	9,850	81.9%	75%

## Subwatershed No. 4 Whitefish Lake (HUC 701010504)

### Goal 1: Forest Land Protection Guidance

- Moderate forest and woody wetland cover, 58%.
- Home to very high quality lakes.
- Landscape slopes from north to south.
- Whitefish Chain of Lakes serves as a settling base for the upper part of the Pine River.
- Lands in the north are largely under county management.
- CR-1 is a future development corridor.
- Whitefish Lake has significant loading from the surrounding landscape.
- At risk from residential development, grazing, and declining water quality trends.
- High priority for forest land protection because the Whitefish Chain of Lakes is important.
- Current forest land protection is 56%, the base subwatershed protection goal is 65% and the stretch goal is 70%.

### Goal 2: Forest Stewardship Guidance

- The geomorphology in this subwatershed is a mix of till plains, outwash, lacustrine, and ice contact deposits. The lacustrine and outwash deposits are in the lower elevation areas near the large lakes, while the till plains and ice contact deposits are generally found in the higher elevation areas in the northern half of the subwatershed.
- Fire-dependent forests are likely to be supported on the lacustrine deposits and sandy outwash plains, while mesic hardwood forests have greater potential on the till plains. Most of the wetland areas have the potential to support wet meadow NPCs.
- The current forest cover is heavily deciduous and largely in the aspen-birch cover type, although northern hardwoods and oak cover types are scattered throughout the subwatershed as well.
- See the Fire-Dependent and Mesic Hardwood vegetation management goals from the 2<sup>nd</sup> Generation North Central Landscape Plan.
- Forest stewardship plan goal – 87 plans, 9,842 acres.

### Priority Minor Watersheds

- Priority minor watersheds for protection are 11014, 11060, 11065, and 11067.

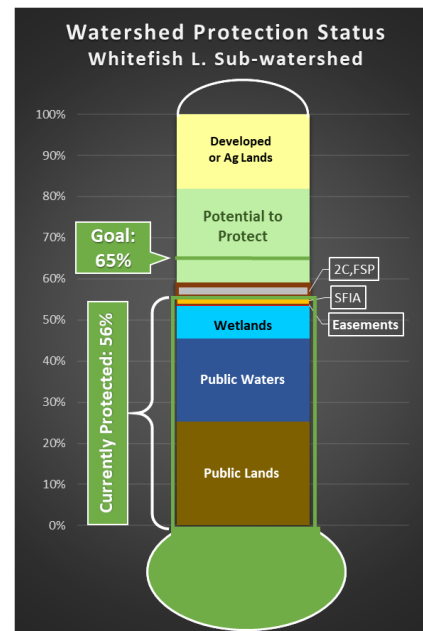
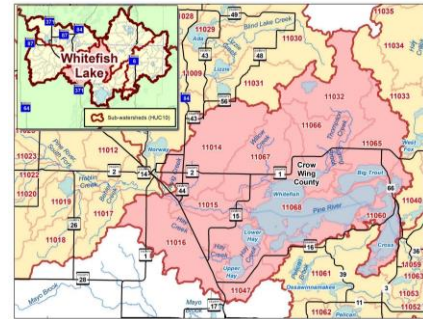


Table 6. Minor watershed info.

Minor wshd #	Acres	Current % protected	Protection goal %
11014	11,103	46.7%	75%
11015	2,988	21.3%	75%
11016	9,492	40.3%	75%
11032	9,971	83.5%	75%
11047	8,542	34.2%	75%
11060	5,274	67.3%	75%
11065	8,263	58.5%	75%
11066	5,698	53.2%	75%
11067	6,916	59.4%	75%
11068	15,733	65.6%	75%

## Subwatershed No. 5 Little Pine River (HUC 701010505)

### Goal 1: Forest Land Protection Guidance

- High forest and woody wetland cover, 74%.
- Abundant wetlands that cover 39% of the subwatershed.
- High terrestrial biodiversity and Forests for the Future scores.
- At risk from development.
- Medium priority for forest land protection.
- Subwatershed forest land protection goal is 75%, current protection is 71%.

### Goal 2: Forest Stewardship Guidance

- The Mille Lacs Moraine forms the eastern boundary to this subwatershed, and a mix of till and outwash plains comprise the remainder.
- Most of the upland area has the potential to support mesic hardwood forests, although parts of the subwatershed by the western border may support fire dependent forests. The wetland areas have good potential to support wet forest and acid peatland NPCs.
- The current forest cover is primarily deciduous and a mix of the aspen-birch, northern hardwoods, and oak cover types. South of the city of Emily is a concentration of pine forests, and the forest lowland areas support lowland conifer forests (e.g., spruce, fir, tamarack, cedar).
- See the Mesic Hardwood, Wet Forest, and Acid Peatland vegetation management goals from the 2<sup>nd</sup> Generation North Central Landscape Plan.
- Forest stewardship plan goal – 63 plans, 7,142 acres.

### Priority Minor Watersheds

- Priority minor watersheds for protection are 11045, 11057, and 11058.

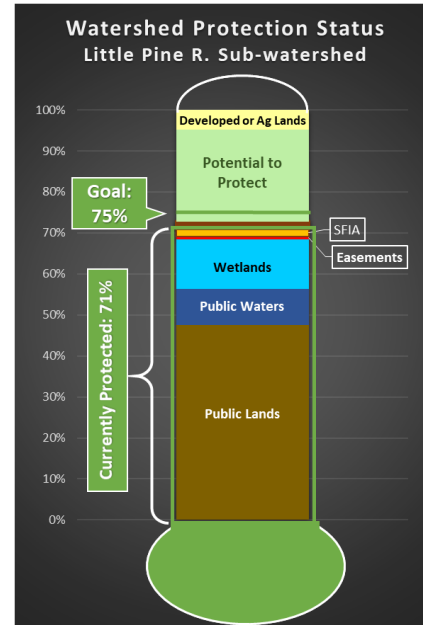
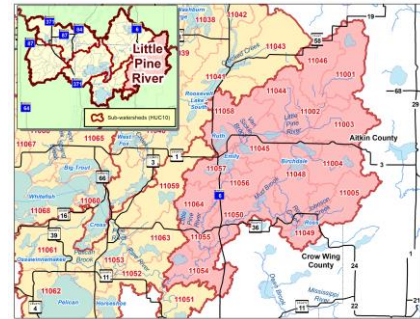


Table 7. Minor watershed info.

Minor wshd #	Acres	Current % protected	Protection goal %
11001	7,063	95.4%	75%
11002	4,673	73.1%	75%
11003	6,089	88.7%	75%
11004	5,259	85.5%	75%
11005	5,433	85.2%	75%
11044	3,938	88.3%	75%
<b>11045</b>	<b>4,658</b>	<b>62.1%</b>	<b>75%</b>
11046	5,312	91.1%	75%
11048	7,307	75.3%	75%
11049	4,043	62.9%	75%
11050	8,118	45.5%	75%
11054	6,224	57.7%	75%
11055	2,593	53.3%	75%
11056	4,725	57.4%	75%
<b>11057</b>	<b>4,033</b>	<b>62.4%</b>	<b>75%</b>
<b>11058</b>	<b>7,697</b>	<b>62.3%</b>	<b>75%</b>
11064	3,577	53.6%	75%



## Subwatershed No. 6 Lower Pine River (HUC 701010506)

### Goal 1: Forest Land Protection Guidance

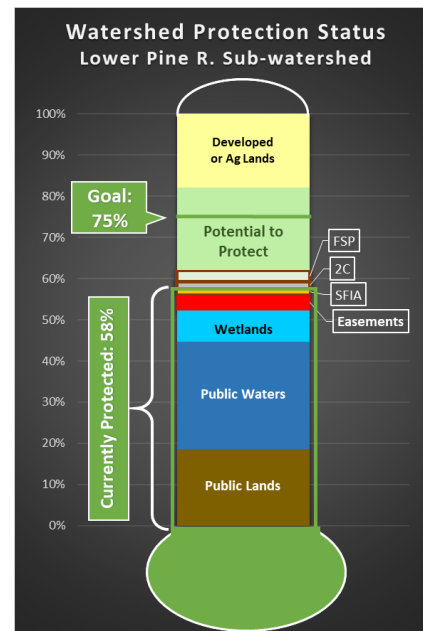
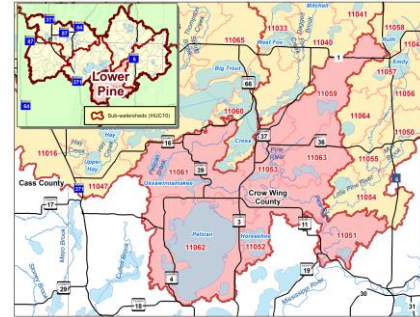
- High forest and woody wetland cover, 60%.
- Home to numerous small and mid-size high quality lakes.
- Has many lakes of high or higher phosphorus sensitivity significance.
- At risk from residential development.
- High priority for forest land protection.
- Subwatershed forest land protection goal is 75%, current protection is 58%.
- Current forest land protection is 58%, subwatershed goal is 75% and a lot of work has already been done to move the needle in the right direction.

### Goal 2: Forest Stewardship Guidance

- Most of this subwatershed lies in the sandy (and topographically flat) outwash plain, with some moraine till present along the edges. Pelican Lake sits in sandy lacustrine (lake-bed) sediment.
- The upland area in this subwatershed can support both fire-dependent and mesic hardwood forests, although fire-dependent forests have greater potential on the outwash plains and the mesic hardwoods are better suited to the moraines. The wetland areas have good potential to support wet forest NPCs.
- Compared to other subwatersheds the forest cover in the Lower Pine River Subwatershed has a greater conifer component. The primary cover types are aspen-birch and pine, although oak and northern hardwood cover types are scattered throughout the subwatershed as well.
- See the Fire-Dependent, Mesic Hardwood, and Wet Forest vegetation management goals from the 2<sup>nd</sup> Generation North Central Landscape Plan.
- Forest stewardship plan goal – 128 plans, 14,449 acres.

### Priority Minor Watersheds

- Priority minor watersheds for protection are 11059, 11061, and 11062.



**Table 8. Minor watershed info.**

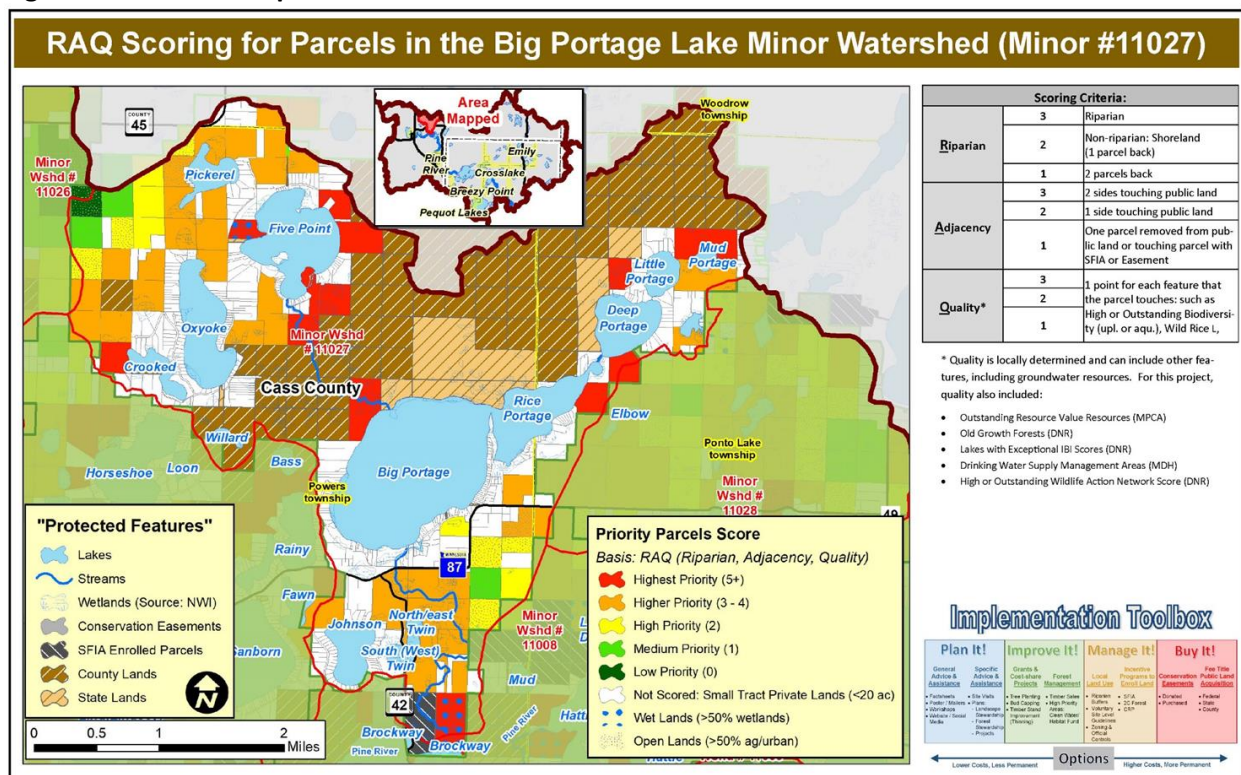
Minor wshd #	Acres	Current % protected	Protection goal %
11051	4,919	68.3%	75%
11052	6,562	78.6%	75%
11053	5,025	53.8%	75%
11059	8,354	51.0%	75%
11061	12,893	36.5%	75%
11062	17,816	64.3%	75%
11063	5,518	63.6%	75%

## Minor Watershed Methodology and RAQ Scoring

The overall Pine River Major Watershed has a protection goal of 75%. Each of its nine subwatersheds have their own protection goals, which range from 65% in the South Fork Pine River and Whitefish Lake subwatersheds to 75% in all the others. The subwatersheds have 7 to 17 minor watersheds, and each minor also has a protection goal that was determined by the Pine River LSP Planning Team based on their best professional judgement on what is achievable for that minor.

To meet these goals local service providers will need to identify and target individual parcels and landowners. To assist in this effort, a Minor Watershed Assessment (MWA) was developed for every minor watershed in the Pine River Major Watershed. As a part of this assessment every minor watershed has a map showing its potential for protection, parcel and landowner RAQ scores (Riparian – Adjacency – Quality), and tables of information about individual parcels and landowners. An example of one of these resources is Fig 15, which shows the RAQ scores for parcels in minor watershed #11027 in the Headwaters Pine River Subwatershed. We can see on this map that the parcels with the highest RAQ scores are next to the lakes and near public land. Protecting these parcels would provide the greatest return on investment. MWA maps and tables are provided in the LFT Workbook. The MWA priorities and RAQ scoring can also be useful information to support local land use officials when developing their comprehensive plans and guidance on land use and public infrastructure decisions.

**Fig 15. RAQ scores for parcels in minor watershed #11027.**



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## Making it Happen

The key to successfully implementing any plan is coordination. Coordination is the critical, yet far too often, invisible process of organizing the ongoing work to be done in landscape management. Successful implementation requires proactive and purposeful coordination. This part of the plan focuses outlines how funding and staff resources will be coordinated to implement the vision and goals in this Plan.

### Coordination Strategies

This plan calls for protecting 40,050 acres of private forest land and the preparation of 57,576 acres of forest stewardship plans across the 500,000-acre Pine River Major Watershed over the next ten years. Implementing these goals will require significant collaborative efforts over this timeframe.

To be certain, these are “push” goals. But they are doable, especially given growing funding levels for protection from state Legacy funds through Clean Water and Outdoor Heritage Funds. In addition, there are growing capacity funds for private forest management that service providers are securing including funding from the US Forest Service S&PF through the LSR grants, DNR cost share and SFIA programs, and local capacity funds to soil and water conservation districts through the BWSR. These funds are foundational to supporting this dynamic private forest management paradigm.

The team of service providers working in this watershed need to pre-think through and commit to a series of coordination strategies. The following outline provides partners in the Pine River Major Watershed an initial pathway to greater success implementation through better coordination:

- Coordination Strategy # 1 – Reconvene, Support and Sustain the Local Forestry Technical Team.
- Coordination Strategy # 2 – Confirm the Project Coordinator.
- Coordination Strategy # 3 – Clarify Partner Roles in Serving Private Landowners.
- Coordination Strategy # 4 – Coordinate Resources for Implementation.
- Coordination Strategy # 5 – Support Accomplishment Reporting.
- Coordination Strategy # 6 – Recommendations to Local and State Agencies and Programs.





## Coordination Strategy # 1 – Reconvene the Local Forestry Technical Team

The primary coordination strategy for this plan is to periodically convene a core group of partners – resource professionals, service providers, local and state officials, environmental groups, tribal representatives, and landowners – into a local team to oversee the coordination and implementation efforts over the next ten years. The team should meet on a regular basis to 1) review and determine service delivery priorities and workloads, 2) collaborate on developing proposals for funding opportunities, 3) coordinate training and landowner outreach efforts, 4) support accomplishment reporting, and 5) ensure clear communications on the status of the project. The LFT Workbook (to be distributed to the LFT when it reconvenes) provides additional guidance to support the team’s coordination efforts.

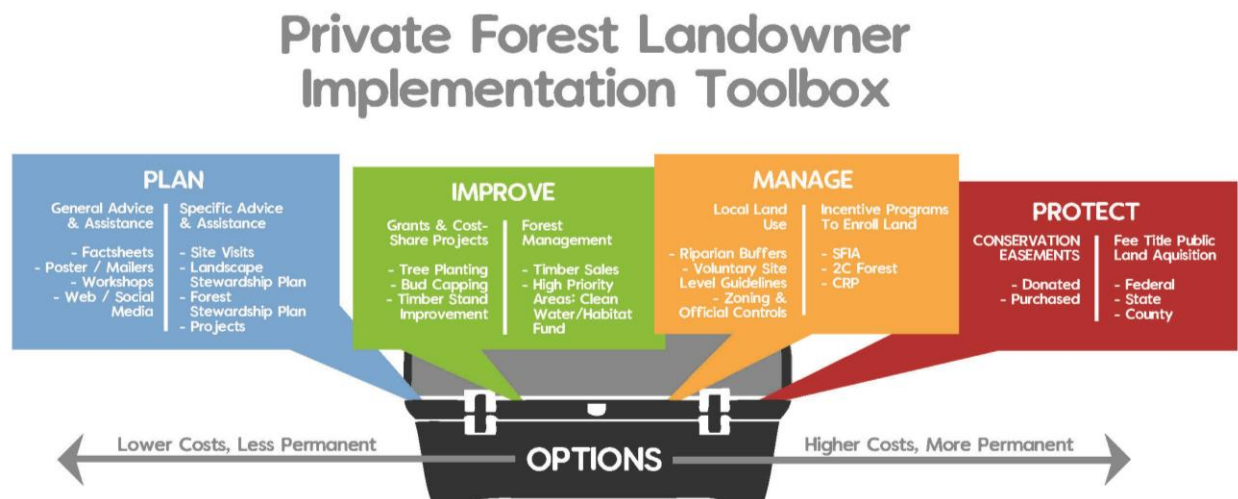
## Coordination Strategy # 2 – Confirm the Project Coordinator

To support the ongoing coordination work by the Local Forestry Technical Team, it is essential that one person serve as the point of contact to manage the overall coordination process. This should be a paid position and could be administered by one of the three SWCDs. Seed moneys and capacity funding are available to support this position.

## Coordination Strategy # 3 – Clarify Partner Roles in Serving Private Landowners

### PFM Implementation Toolbox

There are four primary approaches to delivering services to private landowners. The “PFM implementation toolbox” shown below illustrates these approaches and the full suite of options available to serving private landowners. Promoting the full range of options to private landowners helps to improve the economic, ecological, and social benefits they can receive from their woodlands. As the diagram below suggests, services provided to landowners on the left tend to be less costly but are also less permanent and generally have less societal benefits. In contrast, tools further to the right involve options that are more costly (to the public) but have a greater degree of permanence and produce more recognizable benefits to society. Local forestry technical teams are encouraged to define roles and organize their implementation efforts through these four approaches and corresponding array of tools.



Forestry professionals including approved Minnesota Forest Stewardship Plan writers are available to help private forest landowners obtain forest stewardship plans for their property and implement parts of the toolbox. These professionals are typically from the DNR, local SWCD and NRCS offices, forest industries, or are private consultants. An estimated 13 approved forestry professionals/plan writers have service areas in and near the Pine River Major Watershed. Their contact information can be found at <http://www.myminnisotawoods.umn.edu/minnesota-stewardship-plan-preparers/>.

### Clarifying Roles, Growing Commitment

Partners and stakeholders working in the watershed are all encouraged to serve on the Forestry Technical Team. The team should include DNR Forestry, SWCDs, consulting foresters, tribal representatives, environmental organizations, industry foresters, loggers and vendors, landowners, local officials, and other local groups.

The PFM implementation toolbox displays many of the choices that can be used to promote private forest stewardship. However, not all service providers in this watershed have the resources to implement all the options. To efficiently implement the full toolbox, partners on the forestry technical teams are encouraged to define the roles and responsibilities of each partner using the diagram below.

	#1 General advice & <u>assistance</u>	#2 Specific advice & <u>assistance</u>	#3 Grants / cost-share <u>project</u>	#4 Forest <u>management</u>	#5 Land use <u>controls</u>	#6 Incentive <u>programs</u>	#7 Conservation <u>easements</u>	#8 Fee title public land <u>acquisition</u>
<u>Mission and roles</u>								
<ul style="list-style-type: none"> <li>• Primary</li> <li>• Supporting</li> </ul>								
<u>Programs/projects</u>								
<ul style="list-style-type: none"> <li>• Geographic areas of interest</li> <li>• Topical interests</li> </ul>								
<u>Staffing/equipment</u>								
<ul style="list-style-type: none"> <li>• FTE's, expertise</li> <li>• Equipment</li> <li>• Other resources</li> </ul>								

By working together to define each partners roles and responsibilities will help to ensure seamless, effective, and efficient PFM service delivery. The more commitment that partners and stakeholders bring to the table in sharing resources and information increases the successful implementation of this plan. Actively participating on an ongoing basis is the core to developing and expanding partnership and stakeholder capacity to reach the shared goals and objectives of this Plan.

Moving from a paradigm of serving one landowner at a time to a landscape team approach that concurrently serves landowners and their communities will require the project coordinator and forestry technical team to encourage all partners to significantly expand the sharing of their limited resources for landscape stewardship. The sharing of resources—staff, funding, equipment, information, and know-how—in far more robust and active ways—is fundamental to partnership capacity development.

### Collaborate Outreach Efforts to Engage Landowners, Community Leaders and Local Decision Makers

To gain the support of decision makers in the community, resource managers need to provide a convincing answer to the fundamental marketing question: “What is in it for them?” Broader community support is likely to depend on being able to demonstrate that conservation programs are effectively and efficiently

addressing issues of importance in terms that residents and their decision makers easily understand. Increasing support for forest conservation that protects and enhances water quality will be based primarily on the off-site benefits that accrue to community residents, rather than on the on-site benefits that accrue to forest landowners.

Tools for Engaging Landowners Effectively (TELE) was developed by the Sustaining Family Forests Initiative (SFFI) to engage landowners effectively. The SFFI is a collaboration of government agencies, NGOs, certification systems, landowner groups, businesses, and universities organized to gain comprehensive knowledge about family forest owners (10-999 acres) in the United States. The SFFI has taken advantage of the wealth of information from the National Woodland Owner Survey database and linked this resource with demographic and behavior information to develop the TELE marketing approach to help natural resource professionals and others engage more effectively with family forest owners about their woods and woodland management. More information about the SFFI and TELE can be found at [www.engaginglandowners.org](http://www.engaginglandowners.org) and in the [Appendix](#).

## **Coordination Strategy # 4 – Coordinating Resources for Implementation**

### **Prioritizing PFM Service Delivery Through MWA and RAQ**

DNR Forestry and BWSR have developed the minor watershed assessment/RAQ methodology that connects forest land cover and water quality based on research developed by MN DNR Fisheries. The process works as follows: 1) Prioritize lakes that can meet at least 3 of 5 risk and quality factors, and have less than 75% protected watersheds, 2) Target specific parcels with high scores for proximity to riparian “R”, adjacency to public land “A”, and habitat quality “Q” (RAQ) scores (5 or greater) and focused proactive outreach efforts to these landowners that promote increased forest management and forest land protection (SFIA, conservation easements, public land acquisitions), and 3) over time, measure progress toward 75% protection goal on watershed basis.

We periodically measure the percent of the watersheds with permanent forest protection to illustrate this transformation on graphic dial like a speedometer. We call this measurement and assessment, moving the needle towards watershed protection. Through the implementation and monitoring of this plan over time, we can document and assess forest land protection levels at the major watershed, subwatershed and minor watershed levels.

This plan is intended to help support the PTM thinking by all service providers in a collaborative manner. This intentional and measurable planning process enhances opportunities for the collaborative implementation of the plans over time. To support this effective cross boundary approach, increased coordination capacity provided by this federal grant is essential.

### **Linking Landscape Stewardship Plans and 1W1Ps through PTM**

By coordinating forest and water resource planning and implementation through the development of this plan, we are setting the watershed/land cover context for developing the Pine River 1W 1P. These interconnected public planning processes promote more active and cross boundary management of not only forest resources, but water resources along with fish and wildlife. This collaborative work is helping to strengthen working relationships with agency fish and wildlife managers as well as outdoor and sportsmen groups. Through the LSP and 1W1P, MN DNR Forestry and partners are shaping approaches to working more proactively with landowners and providing them with more options to:

- Provide conservation-minded landowners with 3 protection options.
- Promote SFIA, the state’s incentives program for maintaining forest lands.

- Conservation easements acquired by either Forests for the Future (FFF) or Reinvest in Minnesota (RIM) programs. FFF focusing more on larger tracts and shoreland, RIM focusing on smaller tracts and backlots.
- For landowners choosing fee title, proposals go to the county via the land commissioner for review and comment—first. Work with conservation organizations on fee title projects. Transfer land to either county or state.

The Subwatershed Action Plans, Minor Watershed Assessments and RAQ scoring (provided in the LFT Workbook) provide a useful evaluation of the land cover/watershed relationships and initial risk assessment. These tools provide the Local Forestry Technical Team with resource management strategies at the subwatershed and minor watershed scales to more effectively implement the two goals in this plan.

### 10-Year Investment Plan

The table below summarizes acreage goals and estimated costs for implementing Goal 1 – Increase Forest Land Protection and Goal 2 – Promote Forest Stewardship. This information should be reviewed and integrated into the Pine River 1W1P and used to help secure funding needed to implement the goals in this plan. It should be noted that the table below indicates 0 acres for forest land protection given the 75% metric at the subwatershed level. Although the Daggett Brook Subwatershed is over 75% protected, a couple of the minors are not. When conservation easements are desired and appropriate (higher RAQ scores) the local Forestry Technical Team should review these with the Advisory Committee for the investing of RIM funds. Other PFM services should be made available to Interested landowners in these subwatersheds.

**Table 9. 10-year forestry investment plan summary.**

No.	Subwatershed name	Goal 1 – Increase Forest Land Protection		Goal 2 – Promote Forest Stewardship	
		Acres	Public investment <sup>A</sup>	Plans / acres	Public investment <sup>B</sup>
1	Headwaters Pine River	12,478	\$16,040,093	137 / 15,506	\$109,600
2	South Fork Pine River	5,560	\$6,281,970	63 / 7,156	\$50,400
3	Daggett Brook	0	\$0	31 / 3,481	\$24,800
4	Whitefish Lake	7,846	\$11,175,769	87 / 9,842	\$69,600
5	Little Pine River	3,509	\$4,006,822	63 / 7,142	\$50,400
6	Lower Pine River	10,658	\$17,204,724	128 / 14,449	\$102,400
	<b>Totals</b>	40,050	\$54,709,378	509 / 57,576	\$407,200

<sup>A</sup>Cost assumes 50% of area in conservation easement and 50% in SFIA for 100 years.

<sup>B</sup>Cost assumes \$800 / stewardship plan plus - \$600 for the plan plus \$200 for outreach and administration costs. Public funds to be used to help underwrite costs of preparing forest stewardship plans. Assumes average parcel size of 113 acres. 50% of the plan writing cost to be cost shared.



## **Funding Sources**

How will the implementation of this plan be funded? Experience has shown that landscape approaches to natural resource conservation tend to have a synergistic effect on funding. Partners that get involved in a landscape-scale project area do so because it meets some of their own resource or public relations goals. Because of this they can support efforts in the project area.

Landscape-scale, multi-partner, coordinated efforts often carry increased weight with foundations, trusts, and government agencies when it comes to applying for grants. Federal and state funding agencies as well as private foundations tend to look favorably on multi-partner project applications. There is a considerable amount of money available through grants and other programs that landscape stewardship approaches can facilitate.

The following is a list of potential resources available to the Forestry Technical Team to pursue in the project and funding development. The Team should maintain and grow this inventory to foster increased success in implementation of this Plan.

- BWSR capacity funds.
- DNR PFM Program – cost share and SFIA.
- Watershed based implementation funding (WBIF).
- Clean Water Legacy funding through BWSR, MPCA and DNR.
- LSOHC – big and small grants.
- LCCMR.
- US Endowment.

## **Private Sector Partnerships**

As envisioned by the US Forest Service and state foresters, landscape stewardship projects seek to encourage and promote greater levels of private investments in ways to leverage public investments. Private woodland owners make significant investments in their own lands. These investments may not end up on the balance sheets of service provider agencies (although they sometimes do), but the investments private landowners make on their lands are no less important. The bottom line is that there will likely be more money and resources for coordination and implementation available in a more coordinated way for on-the-ground resource management work.

An untapped reservoir of funding may come from local businesses that will benefit from the results of the resource management activities taking place. For example, a local canoe outfitter may see benefit in financially aiding efforts that will result in maintenance or improvement in water quality in a local river. Family resorts, campgrounds and other businesses that benefit from clean water and healthy forests can promote and support the watershed-based landscape stewardship plans. By doing so, they can help promote opportunities for financial support at the community level through lake associations and chambers of commerce to encourage more businesses decide to project a “high quality forest and water – sustainable green” image where we can all benefit through win-win-win approaches.

## **Coordination Strategy # 5 – Support Accomplishment Reporting**

Accomplishment reporting will be critical to evaluating the success of implementation efforts of this Plan over the next ten years. The table below provides a starting point for monitoring progress made by all partners. It should be maintained on an annual basis. The Forestry Technical Team will be responsible for organizing this information and sharing it with their local boards, DNR, and BWSR.

**Table 10. Annual PFM accomplishment report summary table - template.**

	Headwaters Pine River	South Fork Pine River	Daggett Brook	Whitefish Lake	Little Pine River	Lower Pine River
<b>Baseline</b>						
Total land area (acres)	95,510	74,074	95,494	83,980	90,743	61,086
Area of private ownership (acres; % of subwshd)	46,634; 49%	41,533; 56%	27,103; 28%	45,825; 55%	39,661; 44%	33,760; 55%
Private parcels <5 acres	3,130	610	3,784	5,585	1,755	8,792
Private parcels 5-20 acres	777	339	491	774	386	585
Private parcels >20 acres	1,643	949	1,712	1,382	1,850	788
Forest stewardship plans (#; acres)	48; 4,474	26; 2,844	46; 4,738	51; 5,377	25; 4,442	31; 3,753
<b>General advice &amp; assistance</b>						
Mailings						
Workshops						
<b>Specific advice &amp; assistance</b>						
Site visits						
Forest stewardship plans						
<b>Grants/ cost-share projects</b>						
Forest restoration						
Forest stand improvement						
<b>Forest management</b>						
Timber harvests						
Biomass harvests						
<b>Land use controls</b>						
Riparian buffer plantings						
Site-level guideline compliance						
<b>Incentive programs</b>						
SFIA						
2C						
<b>Conservation easements</b>						
Public						
Private/nonprofit NGO						
<b>Fee title public land acquisition</b>						
Public land acquisitions						
Land trades/ exchanges						

Template table to be completed annually by the Local Forestry Technical Team and distributed to DNR Forestry, local SWCD board and county boards, US FS, and the MFRC North Central Landscape Committee.

## **Coordination Strategy # 6 – Recommendations to Local and State Agencies**

### **Recommendations to BWSR and SWCDs for the Pine River 1W1P**

1. MOUs. Complete the memorandum of understanding between DNR Forestry and BWSR on the new paradigm for PFM including landscape stewardship and comprehensive local water planning.
2. Reference Document. Adopt the Pine River Watershed Landscape Stewardship Plan by reference for addressing forest land protection and forest stewardship topics in the Pine River 1W1P. Attached the LSP as an appendix to the 1W1P.
3. Policy Integration. Incorporate the two forestry goals into the policy framework in the 1W1P.
4. Funding Coordination. Integrate the overall funding needs listed in the 10-Year Forestry Investment Plan – Summary Table into the 1W1P Implementation Schedule.

### **Recommendations to Pine River Counties**

1. Reference Document. Local land use officials are strongly encouraged to use this Plan as a reference document when developing their comprehensive plans to guide land use and public infrastructure decisions. They are further encouraged to adopt this landscape stewardship plan as an appendix to their plans to provide more detailed guidance on sustainable forest resource management and support more proactive and collaborative funding development.
2. Consider Forests in Local Land Use Decisions. Local officials are encouraged to consider the values and benefits that forests can bring to their communities. Healthy and sustainable forests promote a high quality of life for citizens and can support increased economic opportunities as well. Forests should be included in the land use decision making process.
3. Alternative Land Development Options. Local officials are encouraged to use forestry as a design tool to help them work more effectively with landowners and developers. There are alternative ways that land can be developed to provide for both economic growth and the protection of forest and water resources. Large lot developments are not always desirable or cost effective from the public sector or taxpayers perspectives.
4. Guide Growth to Existing Infrastructure. Use the maps from the minor watershed assessment / RAQ scoring and related tools to help inform local land use decisions. Guide growth and development towards existing roads and infrastructure and protection of larger blocks of working forest lands into interiors areas away from roads.

### **Recommendations to Lake Association Based Sustainability Committees**

1. Convene meeting with the Whitefish Area Property Owner Association (WAPOA) to explore creating sustainable committees in the Whitefish Lake and Headwaters Pine River subwatersheds. WAPOA can serve as local leaders to grow landowner buy-in for forest land protection.
2. Explore setting up a trust fund to use as match for forest land protection on key properties.

### **Recommendations to Pine River County Land Departments**

1. Land Asset Management Programs. Continue to develop county land asset management programs that support guiding of growth and forest land protection areas. Use the maps from the minor watershed assessment / RAQ scoring and relevant PFM implementation tools for land protection to help protect working private forest lands adjacent to county forest lands.
2. Timber Sale Coordination. Continue to support active communications with adjacent private landowners on coordinating timbers sales and other forest management activities.
3. Forest Roads. Continue to support active communications with adjacent private landowners on the maintenance and improvement of forest roads and access issues.

### **Recommendations to state and federal programs for PFM policy changes and funding needed**

1. Integrate Landscape Stewardship Approaches into the PFM Program. Overall, encourage integrated service delivery between the broad range of agencies and organizations that serve private woodland owners to make delivery of their programs better coordinated, simpler and less costly in processing, and less time consuming.
2. Base PFM Program Funding. Increase and sustain funding for the private forest management program including support for SWCDs, consulting foresters, industry foresters and loggers.
3. Coordinated Landowner Outreach. Support efforts by local partners to focus, coordinate and increase landowner outreach efforts to promote forest land protection, forest stewardship plans, and increased forest management in priority areas identified in this LSP through the PTM/MWA/RAQ methodologies to meet the directive set forth by Governor Dayton in his November 2, 2016 letter to Minnesota Forest Industries – *“accelerate outreach efforts with family forest landowners to increase harvest from private lands”*.
4. Forest Habitat Priority Areas Planning. Support the updating of the 25-Year LSOHC Forest Habitat Vision developed by the MFRP and MFRC and the regional landscape committees. Support the collaborative development and integration of other conservation priority efforts that complement priorities identified in the watershed-based landscape stewardship plans.
5. ECS / NPC. Continue to promote the Ecological Classification System (ECS) and Native Plant Community modeling (NPC) from the MFRC landscape plans as guides to developing forest vegetation and land management strategies when working with landowners and local officials.
6. Ash Management. Prioritize funding towards proactively managing ash resources on private lands and increasing resilience of wet forest ecosystems to address emerald ash borer.
7. Source Water. Continued support from the Minnesota Department of Health to work with the LFT on projects through this the implementation of this plan that support and protect source water resources.
8. Climate Change and Carbon Sequestration. Support efforts by the LFT to address climate change and carbon sequestration through the implementation of this LSP including: 1) protect existing forestlands in the watershed from being converted to non-forested land uses, 2) improve forest management activities to increase carbon storage in the forest and associated wood products that come from the forests, and 3) support efforts by the LFT to assist interested landowners in the reforestation of their open lands.

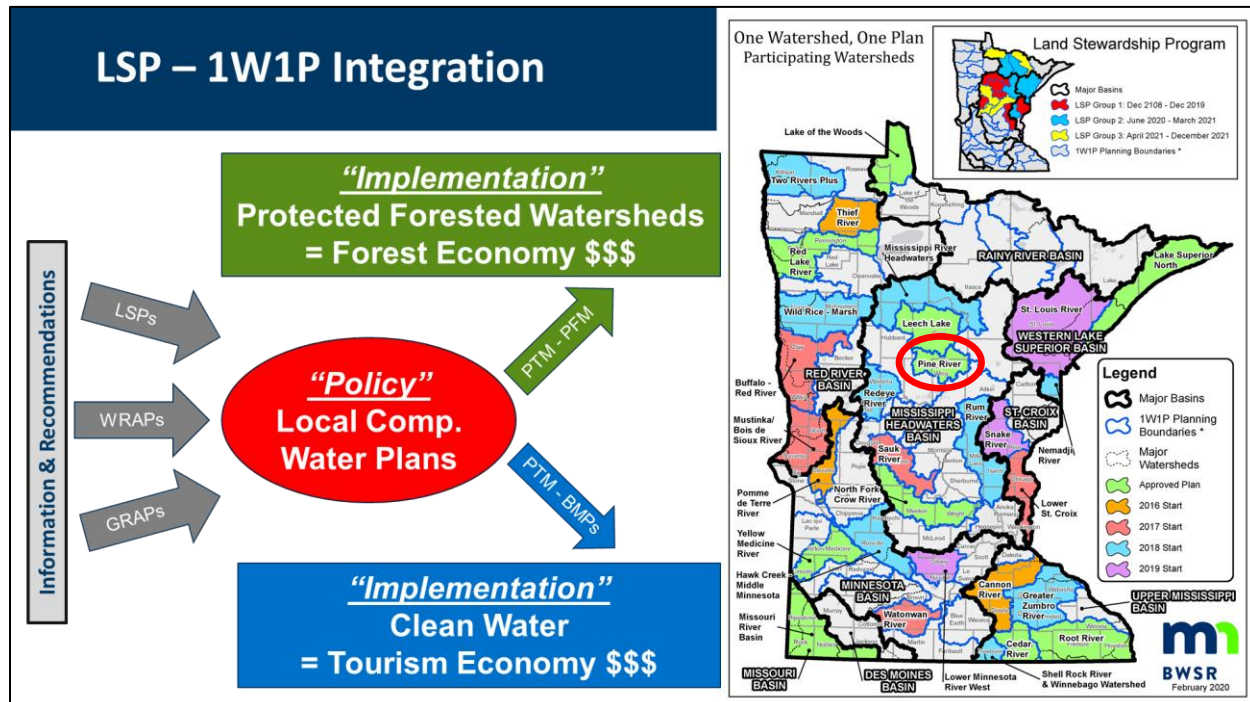


## Demonstration Projects

Demonstration projects can provide valuable insights to resource professionals and landowners. They can serve as starting points for the implementation of this Plan. The table below is a template for developing a 10-year demonstration project list on a subwatershed basis. This list summarizes potential projects with partners, initial priorities, and suggested timelines. One of the benefits and uses of project lists is they can help partners work together to develop shared priorities when pursuing additional funding. The Local Forestry Technical Team will be responsible for developing this list. The Team should periodically review and refine the 10-year project list.

Map no.	Project name and brief description	Subwd / project priority	Lead entity / support entities	Proposed timeline
	<b>Headwaters Pine River Subwatershed</b>			
	<b>South Fork Pine River Subwatershed</b>			
	<b>Daggett Brook Subwatershed</b>			
	<b>Whitefish Lake Subwatershed</b>			
	<b>Little Pine River Subwatershed</b>			
	<b>Lower Pine River Subwatershed</b>			

## Linking Forest & Water Planning and Implementation through LSPs and 1W1Ps

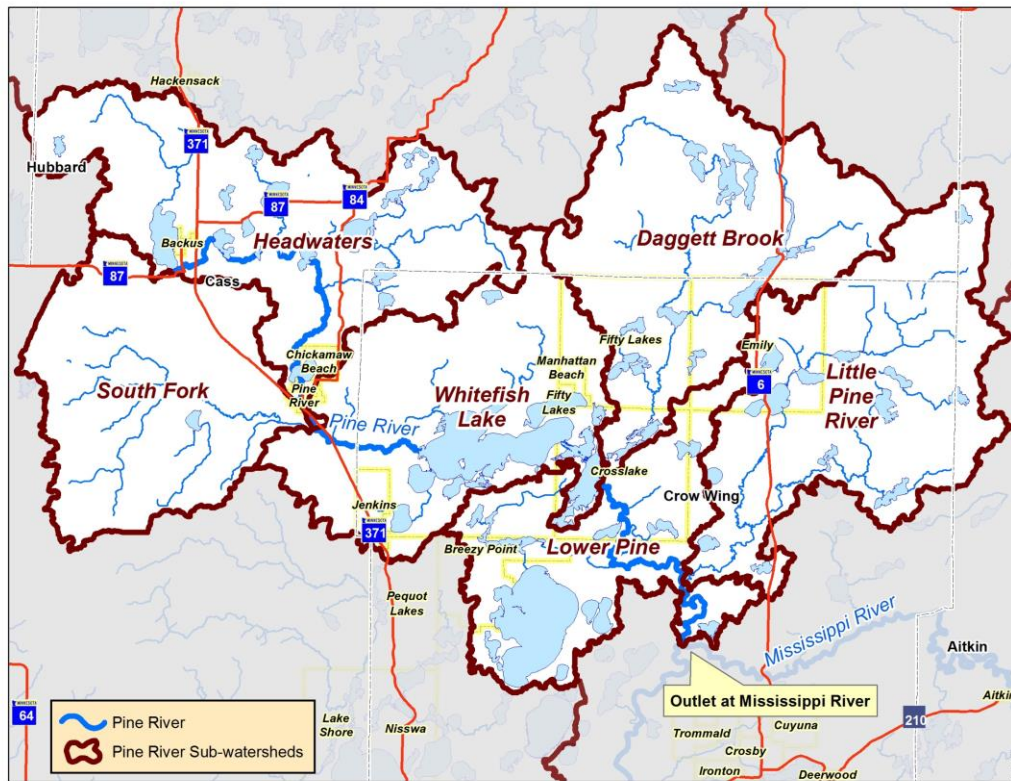


**Note:** Landscape stewardship plans (LSPs) like the MPCA Watershed Restoration and Protection Strategies (WRAPs) and the MDH Groundwater Restoration and Protection Strategies (GRAPs) provide important information and relevant context from state water and forest resource programs to inform comprehensive local water management (1W1Ps) processes. Members of the 1W1P committees are encouraged to consider the recommendations in this document for incorporation into their plans. Through the integration of landscape stewardship plans and 1W1Ps, conservation professionals and landowners are working together to address the following national priorities from the USDA Forest Service:

- Conserve Working Forest Lands.
- Protect Forests from Harm.
- Enhance Public Benefits from Trees and Forests.

*“A lake is the landscape’s most beautiful and expressive feature.  
It is Earth’s eye;  
looking into which the beholder measures the depth of his own nature.”*  
- Henry David Thoreau

## Index Information – Pine River Major Watershed



Subwd no.	Subwatershed name	HUC no.	Acres	No. of minors
1	Headwaters Pine River	701010501	95,510	11
2	South Fork Pine River	701010502	74,074	13
3	Daggett Brook	701010503	95,494	11
4	Whitefish Lake	701010504	83,980	10
5	Little Pine River	701010505	90,743	17
6	Lower Pine River	701010506	61,086	7
	<b>Totals</b>		<b>500,887</b>	<b>69</b>

