

Rum River Watershed Landscape Stewardship Plan



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Mille Lacs County Environmental Resources

The Nature Conservancy

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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.

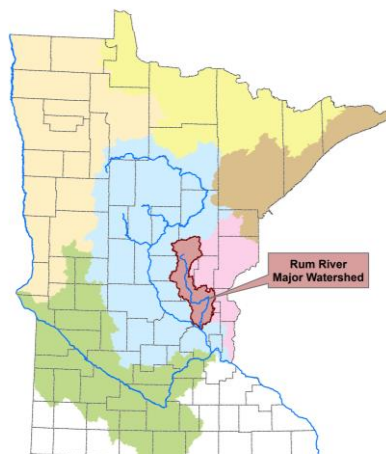
The Rum River Major Watershed in Central Minnesota is home Mille Lacs Lake, which is one of Minnesota’s crown jewels as a recreation destination. The Rum River is also a popular recreation destination and a major tributary to the Mississippi River. Research of lakes and rivers by DNR Fisheries and the hydrologist Sandy Verry revealed the impacts of land use disturbance in a watershed and importance of protecting private lands. The Rum River Major Watershed is well-situated to advance the protection and management of working forest lands on a landscape level.

The Rum 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 Rum River Major Watershed is located in the transition between Minnesota’s lake country to the north, farming regions to the west, and metro centers to south. An assessment of the resources in the watershed described in the first part of this plan found that:

- Private land ownership dominates the watershed. Public lands are concentrated on the northern side around Mille Lacs Lake.
- Forests and wetlands are largely intact in the northern 1/3 of the watershed while elsewhere much of the former habitat has been converted to agriculture and urban development.
- Management activities over many years have altered the species composition from forests dominated by tamarack, northern pin oak, and bur oak to forests of aspen, red oak, and ash.
- 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.

In Minnesota water management planning is done on either the county or the major watershed (HUC 8) scale, and the goals or recommendations from the Landscape Stewardship Plans may be integrated into these water management plans. Major watershed-based water management plans are created through the One Watershed One Plan (1W1P) program administered by BWSR in partnership with local units of government. 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 Rum 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 Rum 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 Rum River Major Watershed is in the eastern portion of the Upper Mississippi Basin and flows into the Mississippi River by the City of Anoka. 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.

The Rum River Major Watershed has its beginnings in Mille Lacs Lake, which is the watershed’s most prominent feature and headwaters to the Rum River. The watershed drains about 1,584 square miles and is composed of seven HUC 10 subwatersheds (Fig 2) which correspond to major streams and lakes in the region. The subwatersheds are further subdivided into 101 minor watersheds (HUC 14), each averaging 15.7 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 southern two-thirds of the Rum River Major Watershed fall into either the “Partial Restoration” or “Full Restoration” categories, while “Protection” catchments are more common in the northern third.

Fig 1. Watershed categorization framework.

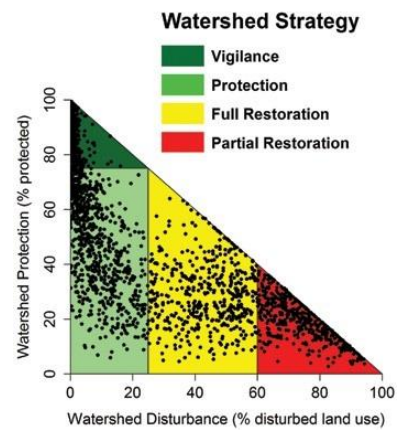


Fig 2. Rum River major and subwatersheds.

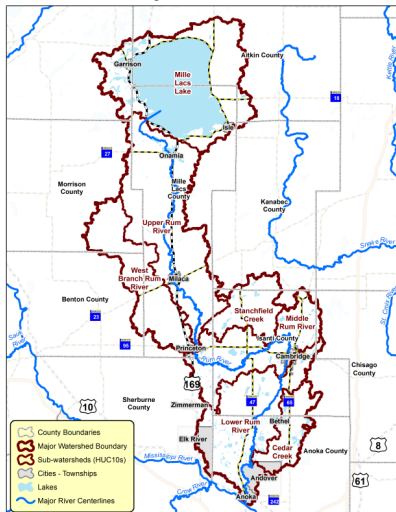
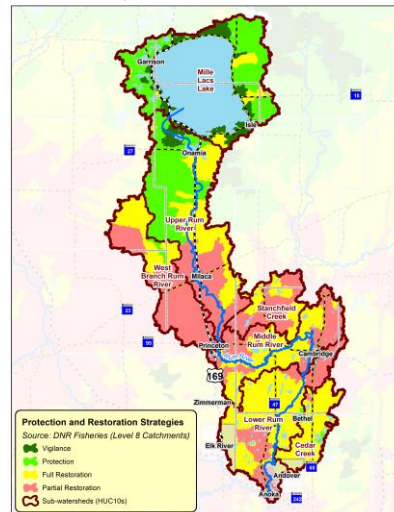


Fig 3. Protection/Restoration classifications.

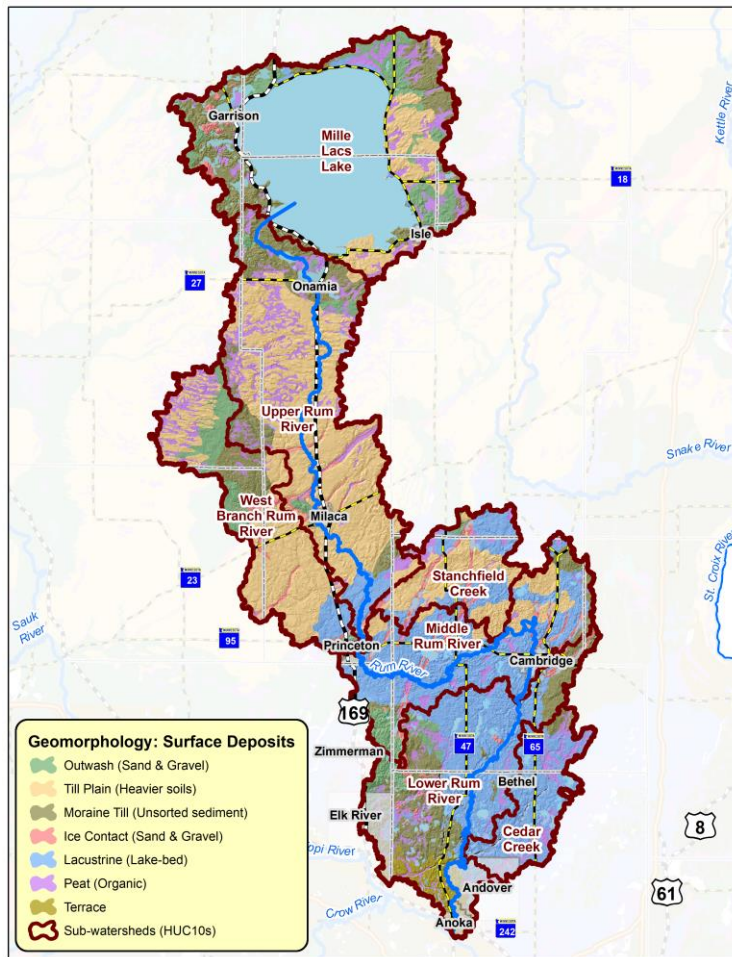


Geomorphology

From a geomorphological perspective the Rum River Major Watershed has roughly three different regions. The first region is the area around Mille Lacs Lake, which is a rolling terrain of end moraines. The next region is the area south of Mille Lacs Lake to just north of Princeton, or approximately the border between the Laurentian Mixed Forest and the Eastern Broadleaf Forest Province. This part of the watershed is characterized by till plains and drumlins formed by the Superior Lobe glacier. The last region covers the southern one-third of the Rum River Major Watershed and corresponds to the extent of the Anoka Sand Plain ECS Subsection in the watershed. This area is a level to gently rolling lake plain with fine, sandy soils.

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 plans. 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.

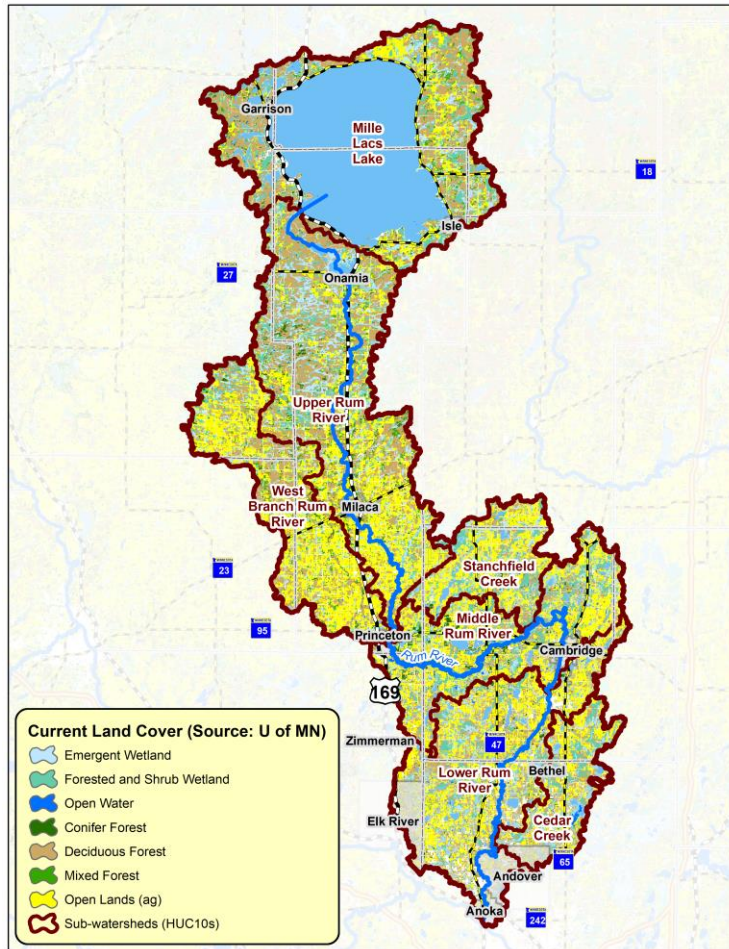
Fig 4. Geomorphology of the Rum River Major Watershed.



Land Cover

Prior to European settlement, the Rum River Major Watershed was covered by forests, savannahs, wetlands, and lakes. Today, the landscape has been significantly modified and much of the forests and savannahs have been converted to agriculture, especially south of Milaca and Highway 23, which is a rough dividing line between the developed and undeveloped portions of the watershed (Fig 5). North of this line are greater amounts of protection and forests, wetlands, and lakes remain the predominate land cover. Conversely, in the Lower Rum and Cedar Creek subwatersheds in the southern end of the major watershed agriculture is decreasing and urban development from the expanding metro area is increasing.

Fig 5. Current land cover in the Rum River Major Watershed.



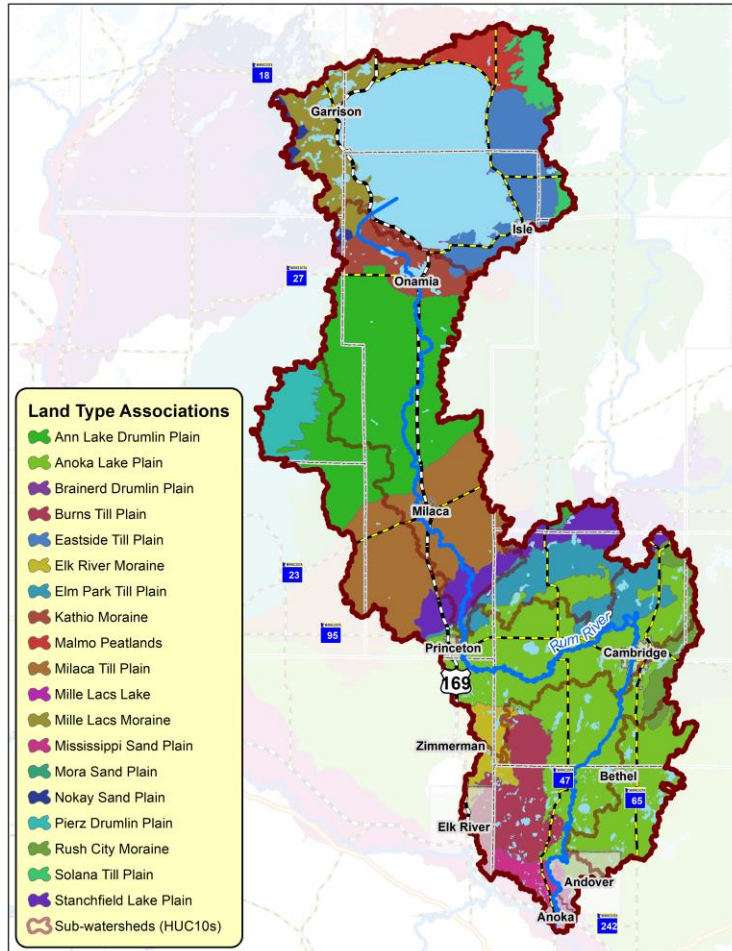
Ecological Setting

The Rum River Major Watershed is uniquely situated at the transition between the Laurentian Mixed Forest Province (LMF), which covers its northern two-thirds, and the Eastern Broadleaf Forest Province (EBF), which covers the southern 1/3. The portion covered by the LMF Province is also located entirely within the Western Superior Uplands ECS Section and the Mille Lacs Uplands ECS Subsection. The EBF portion is entirely within the Minnesota & NE Iowa Morainal Section, and the Anoka Sand Plain 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 Rum River Major Watershed has portions of 19 LTAs (Fig 6), although over half of the area is covered by only three of them: the Anoka Lake Plain (23% of watershed), Ann Lake Drumlin Plain (16%), and Mille Lacs Lake (12%).

Fig 6. Land Type Associations (LTAs) of the Rum River Major Watershed.

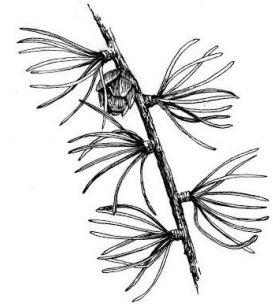


In the Rum River Major Watershed there is a distinct north-south gradient of available moisture, decreasing moisture as one moves from north to south, and the pre-European settlement vegetation reflected that. The forest around Mille Lacs Lake was a wet-mesic hardwood-conifer with white pine as the conifer component. Below Mille Lacs uplands were mesic northern hardwoods with minor amounts of wet-mesic hardwood conifer forest. The lowland areas around and below Mille Lacs were inhabited by sedge-fen, black spruce-sphagnum, or white cedar-black ash communities. Around the transition from the LMF to the EBF province (which occurs just north of Princeton) the upland vegetation shifted relatively quickly to oak forests and savannahs in the uplands, and wet prairie in the lowlands.

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 Rum River Major Watershed the forest shifted away from being largely dominated by tamarack, northern pin oak, and bur oak, to aspen, red oak, and ash being the most abundant species (Table 1).

Table 1. Change in tree species composition in since presettlement.

| Species | Change | Species | Change |
|------------------|-----------------------|-----------|------------------------|
| Tamarack | Decline, > 10-fold | Ash | Increase, 2 to 3-fold |
| Northern pin oak | Decline, 5 to 10-fold | Basswood | Increase, 2 to 3-fold |
| White pine | Decline, 5 to 10-fold | Aspen | Increase, 3 to 5-fold |
| Bur oak | Some decline | Red oak | Increase, 5 to 10-fold |
| Sugar maple | Some decline | Red maple | Rare as bearing tree |
| Paper birch | Some decline | Red pine | Rare as bearing tree |
| Elm | Some increase | | |



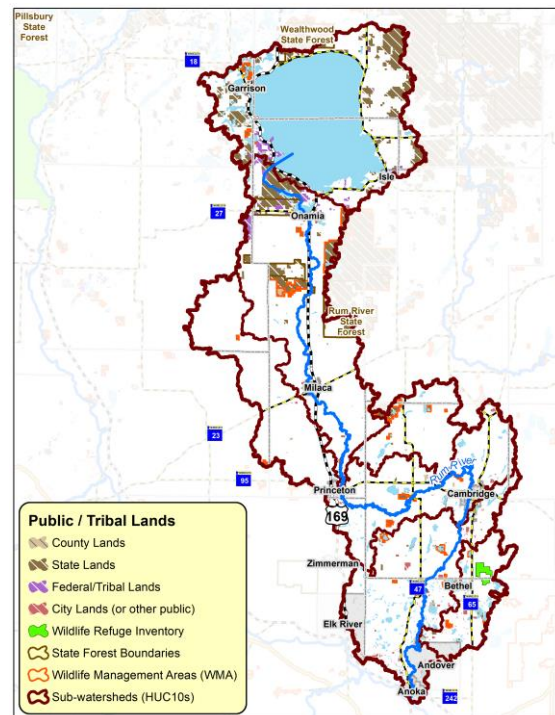
Source: DNR Division of Forestry, Resource Assessment.

Note: Results are summarized from Land Type Association (LTA)-level data that only includes LTAs that intersect with the Rum River Major Watershed.

Land Ownership

Land ownership in the Rum River Major Watershed is largely private and only 25% of the area under public ownership, most of which is Mille Lacs Lake, which is a public water body. Public land accounts for 9% of the watershed and is concentrated around Mille Lacs Lake in Mille Lacs Kathio State Park and tax-forfeited land. Wildlife Management Areas are scattered throughout the rest of the watershed and The University of Minnesota Cedar Creek Ecosystem Science Reserve is located in the Cedar Creek Subwatershed.

Fig 7. Private and public land ownership.



Social and Economic Context

Census data from 2010 estimates that the population of all minor civil divisions in the Rum River Major Watershed is 298,366, or 5.6% of Minnesota’s population. Despite its relatively low population, the Rum River Major Watershed provides outsized social and economic services.

The Rum River Major Watershed is a popular recreation destination that draws tourists from across the nation to visit its 450+ lakes and 600 miles of streams. The most famous of these are Mille Lacs Lake and the Rum River. The Rum River 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. In fact, in the [Forests, Water, and People](#) study by the Forest Service, the Rum River Major Watershed was ranked as the second most important major watershed in all of Minnesota for providing drinking water.

In order to continue producing high quality drinking water, the forests and wetlands in the Rum 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 8). Furthermore, natural cover greatly promotes infiltration and reduces runoff of sediment and potentially pollution-laden runoff (Fig 9).

Fig 8. Annual phosphorous exports by land use.

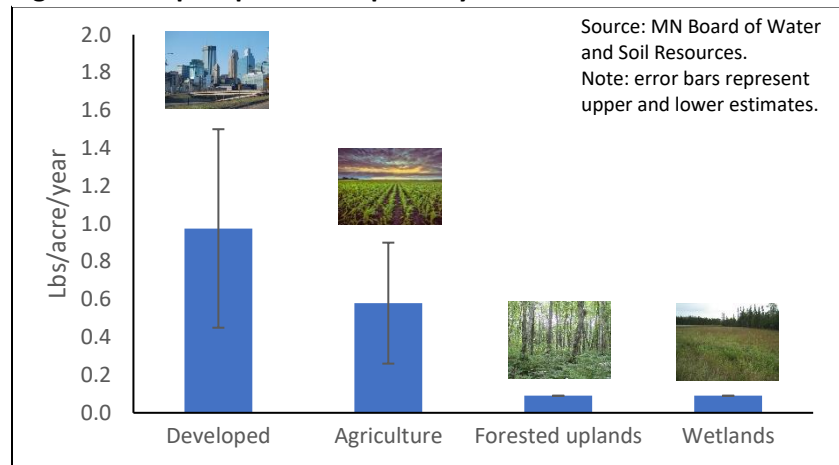
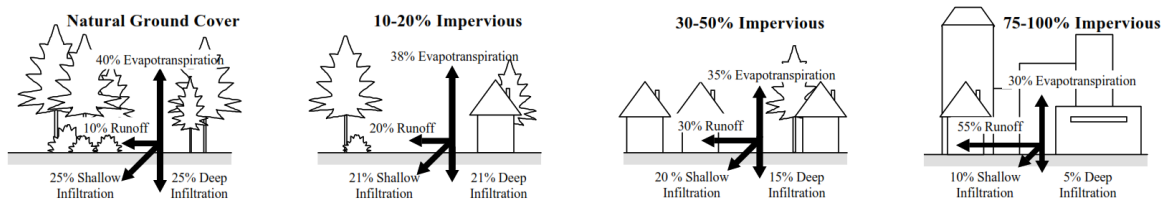


Fig 9. Effects of imperviousness on runoff and infiltration.



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.

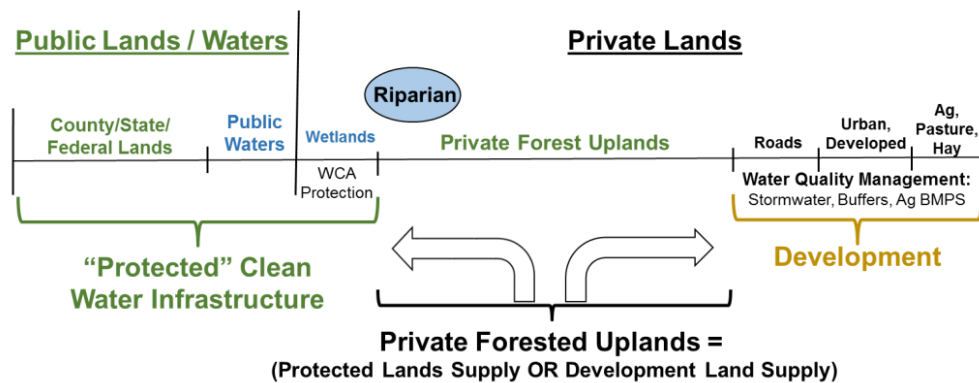


Fig 10. Generalized Land Protection Model.

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 Rum 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 Rum River Major Watershed.

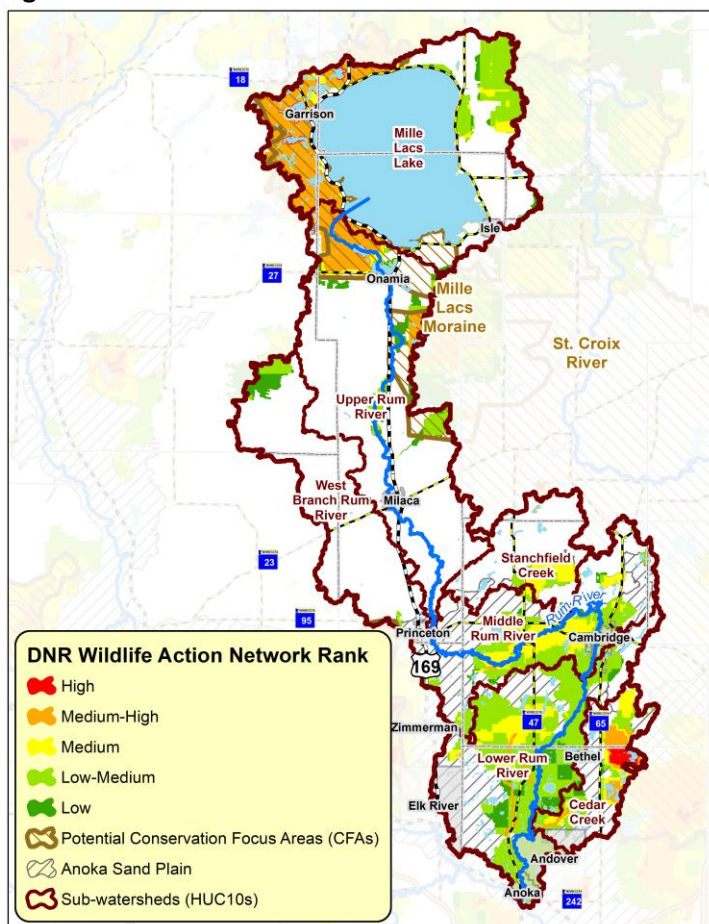
| Subwatershed name | Drivers of quality | Drivers of risk |
|-------------------|------------------------------------|--|
| Mille Lacs Lake | High quality lakes, forest habitat | Ag: animals & crops, development, water quality impairments/declining trends |
| Upper Rum R. | Forest habitat | Ag: animals & crops, development, water quality impairments |
| W Branch Rum R. | Streams, forest habitat | Ag: animals & crops, development, water quality impairments |
| Stanchfield Crk. | Surface water, forest habitat | Ag: animals & crops, development, water quality impairments |
| Middle Rum R. | Surface water, forest habitat | Ag: animals & crops, development, water quality impairments |
| Cedar Crk. | Surface water, forest habitat | Ag: animals & crops, development, water quality impairments/declining trends |
| Lower Rum R. | Surface water, forest habitat | Ag: animals & crops, development, water quality impairments/declining trends |

Forest Conservation Opportunity Areas

The following list of existing conservation priorities in the Rum River Major Watershed have been identified by various state agencies and environmental organizations. As noted previously, these resources were consulted by the Rum 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.
- Rum River Headwaters 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 11. MN DNR Wildlife Action Network.

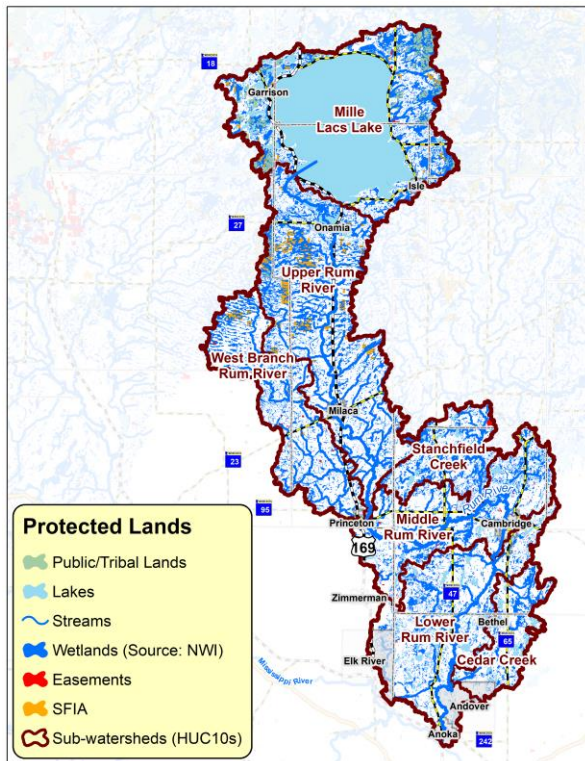


Key Observations and Conclusions

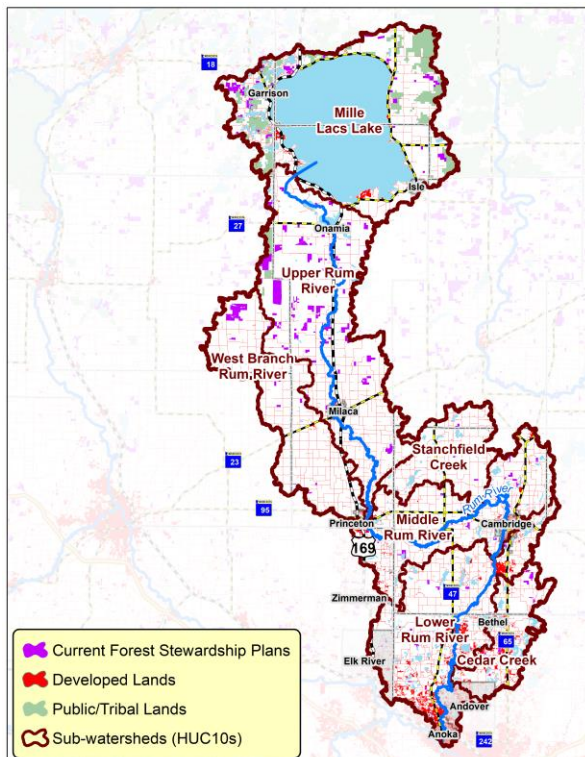
The following key observations and conclusions are based on the information gathered in the course of the planning process for this landscape stewardship plan:

- The Rum River Major Watershed is characteristic of many major watersheds in Minnesota and across the country. Large expanses of forests and wetlands are being lost to agriculture and development, to the detriment of water quality, wildlife habitat, and recreation opportunities. The Rum River Major Watershed is unique in that it is the second most important watershed in the state for providing source water, and so is in special need of protection.
- The expanding metro area to the south of the Rum River Major Watershed has led to urban development overtaking agriculture as the dominant land disturbance in the southern part of the watershed.
- 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.
- There are no major forest industries located within this watershed, although there are a few larger mills not far from the watershed borders, such as Savannah Pallets in McGregor and Sappi in Cloquet. Inside the watershed are also several smaller-scale sawmills and specialty mills for products such as poles, mulches, and shavings. 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.
- The East Central Landscape Plan, which is currently in development, will provide useful guidance for forest vegetation management based on native plant communities across the 9-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.
- Well managed forests are important for carbon sequestration. Utilizing ecosystem-based forest management will improve carbon sequestration and storage. Furthermore, as concerns over climate change increase and the need for increasing carbon capture is becoming more apparent, interest in the reforestation of open lands on the rise. The number of farms and acres of farmland in Minnesota are shrinking, and this represents an opportunity to potentially increase the area of forest land in parts of the watershed where agriculture activities are decreasing.

Forest Land Protection – Current Status



Private Forest Stewardship – Current Status



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

The Vision

Mission

To empower teams of service providers to work together with private landowners and land managers in the Rum 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 Rum 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 – 44%. Goal – 50%.
- Subwatershed levels (HUC 10): Current levels range from 19% to 78%. Goal – increase protection to an additional 5-10% of the subwatershed area, except for Mille Lacs Lake (Subwd No. 1), which is already greater than 75%.
- Highest priority subwatersheds are Upper Rum River and Cedar Creek.
- Minor watershed levels (HUC 14): Protection goals recommended by the RR Forestry Technical Committee. See [Appendix](#) and the [Committee Work Plan](#).

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 MFRC Landscape Plans.
- 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

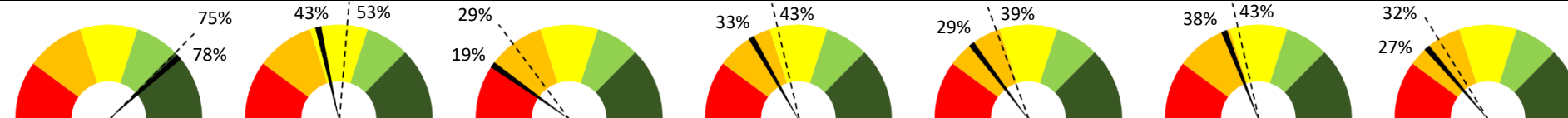
- DNR + BWSR: administrative lead.
- DNR CFM: PFM program coordination.
- SWCDs: local lead, outreach, plans, 1W1P.
- Consulting foresters: plans, timber sales.
- Loggers/vendors: forest management.
- Landowners: Its their land.

Goal 1: Forest Land Protection

In order 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 701020701) Mille Lacs Lake | Subwd. No 2 (HUC 701020702) Upper Rum River | Subwd. No 3 (HUC 701020703) West Branch Rum River | Subwd. No 4 (HUC 701020704) Stanchfield Creek | Subwd. No 5 (HUC 701020705) Middle Rum River | Subwd. No 6 (HUC 701020706) Cedar Creek | Subwd. No 7 (HUC 701020707) Lower Rum River |
|---|---|---|---|---|--|---|---|
| Area | 266,384 ac | 227,951 ac | 118,277 ac | 61,671 ac | 126,743 ac | 53,827 ac | 158,942 ac |
| Natural Factors | | | | | | | |
| Presettlement forest cover | 49% | 97% | 98% | 90% | 87% | 80% | 82% |
| Current forest cover | 25% | 41% | 33% | 19% | 24% | 27% | 27% |
| Lakes | 51 lakes; 51% | 23 lakes; 2% | 5 lakes; 0.1% | 15 lakes; 3% | 60 lakes; 3% | 90 lakes; 8% | 206 lakes; 6% |
| Wetlands | 17% | 28% | 23% | 32% | 24% | 22% | 18% |
| Forest Land Protection Assessment | | | | | | | |
| Public waters | 136,245 ac; 51% | 5,978 ac; 3% | 776 ac; 1% | 1,933 ac; 3% | 5,455 ac; 4% | 4,866 ac; 9% | 10,234 ac; 6% |
| Public lands | 37,450 ac; 14% | 32,908 ac; 14% | 660 ac; 1% | 2,127 ac; 3% | 3,119 ac; 2% | 6,108 ac; 11% | 5,941 ac; 4% |
| Private wetlands | 29,975 ac; 11% | 50,257 ac; 22% | 19,617 ac; 17% | 15,286 ac; 25% | 26,903 ac; 21% | 9,283 ac; 17% | 26,053 ac; 16% |
| SFIA | 2,445 ac; 0.9% | 8,968 ac; 3.9% | 1,488 ac; 1.3% | 40 ac; 0.1% | 19 ac; 0.0% | 0 ac; 0.0% | 0 ac; 0.0% |
| Easements | 491 ac; 0.2% | 302 ac; 0.1% | 295 ac; 0.2% | 667 ac; 1.1% | 927 ac; 0.7% | 105 ac; 0.2% | 424 ac; 0.3% |
| Total protected area | 206,606 ac; 78% | 98,412 ac; 43% | 22,835 ac; 19% | 20,054 ac; 33% | 36,422 ac; 29% | 20,404 ac; 38% | 42,853 ac; 27% |
| Protection priority | Low | High | Low | Medium | Medium | High | Medium |
| Forest Land Protection Cost Analysis | | | | | | | |
| Protection goal | 75%; 0 ac to goal | 53%; 22,402 ac to goal | 29%; 11,465 ac to goal | 43%; 6,465 ac to goal | 39%; 13,007 ac to goal | 43%; 2,741 ac to goal | 32%; 8,008 ac to goal |
| Potential to protect | 37,703 ac; 14% | 89,087 ac; 39% | 58,621 ac; 50% | 16,619 ac; 27% | 32,263 ac; 25% | 8,700 ac; 16% | 37,870 ac; 24% |
| Average land value | \$1,513/ac | \$1,517/ac | \$1,493/ac | \$2,316/ac | \$3,021/ac | \$3,983/ac | \$4,115/ac |
| Protection cost* | \$0 | \$24,353,241 | \$12,380,873 | \$8,577,251 | \$20,009,261 | \$5,007,908 | \$14,947,234 |
| Forest Land Protection Priorities | | | | | | | |
| <i>Quality Protection Factors</i> | | | | | | | |
| Cisco lakes | 3 lakes; 1% | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% |
| Trout lakes | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% |
| Lakes of biodiversity significance (outstanding & high) | 7 lakes; 49% | 3 lakes; 1% | 0 lakes; 0% | 1 lake; 0% | 1 lake; 0% | 1 lake; 1% | 4 lakes; 0% |
| Priority shallow lakes | 3 lakes; 0% | 5 lakes; 1% | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% | 1 lake; 1% | 0 lakes; 0% |
| Priority wild rice lakes | 6 lakes; 1% | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% | 0 lakes; 0% |
| Trout streams | 4 mi | 0 mi | 0 mi | 0 mi | 0 mi | 0 mi | 0 mi |
| FFF mean composite score | 84.6 | 79.2 | 60.9 | 60.5 | 65.9 | 73.7 | 64.0 |
| Terrestrial biodiversity (MBS) (outstanding and high) | 44,633 ac; 17% | 25,816 ac; 11% | 1,767 ac; 1% | 2,977 ac; 5% | 5,149 ac; 4% | 9,293 ac; 17% | 3,580 ac; 2% |
| Wildlife Action Network (high & medium-high) | 57,689 ac; 22% | 21,874 ac; 10% | 0 ac; 0% | 116 ac; 0% | 4,154 ac; 3% | 8,940 ac; 17% | 5,194 ac; 3% |
| <i>Risk Management Factors</i> | | | | | | | |
| Lake phosphorous sensitivity (highest & higher) | 12 lakes; 133,206 ac | 0 lakes; 0 ac | 0 lakes; 0 ac | 2 lakes; 401 ac | 4 lakes; 719 ac | 0 lakes; 0 ac | 7 lakes; 1,662 ac |
| Water quality trend (declining) | 0 lakes; 0 ac | 0 lakes; 0 ac | 0 lakes; 0 ac | 1 lake; 183 ac | 0 lakes; 0 ac | 0 lakes; 0 ac | 1 lake; 517 ac |
| Land use disturbance | 30,304 ac; 11% | 71,140 ac; 31% | 59,354 ac; 50% | 27,005 ac; 44% | 57,218 ac; 45% | 21,868 ac; 41% | 72,701 ac; 46% |

Protection Levels and Goals[†]



*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 Rum River Major Watershed. The yellow circles indicate priorities for forest land management identified by the Rum River Forestry Technical Committee.

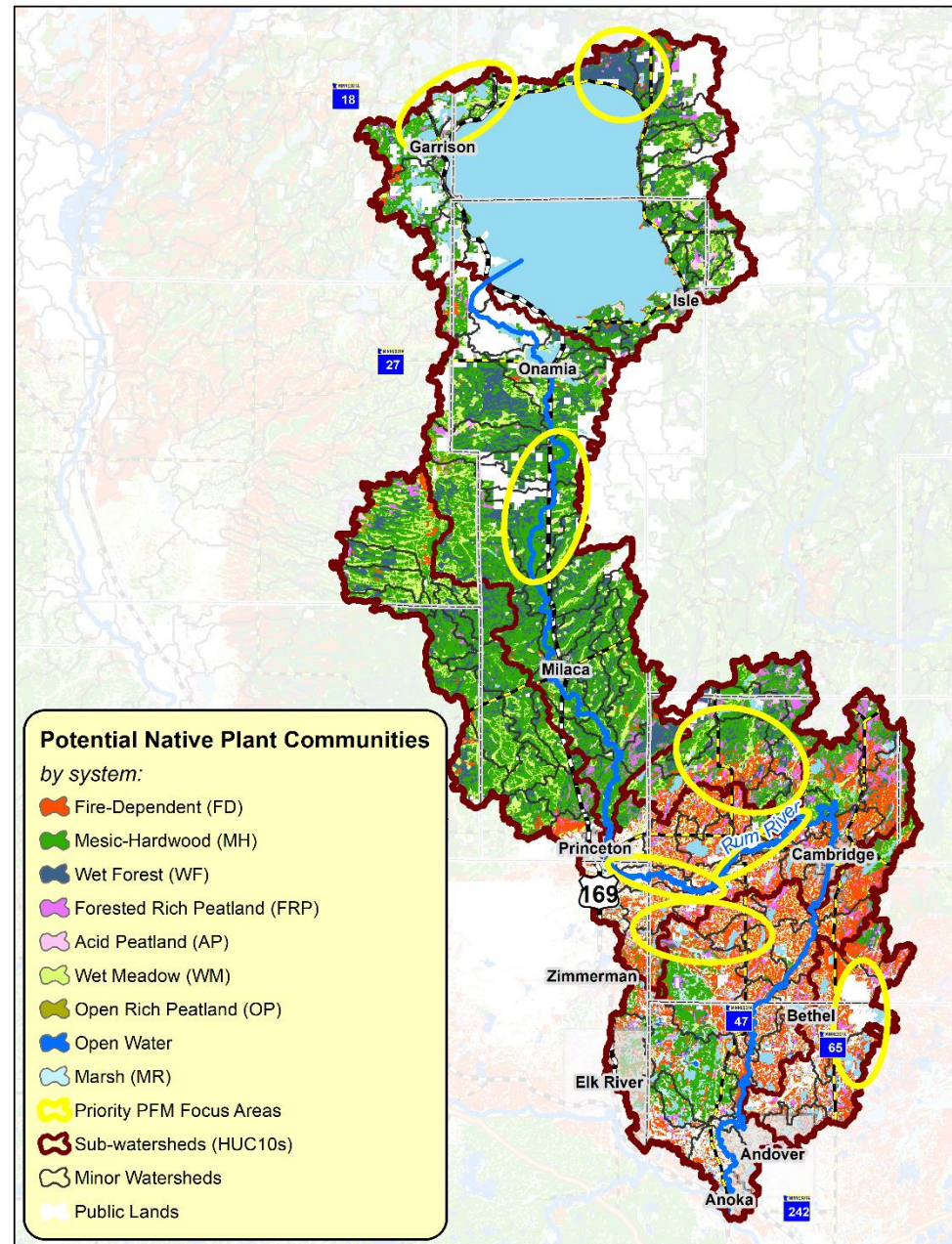
It is important to note that this map displays the potential NPC of private lands only, and it includes lands that are not currently forested. This map is a vision for all private lands, including nonforested lands, because it reflects what the private landscape can potentially be if the land is managed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

| Subwatershed | Private Land | Public Land | Parcels > 20 ac | Acres > 20 ac | Forest Spots | 10 Yr PFM Goals |
|------------------------------------|--------------|-------------|-----------------|---------------|--------------|--------------------|
| Subwd 1 – Mille Lacs Lake | 35% | 65% | 1,594 | 80,183 ac | 42 | 0 fsp; 0 ac |
| Subwd 2 – Upper Rum River | 83% | 17% | 2,725 | 171,631 ac | 104 | 205 fsp; 31,672 ac |
| Subwd 3 – West Branch Rum | 99% | 1% | 1,910 | 110,215 ac | 26 | 86 fsp; 13,248 ac |
| Subwd 4 – Stanchfield Creek | 93% | 7% | 925 | 52,382 ac | 11 | 46 fsp; 7,172 ac |
| Subwd 5 – Middle Rum River | 93% | 7% | 1,775 | 82,830 ac | 25 | 90 fsp; 13,953 ac |
| Subwd 6 – Cedar Creek | 80% | 20% | 555 | 23,381 ac | 7 | 18 fsp; 2,846 ac |
| Subwd 7 – Lower Rum River | 90% | 10% | 1,785 | 78,137 ac | 16 | 54 fsp; 8,433 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% |
| Paper Birch | 16% | 5% | | 19% | 26% | | 14% |
| Balsam Fir | 1% | 7% | | 4% | 11% | | 5% |
| White (Black) Spruce | — | 1% | | 5% | 1% | | 13% |
| White Pine | — | 0% | | 19% | 1% | | 30% |
| Red Maple | — | 4% | — | 1% | 9% | — | 2% |
| White Cedar | — | 0% | — | 2% | 1% | — | 2% |
| Miscellaneous | 11% | 3% | — | 7% | 2% | — | 9% |
| Percent of Community in Growth Stage in Presettlement and Modern Landscapes | 14% | 30% | 27% | 30% | 44% | 39% | 15% |

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 ² | | |
| Paper Birch | 38% | 9% | | 28% | 7% | | 12% |
| Quaking Aspen | 20% | 22% | | 6% | 4% | | 4% |
| Red Oak | 10% | 6% | | 5% | 11% | | 1% |
| Balsam Fir | 5% | 4% | | 3% | 2% | | 1% |
| Basswood | 6% | 9% | | 9% | 19% | | 6% |
| White Spruce ¹ | 1% | 1% | | 13% | 0% | | — |
| Sugar Maple | 11% | 24% | | 14% | 32% | | 29% |
| White Pine | 1% | 0% | | 7% | 1% | | 31% |
| American Elm | 3% | 2% | | 2% | 3% | | 0% |
| Red Maple | — | 9% | — | — | 4% | — | 0% |
| Ironwood | 1% | 7% | — | 1% | 7% | — | 1% |
| Bur Oak | 1% | 1% | — | 2% | 3% | — | 0% |
| Miscellaneous | 3% | 6% | — | 10% | 7% | — | 15% |
| Percent of Community in Growth Stage in Presettlement and Modern Landscapes | 39% | 29% | 51% | 52% | 8% | 18% | 1% |

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 Rum River Major Watershed.

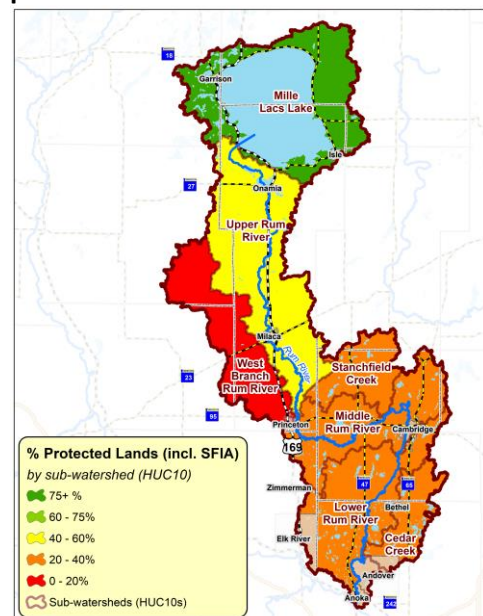
- Private lands dominate the vast majority of the Rum River Major Watershed, except in the Mille Lacs Lake Subwatershed. This subwatershed has a moderate amount of public land and very high levels of public waters, and so is beyond the 75% protection goal as stated in goal 1. It is not a priority for private forest management because few private forest acres are available. The West Branch Rum River Subwatershed is also not a priority for forest management because it contains so much risk from agriculture and low levels of protection that spending a large amount of public dollars in this subwatershed would not yield a good return on investment.
- The Upper Rum River and Cedar Creek Subwatersheds were determined to be high priorities for forest land protection because they both have a moderate amount of risk, but also relatively high indicators of quality (e.g. lakes of biological significance, high terrestrial biodiversity scores, etc.).
- Across the Rum River Major Watershed the planning team selected priority areas (see map with Goal 2 narrative and lists in the following Subwatershed Action Plans) to focus forest land protection / stewardship efforts and identified specific minor watersheds to concentrate landowner outreach efforts.

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 Rum 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 12. Subwatershed (HUC10) protection levels.



**Subwatershed No. 1
Mille Lacs Lake (HUC 701020701)**

Goal 1: Forest Land Protection Guidance

- Moderate amount of forest cover, 25%.
- Headwaters to the entire major watershed.
- Has many lakes of outstanding or high biodiversity significance, priority shallow lakes, and priority wild rice lakes.
- Home to Mille Lacs Lake, one of the most famous lakes in the country.
- High terrestrial biodiversity and Wildlife Action Network scores.
- At risk from lakes with high phosphorous sensitivity.
- Low priority for forest land protection. Subwatershed is already highly protected.
- Forest land protection goal is 75%, current protection is 78% - goal met!

Goal 2: Forest Stewardship Guidance

- In this subwatershed the area to the west of Mille Lacs Lake is the Mille Lacs Moraine, which likely supports forests of mesic hardwoods.
- The area to the west of Mille Lacs Lake is a combination of morainal and till plain deposits, outwash, and peat formations. Mesic hardwoods are the most likely NPC system to occur on all the deposits except the peat formations. Wet forests and wet meadows may be found on the peat formations and other lowland areas.
- The current forest cover is heavily deciduous with a minor conifer component.
- Refer to the Mesic Hardwood and Wet Forest vegetation management goals in the 2nd Generation East Central Landscape Management Plan.
- Forest stewardship goal – 0 plans; 0 acres.

Priority Minor Watersheds

- Priority minor watersheds for protection are 21001, 21007, and 21058.
- Forest land protection and stewardship plan goals are met! Work with interested landowners with current PFM program services.

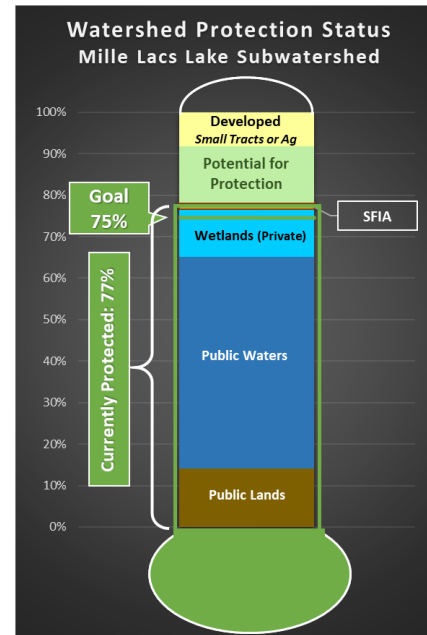


Table 3. Minor watershed info.

| Minor wshd # | Acres | Current % protected | Protection goal % |
|--------------|---------|---------------------|-------------------|
| 21001 | 7,025 | 65.1% | 75% |
| 21002 | 164,789 | 88.3% | 75% |
| 21003 | 6,367 | 66.4% | 66% |
| 21004 | 4,932 | 50.0% | 60% |
| 21005 | 4,896 | 40.9% | 60% |
| 21006 | 4,650 | 46.1% | 60% |
| 21007 | 6,660 | 55.7% | 75% |
| 21008 | 6,593 | 56.0% | 60% |
| 21009 | 10,870 | 78.3% | 75% |
| 21010 | 10,886 | 50.0% | 60% |
| 21011 | 7,725 | 83.4% | 75% |
| 21017 | 3,352 | 42.2% | 60% |
| 21058 | 11,294 | 49.7% | 75% |
| 21059 | 11,471 | 59.9% | 75% |
| 21103 | 4,876 | 70.5% | 75% |

**Subwatershed No. 2
Upper Rum River (HUC 701020702)**

Goal 1: Forest Land Protection Guidance

- Moderate amount of forest cover, 41%.
- Largely stream based watershed with relatively few lakes.
- At risk in its lower half from low levels of protection, some development, and high amounts of agriculture.
- High priority for forest land protection. Focus protection efforts on the Rum River corridor, especially the area around the Rum River State Forest and nearby Wildlife Management Areas.
- Forest land protection goal is 53%, current protection is 43%.

Goal 2: Forest Stewardship Guidance

- The primary landforms in the Upper Rum River subwatershed are till plains and a small portion of the Mille Lacs Moraine near its northern border. Also present in the northern half of the subwatershed are east-west orientated drumlins, between which are peat formations.
- The potential NPCS in this subwatershed are a variegated mixture of mesic hardwood forests in the upland areas and wet forest or wet meadows in the lowlands.
- The current forest cover is heavily deciduous with a minor conifer component. Overall cover is much greater in the northern half of the subwatershed than the southern half.
- Refer to the Mesic Hardwood and Wet Forest vegetation management goals in the 2nd Generation East Central Landscape Management Plan.
- Forest stewardship goal – 205 plans, 31,672 acres.

Priority Minor Watersheds

- Priority minor watersheds for protection are 21019, 21021, and 21027.

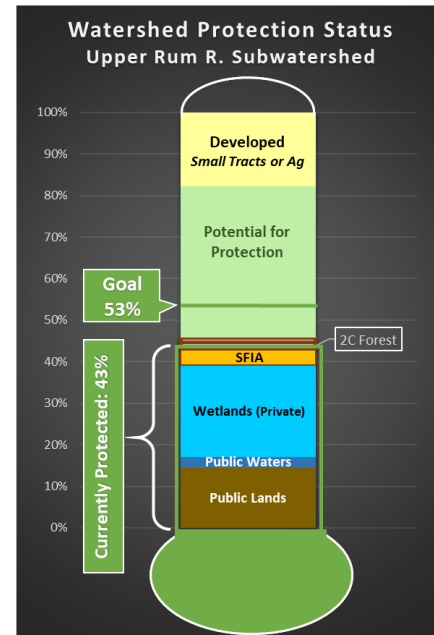


Table 4. Minor watershed info.

| Minor wshd # | Acres | Current % protected | Protection goal % |
|--------------|--------|---------------------|-------------------|
| 21012 | 8,933 | 60.5% | 75% |
| 21013 | 20,610 | 66.1% | 75% |
| 21014 | 9,837 | 95.1% | 75% |
| 21015 | 7,789 | 59.1% | 75% |
| 21016 | 3,868 | 52.2% | 75% |
| 21018 | 15,633 | 51.3% | 75% |
| 21019 | 11,113 | 47.0% | 70% |
| 21020 | 3,876 | 80.0% | 75% |
| 21021 | 15,166 | 42.9% | 70% |
| 21022 | 27,516 | 42.8% | 75% |
| 21025 | 7,615 | 20.6% | 45% |
| 21026 | 4,807 | 12.4% | 45% |
| 21027 | 5,009 | 36.7% | 60% |
| 21028 | 10,628 | 39.6% | 65% |
| 21029 | 5,312 | 25.2% | 35% |
| 21030 | 9,314 | 20.4% | 25% |
| 21031 | 4,653 | 15.7% | 35% |
| 21032 | 15,961 | 27.4% | 50% |
| 21033 | 6,773 | 18.8% | 35% |
| 21034 | 10,605 | 22.8% | 35% |
| 21043 | 4,496 | 16.8% | 40% |
| 21049 | 6,640 | 16.7% | 30% |
| 21050 | 11,799 | 59.1% | 75% |

**Subwatershed No. 3
West Branch Rum River (HUC 701020703)**

Goal 1: Forest Land Protection Guidance

- Moderate amount of forest cover, 33%.
- Largely stream based watershed with relatively few lakes.
- Has the most land use disturbance (i.e. agriculture and development) of any subwatershed in the major watershed, about 50%.
- At risk from low levels of protection, some development, high amounts of agriculture, and stream impairments.
- Low priority for forest land protection.
- Forest land protection goal is 29%, current protection is 19%.

Goal 2: Forest Stewardship Guidance

- This subwatershed has large areas of till plains, but also some outwash and morainal deposits in its northern half. In its northern half are east-west orientated drumlins, which are part of the same formation as the drumlins in the Upper Rum River Subwatershed.
- Nearly all the upland areas in this subwatershed have the potential to support mesic hardwood forests, but little potential for fire dependent forests. The potential lowland NPCs are mainly wet forest and wet meadows in the area between the drumlins and other low spots.
- The current forest cover is heavily deciduous with a minor conifer component. Overall forest cover is greater in the northern half of the subwatershed than the southern half.
- Refer to the Mesic Hardwood and Wet Forest vegetation management goals in the 2nd Generation East Central Landscape Management Plan.
- Forest stewardship goal – 86 plans, 13,248 acres.

Priority Minor Watersheds

- Priority minor watersheds for protection are 7050, 7052, 7053, 7061, 7062, 7083, and 7084.

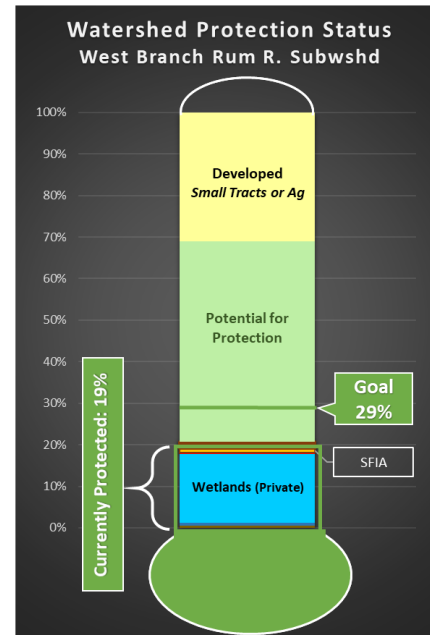


Table 5. Minor watershed info.

| Minor wshd # | Acres | Current % protected | Protection goal % |
|--------------|--------|---------------------|-------------------|
| 21023 | 9,842 | 22.5% | 60% |
| 21024 | 2,769 | 35.5% | 75% |
| 21040 | 4,958 | 19.1% | 35% |
| 21041 | 5,237 | 20.2% | 35% |
| 21042 | 7,068 | 16.4% | 40% |
| 21044 | 5,308 | 19.0% | 25% |
| 21045 | 4,920 | 20.6% | 45% |
| 21046 | 9,012 | 26.8% | 55% |
| 21047 | 13,973 | 21.2% | 35% |
| 21048 | 13,064 | 17.3% | 40% |
| 21053 | 5,153 | 23.2% | 65% |
| 21054 | 4,962 | 21.5% | 40% |
| 21055 | 20,499 | 37.7% | 65% |
| 21056 | 5,178 | 36.2% | 50% |
| 21057 | 6,333 | 30.2% | 50% |

**Subwatershed No. 4
Stanchfield Creek (HUC 701020704)**

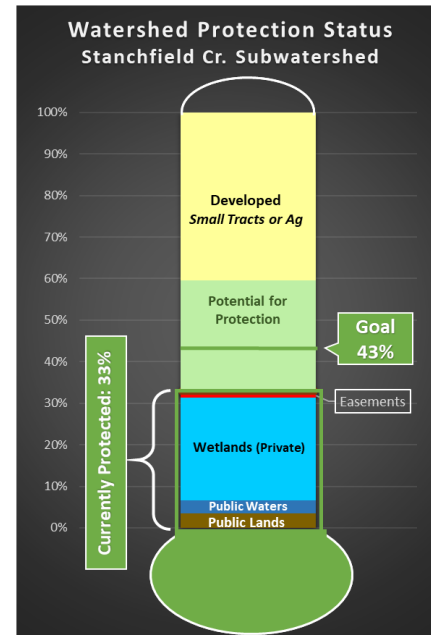
Goal 1: Forest Land Protection Guidance

- Low amount of forest cover, 19%.
- Abundant wetlands that cover 32% of the subwatershed.
- Has high land use disturbance, 44% of the watershed has been converted to agriculture or urban development.
- At risk from low levels of protection, high amounts of agriculture, and stream and lake impairments.
- Medium priority for forest land protection, focus protection efforts on parcels with high RAQ scores in the priority minor watersheds (Table 6).
- Forest land protection goal is 43%, current protection is 33%.



Goal 2: Forest Stewardship Guidance

- The main landforms are till plains and former lake-beds with defined channels of ice-contact deposits running through them.
- This subwatershed is partially split between the Mille Lacs Uplands ECS Subsection and the Anoka Sand Plains ECS Subsection, and along the split is a highly noticeable difference in the potential NPCs. In the Mille Lacs Uplands mesic hardwood forests are the most common potential NPC in the upland areas, whereas in the Anoka Sand Plains the uplands are more likely to support fire-dependent forests.
- The current forest cover is heavily deciduous with a minor conifer component. Overall forest cover is greater in the eastern half of the subwatershed than the western half.
- Refer to the Mesic Hardwood and Forested Rich Peatland vegetation management goals in the 2nd Generation East Central Landscape Management Plan.
- Forest stewardship goal – 46 plans, 7,172 acres.



Priority Minor Watersheds

- Priority minor watersheds for protection are 21060, 21062, 21066, 21067, and 21073.

Table 6. Minor watershed info

| Minor wshd # | Acres | Current % protected | Protection goal % |
|--------------|--------|---------------------|-------------------|
| 21035 | 6,669 | 41.0% | 45% |
| 21060 | 7,129 | 52.7% | 55% |
| 21061 | 7,242 | 40.5% | 50% |
| 21062 | 11,176 | 34.1% | 45% |
| 21066 | 17,130 | 36.1% | 40% |
| 21067 | 8,913 | 37.0% | 40% |
| 21073 | 3,412 | 32.4% | 35% |

**Subwatershed No. 5
Middle Rum River (HUC 701020705)**

Goal 1: Forest Land Protection Guidance

- Low amount of forest cover, 24%.
- Has high land use disturbance, 45% of the watershed has been converted to agriculture or urban development.
- At risk from low levels of protection, high amounts of agriculture and development, and lake impairments.
- Medium priority for forest land protection, focus protection efforts on the Rum River corridor.
- Forest land protection goal is 39%, current protection is 29%.

Goal 2: Forest Stewardship Guidance

- This subwatershed is largely covered by lacustrine deposit of fine sand. The most likely NPCs that can be supported in these conditions are fire-dependent forests and upland prairie.
- The current forest cover is mainly deciduous with a moderate conifer component from pine plantations.
- Refer to the Fire-Dependent vegetation management goals in the 2nd Generation East Central Landscape Management Plan.
- Forest stewardship goal – 90 plans, 13,953 acres.

Priority Minor Watersheds

- Priority minor watersheds for protection are 21038, 21051, 21077, 21078, 21080, 21081, and 21092.

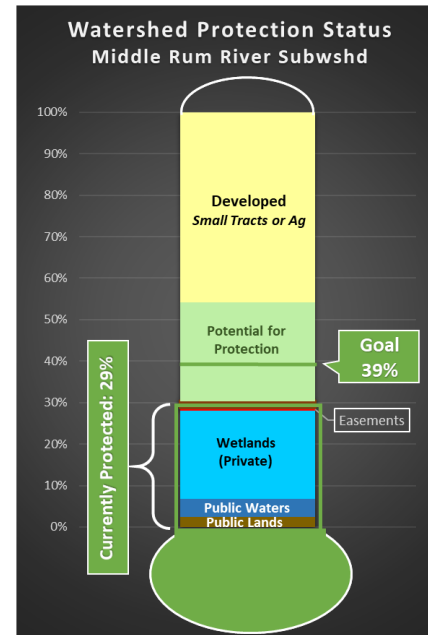


Table 7. Minor watershed info.

| Minor wshd # | Acres | Current % protected | Protection goal % |
|--------------|--------------|---------------------|-------------------|
| 21036 | 7,623 | 21.5% | 35% |
| 21037 | 5,502 | 20.2% | 25% |
| 21038 | 6,387 | 31.2% | 40% |
| 21039 | 6,068 | 31.8% | 35% |
| 21051 | 7,737 | 33.0% | 35% |
| 21063 | 7,784 | 38.6% | 45% |
| 21068 | 10,870 | 45.5% | 55% |
| 21069 | 11,295 | 34.8% | 45% |
| 21071 | 11,859 | 27.0% | 30% |
| 21072 | 4,017 | 38.0% | 40% |
| 21074 | 3,820 | 24.8% | 25% |
| 21075 | 4,775 | 25.0% | 25% |
| 21076 | 7,376 | 50.0% | 52% |
| 21077 | 6,594 | 32.4% | 40% |
| 21078 | 4,362 | 40.4% | 45% |
| 21079 | 4,618 | 33.5% | 35% |
| 21080 | 6,163 | 31.1% | 35% |
| 21081 | 2,698 | 43.5% | 45% |
| 21092 | 7193 | 19.2% | 35% |

**Subwatershed No. 6
Cedar Creek (HUC 701020706)**

Goal 1: Forest Land Protection Guidance

- Moderate amount of forest cover, 27%.
- Has lots of small lakes, including one lake of outstanding biodiversity significance.
- High terrestrial biodiversity and Wildlife Action Network scores.
- Has high land use disturbance, 41% of the watershed has been converted to agriculture or urban development.
- At risk from low levels of protection, high amounts of development, and agriculture.
- High priority for forest land protection, focus protection efforts on parcels with high RAQ scores in the priority minor watersheds (Table 8).
- Forest land protection goal is 43%, current protection is 38%.

Goal 2: Forest Stewardship Guidance

- The Cedar Creek Subwatershed is similar to the Middle Rum River subwatershed in that it is covered by a lacustrine deposit of sand and has the potential to support both fire-dependent forests and upland prairie.
- The current forest cover is heavily deciduous with a minor conifer component.
- Refer to the Fire-Dependent vegetation management goals in the 2nd Generation East Central Landscape Management Plan.
- Forest stewardship goal – 18 plans, 2,846 acres.

Priority Minor Watersheds

- Priority minor watersheds for protection are 21089, 21098, 21099, 21102.

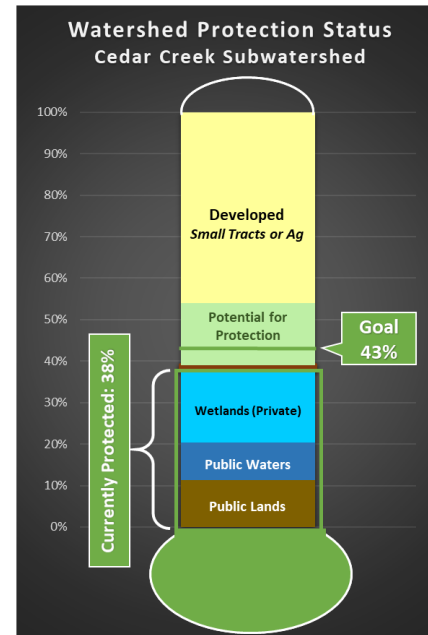


Table 8. Minor watershed info.

| Minor wshd # | Acres | Current % protected | Protection goal % |
|--------------|--------|---------------------|-------------------|
| 21089 | 23,646 | 31.5% | 35% |
| 21097 | 8,743 | 36.9% | 45% |
| 21098 | 10,516 | 51.9% | 60% |
| 21099 | 5,350 | 42.4% | 50% |
| 21102 | 5,571 | 31.5% | 35% |

**Subwatershed No. 7
Lower Rum River (HUC 701020707)**

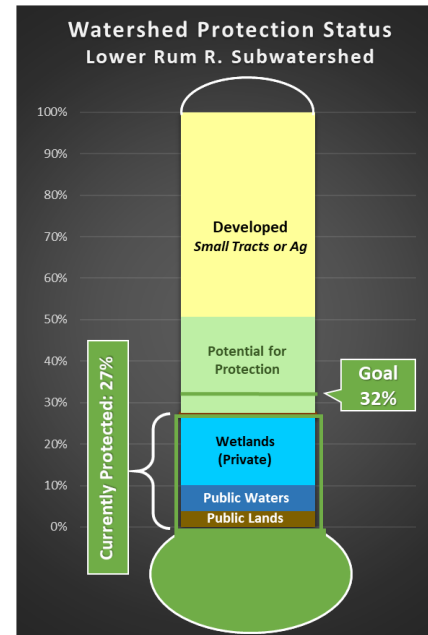


Goal 1: Forest Land Protection Guidance

- Moderate amount of forest cover, 27%.
- Has lots of small lakes, including four lakes of outstanding or high biodiversity significance.
- Has high land use disturbance, 46% of the watershed has been converted to agriculture or urban development.
- At risk from low levels of protection, high amounts of development, agriculture, and stream and lake impairments.
- Medium priority for forest land protection, focus protection efforts on riparian parcels in the northern part of the subwatershed.
- Forest land protection goal is 32%, current protection is 27%.

Goal 2: Forest Stewardship Guidance

- This subwatershed is covered by both morainal and lacustrine deposits. The moraine has the potential to support mesic hardwood forests, while fire-dependent forests and upland prairie may naturally occur on the lacustrine deposits.
- The current forest cover is heavily deciduous with a minor conifer component. Overall forest cover is scattered, although a few sizeable blocks of relatively intact forests do exist in this subwatershed.
- Refer to the Fire-Dependent and Mesic Hardwood vegetation management goals in the 2nd Generation East Central Landscape Management Plan.
- Forest stewardship goal – 54 plans, 8,433 acres.



Priority Minor Watersheds

- Priority minor watersheds for protection are 21084, 21085, and 21091.

Table 9. Minor watershed info.

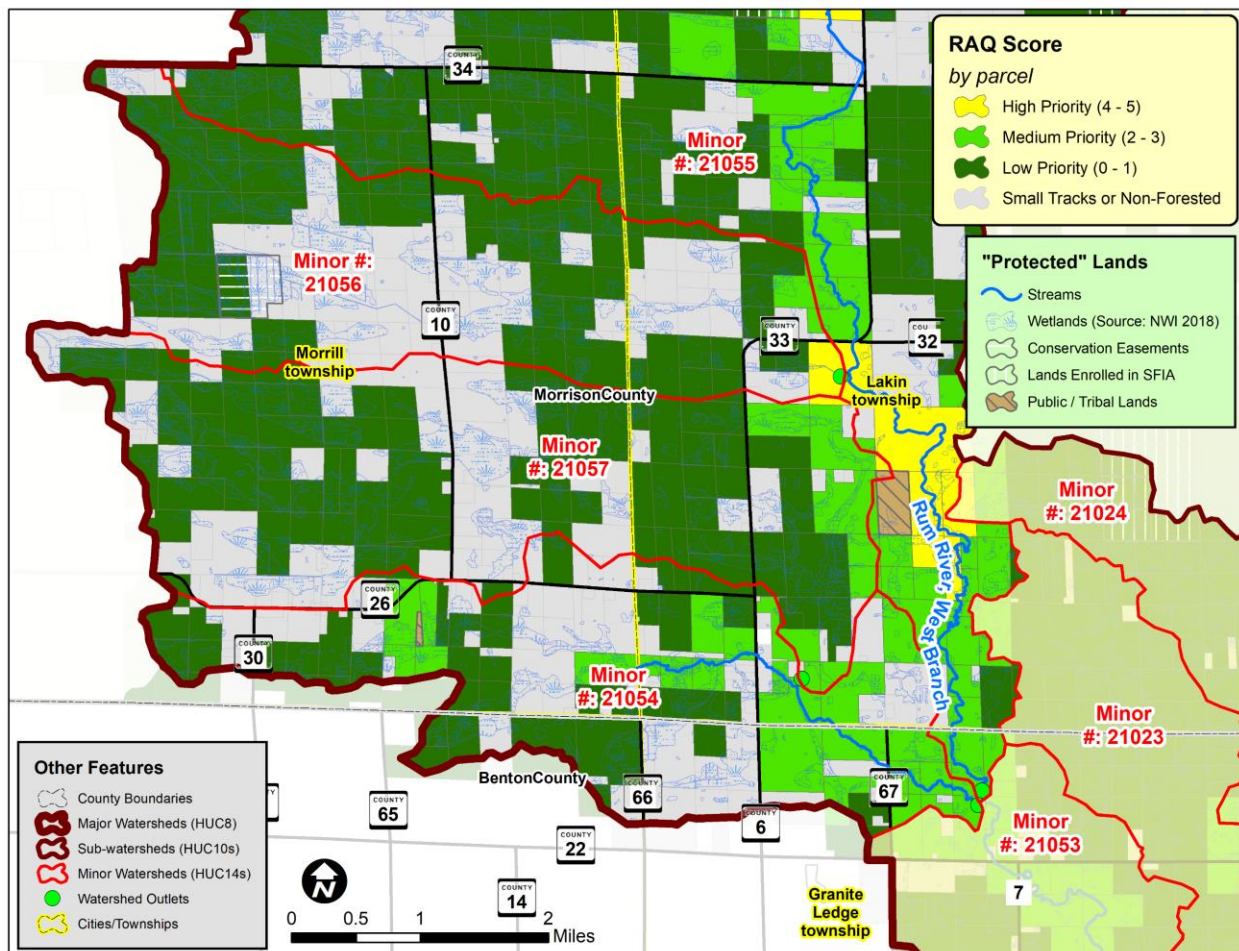
| Minor wshd # | Acres | Current % protected | Protection goal % |
|--------------|---------------|---------------------|-------------------|
| 21052 | 18,994 | 24.5% | 30% |
| 21070 | 12,526 | 32.0% | 40% |
| 21082 | 4,644 | 25.4% | 25% |
| 21083 | 5,061 | 31.3% | 35% |
| 21084 | 3,824 | 41.9% | 55% |
| 21085 | 5,840 | 29.7% | 40% |
| 21086 | 7,682 | 27.9% | 35% |
| 21087 | 6,771 | 28.4% | 37% |
| 21088 | 4,370 | 59.8% | 65% |
| 21090 | 5,016 | 19.5% | 20% |
| 21091 | 25,928 | 36.6% | 45% |
| 21093 | 24,162 | 36.7% | 45% |
| 21094 | 4,076 | 42.6% | 45% |
| 21095 | 3,591 | 23.3% | 45% |
| 21096 | 8,429 | 44.4% | 50% |
| 21100 | 4,551 | 27.0% | 30% |
| 21101 | 13,478 | 34.3% | 34% |

Minor Watershed Methodology and RAQ Scoring

The overall Rum River Major Watershed has a protection goal of 50%. Each of its nine subwatersheds have their own protection goals, which range from 29% in the West Branch Rum River Subwatershed to 75% in the Mille Lacs Lake Subwatershed. The subwatersheds have 6 to 22 minor watersheds, and each minor also has a protection goal that was determined by the Rum River LSP Planning Team based on their best professional judgement on what is achievable for that minor.

In order 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 Rum 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 13, which shows the RAQ scores for parcels across a group of minor watersheds in the West Branch Rum River Subwatershed. We can see on this map that the parcels with the highest RAQ scores are along the Rum River, West Branch in Lakin Township. Protecting these parcels would provide the greatest return on investment. MWA maps and tables are provided in the [Appendix](#) and [Workbook](#). The MWA priorities and RAQ scoring can also useful information to support local land use officials when developing their comprehensive plans and guidance on land use and public infrastructure decisions.

Fig 13. RAQ scores for parcels in minor watersheds #21054-21057.



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 64,088 acres of private forest land and the preparation of 74,314 acres of forest stewardship plans across the 1 million-acre Rum 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 Rum 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 [Service Provider Workbook](#) provides additional guidance to support the team’s coordination efforts.

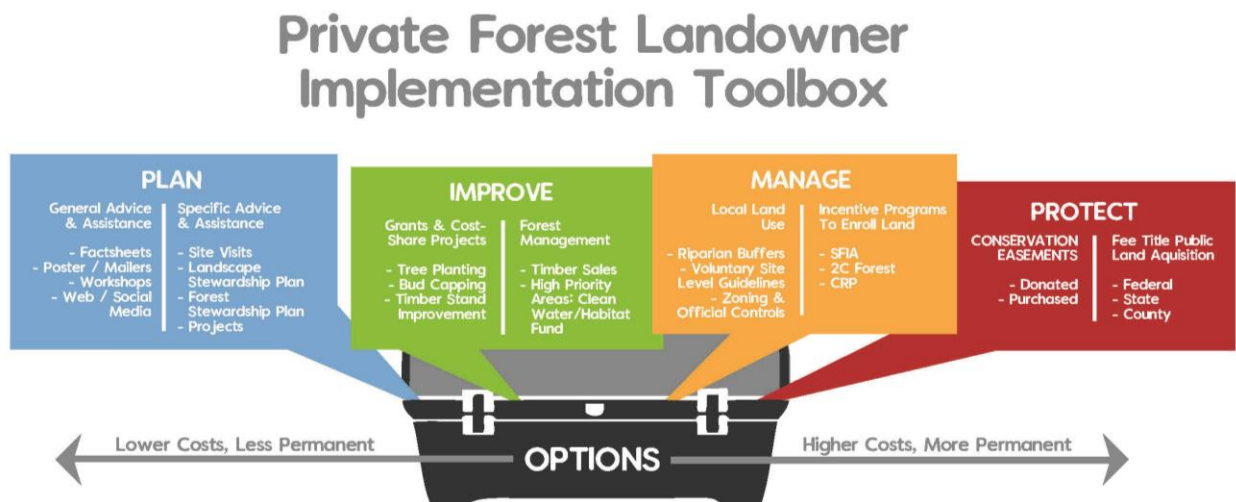
Coordination Strategy # 2 – Confirm the Project Coordinator

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 16 approved forestry professionals/plan writers have service areas in and near the Rum 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. In order 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 & assistance | #2 Specific advice & assistance | #3 Grants / cost-share project | #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> • Primary • Supporting | | | | | | | | |
| <u>Programs/projects</u> • Geographic areas of interest • Topical interests | | | | | | | | |
| <u>Staffing/equipment</u> • FTE's, expertise • Equipment • Other resources | | | | | | | | |

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 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 Rum 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 [Appendix](#) and [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 in order 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 Rum 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 Mille Lacs Lake Subwatershed is over 75% protected, several 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 this subwatershed.

Table 10. 10-year forestry investment plan summary.

| No. | Subwatershed name | Goal 1 – Increase Forest Land Protection | | Goal 2 – Promote Forest Stewardship | |
|-----|-----------------------|--|--------------------------------|-------------------------------------|--------------------------------|
| | | Acres | Public investment ^A | Plans / acres | Public investment ^B |
| 1 | Mille Lacs Lake | 0 | \$0 | 0 / 0 | \$0 |
| 2 | Upper Rum River | 22,402 | \$24,353,241 | 205 / 31,672 | \$164,000 |
| 3 | West Branch Rum River | 11,465 | \$12,380,873 | 86 / 13,248 | \$68,800 |
| 4 | Stanchfield Creek | 6,465 | \$8,577,251 | 46 / 7,172 | \$36,800 |
| 5 | Middle Rum River | 13,007 | \$20,009,261 | 90 / 13,953 | \$72,000 |
| 6 | Cedar Creek | 2,741 | \$5,007,908 | 18 / 2,846 | \$14,400 |
| 7 | Lower Rum River | 8,008 | \$14,947,234 | 54 / 8,433 | \$43,200 |
| | Totals | 64,088 | \$85,275,767 | 499 / 77,324 | \$399,200 |

^ACost assumes 50% of area in conservation easement and 50% in SFIA for 100 years.

^BCost 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 155 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 11. Annual PFM accomplishment report summary table - template.

| | Mille Lacs Lake | Upper Rum River | West Branch Rum River | Stanchfield Creek | Middle Rum River | Cedar Creek | Lower Rum River |
|---|-----------------|-----------------|-----------------------|-------------------|------------------|-------------|-----------------|
| Baseline | | | | | | | |
| Total land area (acres) | 266,384 | 227,951 | 118,277 | 61,671 | 126,743 | 53,827 | 158,942 |
| Area of private ownership (acres; % of subwshd) | 92,689; 35% | 189,066; 83% | 116,841; 99% | 57,610; 93% | 118,169; 93% | 42,853; 80% | 142,767; 90% |
| Private parcels <5 acres | 11,449 | 2,885 | 1,629 | 557 | 8,854 | 5,399 | 29,491 |
| Private parcels 5-20 acres | 919 | 1,775 | 993 | 495 | 2,116 | 1,011 | 3,112 |
| Private parcels >20 acres | 1,594 | 2,725 | 1,910 | 925 | 1,775 | 555 | 1,785 |
| Forest stewardship plans (#; acres) | 42; 5,895 | 104; 21,563 | 26; 4,120 | 11; 678 | 25; 1,827 | 7; 764 | 16; 917 |
| General advice & assistance | | | | | | | |
| Mailings | | | | | | | |
| Workshops | | | | | | | |
| Specific advice & assistance | | | | | | | |
| Site visits | | | | | | | |
| Forest stewardship plans | | | | | | | |
| Grants/ cost-share projects | | | | | | | |
| Forest restoration | | | | | | | |
| Forest stand improvement | | | | | | | |
| Forest management | | | | | | | |
| Timber harvests | | | | | | | |
| Biomass harvests | | | | | | | |
| Land use controls | | | | | | | |
| Riparian buffer plantings | | | | | | | |
| Site-level guideline compliance | | | | | | | |
| Incentive programs | | | | | | | |
| SFIA | | | | | | | |
| 2C | | | | | | | |
| Conservation easements | | | | | | | |
| Public | | | | | | | |
| Private/nonprofit NGO | | | | | | | |
| Fee title public land acquisition | | | | | | | |
| 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 East Central Landscape Committee.

Coordination Strategy # 6 – Recommendations to Local and State Agencies

Recommendations to BWSR and SWCDs for the Rum 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 Rum River Watershed Landscape Stewardship Plan by reference for addressing forest land protection and forest stewardship topics in the Rum 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 Rum 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 Rum 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 in order 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.

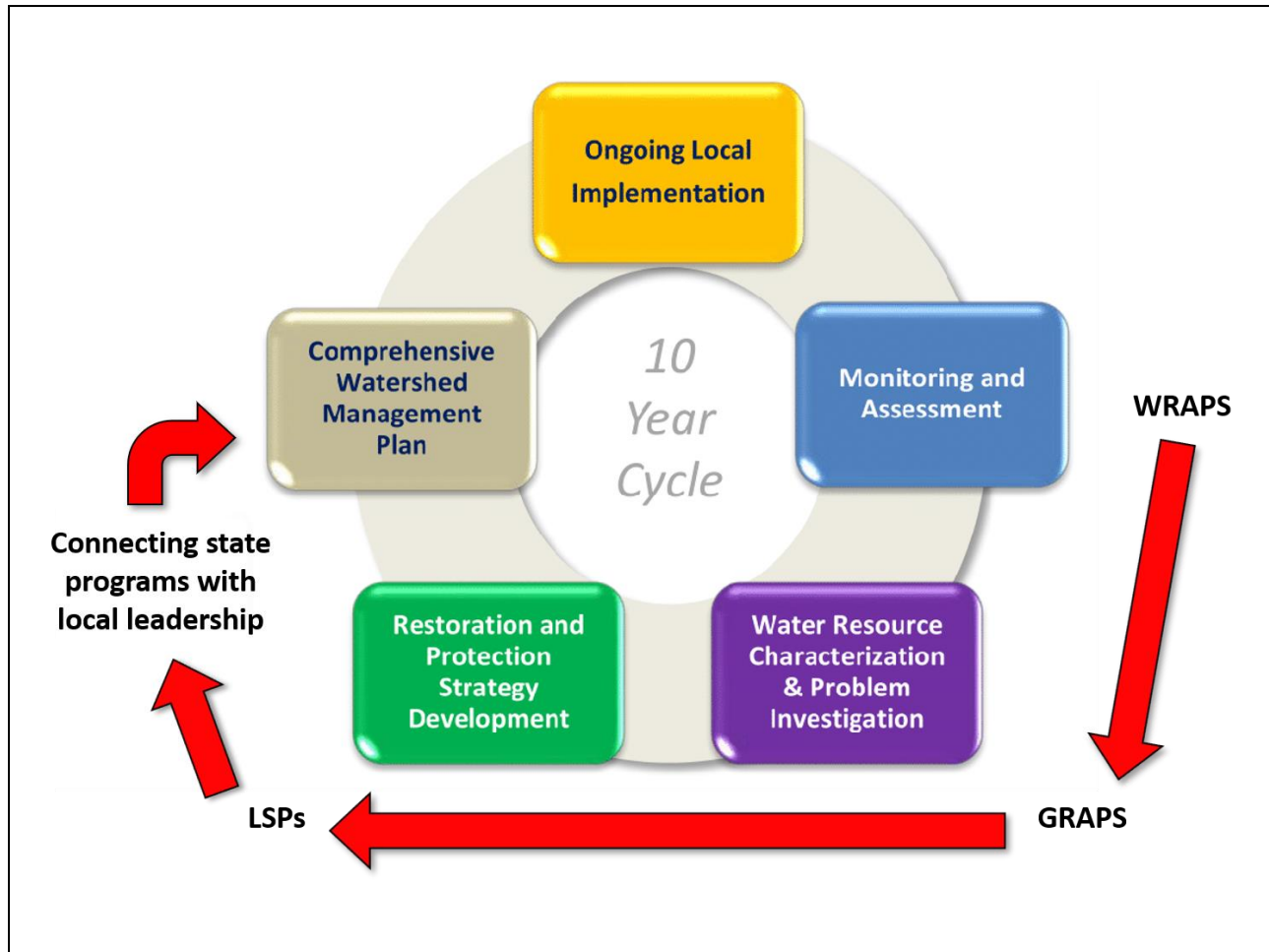
Demonstration Projects

Demonstration projects can provide valuable insights to resource professionals and landowners and serve as a starting point for the implementation of this Plan. The table below is a 10-year demonstration project list that summarizes potential projects with partners, initial priorities, and suggested timelines. While this list will need more development by the Local Forestry Technical Team, there are a lot of opportunities to build from conservation work already in progress in the watershed. 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 |
|---------|---|--------------------------|--------------------------------|-------------------|
| | Mille Lacs Lake Subwatershed | | | |
| | | | | |
| | | | | |
| | | | | |
| | Upper Rum River Subwatershed | | | |
| | | | | |
| | | | | |
| | | | | |
| | West Branch Rum River Subwatershed | | | |
| | | | | |
| | | | | |
| | | | | |
| | Stanchfield Creek Subwatershed | | | |
| | | | | |
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| | Middle Rum River Subwatershed | | | |
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| | | | | |
| | Cedar Creek Subwatershed | | | |
| | | | | |
| | | | | |
| | | | | |
| | Lower Rum River Subwatershed | | | |
| | | | | |
| | | | | |
| | | | | |

Insert project list from the LSP Planning Team on proposed demonstration projects

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



Note: The red arrow emphasizes the important connection between state water and forest resource programs with local water management. Local partners are involved -and often lead -in each stage in this framework.

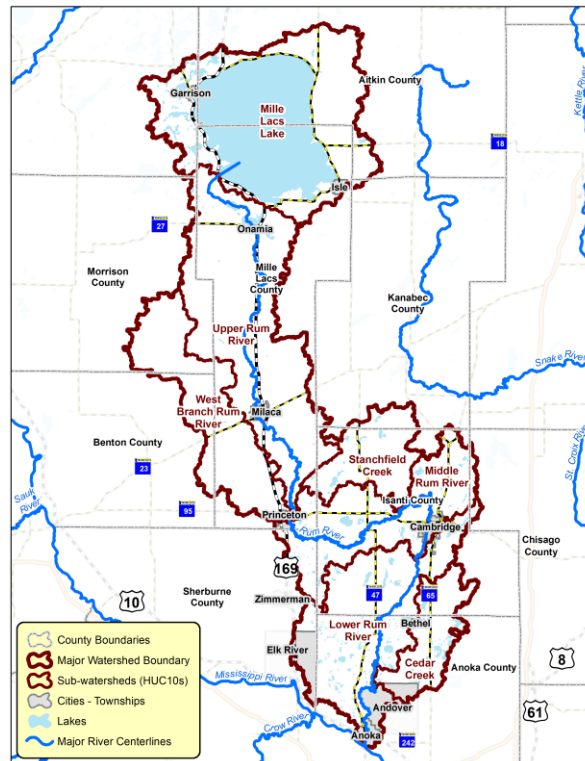
Through the integration of landscape stewardship plans and 1W1Ps, conservation professionals and landowners are working together to address the following national priorities:

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

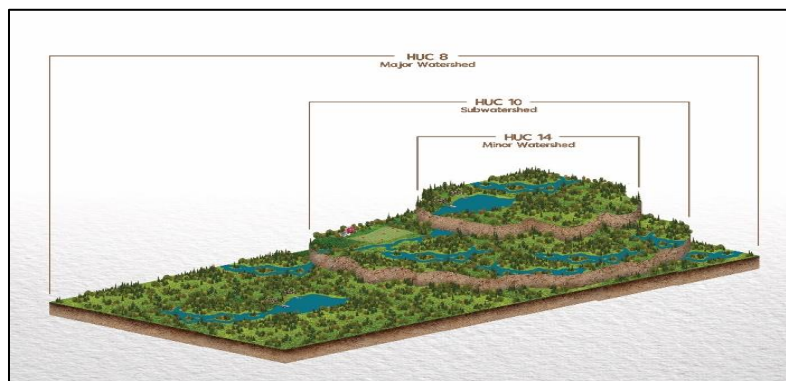
*"A lake is the landscape's most beautiful and expressive feature.
It is Earth's eye;
looking into which the beholder measures the depth of his own nature."*

- Henry David Thoreau

Index Information – Rum River Major Watershed



| Subwd no. | Subwatershed name | HUC no. | Acres | No. of minors |
|-----------|-----------------------|-----------|------------------|---------------|
| 1 | Mille Lacs Lake | 701020701 | 266,384 | 15 |
| 2 | Upper Rum River | 701020702 | 227,951 | 23 |
| 3 | West Branch Rum River | 701020703 | 118,277 | 15 |
| 4 | Stanchfield Creek | 701020704 | 61,671 | 7 |
| 5 | Middle Rum River | 701020705 | 126,743 | 19 |
| 6 | Cedar Creek | 701020706 | 53,827 | 5 |
| 7 | Lower Rum River | 701020707 | 158,942 | 17 |
| | Totals | | 1,013,794 | 101 |



Rum River Watershed Landscape Stewardship Plan

Appendix



Aitkin SWCD Crow Wing SWCD Isanti SWCD Mille Lacs SWCD Sherburne SWCD
Mille Lacs County Environmental Resources The Nature Conservancy

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Project Partners

This section provides an overview of the people involved with the development of the Rum River Landscape Stewardship Plan.

Rum River LSP Planning Team

The Rum River Landscape Stewardship Plan development involved several people representing different interests. The following list includes planning team members arranged alphabetically by last name. In addition to those on this list, there were many others who supported the effort in various ways.

| Team Member | Organization |
|-------------------|---|
| Mitch Lundeen | Aitkin SWCD |
| Jamie Schurbon | Anoka SWCD |
| Sheila Boldt | Crow Wing SWCD |
| Tiffany Determan | Isanti SWCD |
| Dillon Hayes | Mille Lacs County Environmental Resources |
| Harmony Maslowski | Mille Lacs SWCD |
| Susan Shaw | Mille Lacs SWCD |
| Dan Cibulka | Sherburne SWCD |
| Francine Larson | Sherburne SWCD |
| Gina Hugo | Sherburne SWCD |
| Jeff Wilder | MN DNR Forestry |
| Tony Miller | MN DNR Forestry |
| Troy Holcomb | MN DNR Forestry |
| Barb Peichel | Board of Water and Soil Resources |
| Leah Hall | The Nature Conservancy |

Staff Supporting the Rum River LSP Development

Board of Water and Soil Resources

- Lindberg Ekola, Forest Stewardship Planning Coordinator
- Dan Steward, Watershed/Private Forest Management Program Coordinator

Independent Contractors

- David Henkel-Johnson, plan writer
- Mitch Brinks, GIS support

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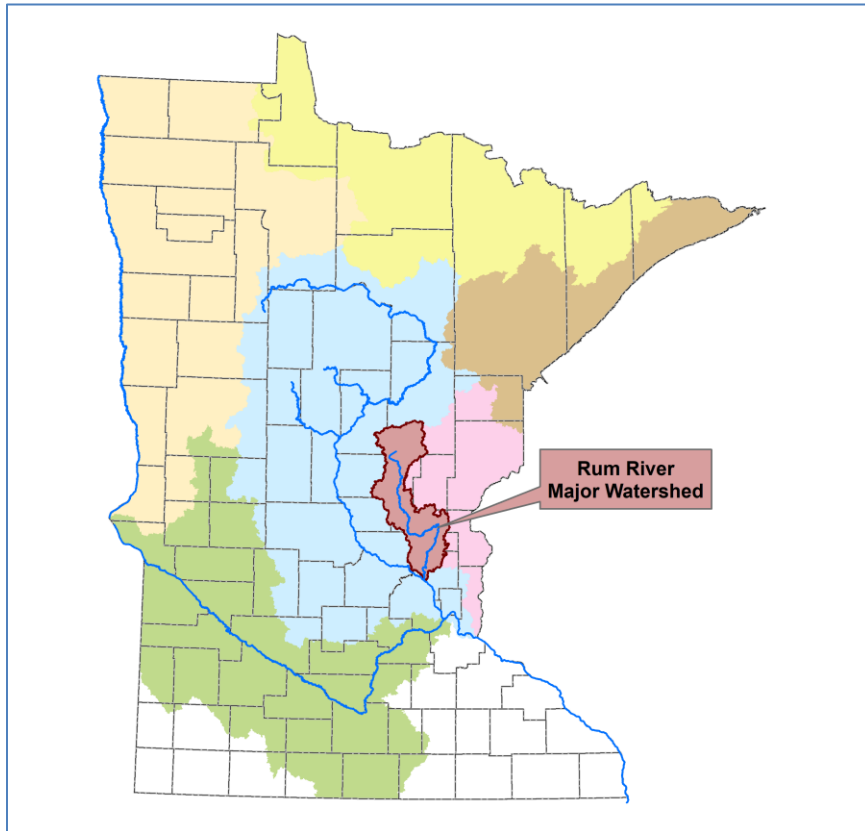
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Rum River Resource Inventory

The purpose of this section is to provide major watershed-scale (HUC 8) geographic data as a reference for the Rum River Landscape Stewardship Plan. Included in this section are maps regarding forest management topics for the Rum River Major Watershed.

Figure 1. Location of the Rum River Major Watershed.



Geography

Figure 2. Geomorphological landforms.

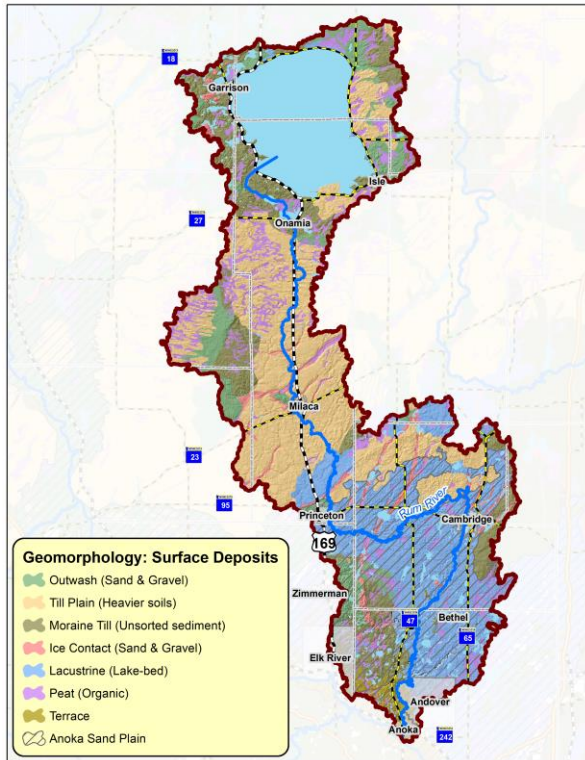


Figure 3. Elevation.

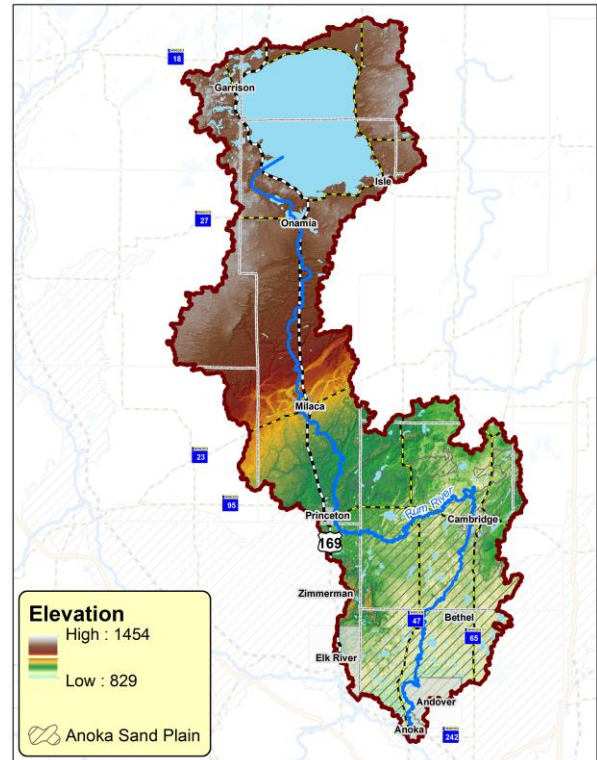


Figure 4. Ecological subsections.

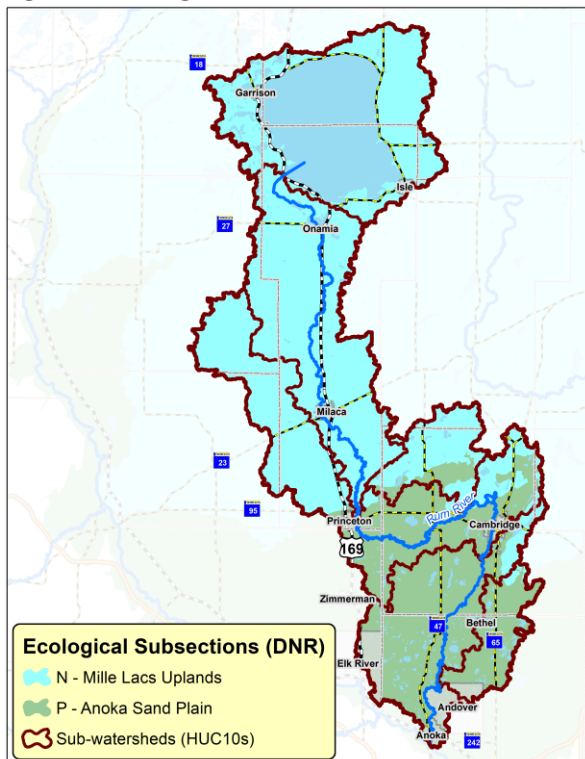


Figure 5. Land type associations.

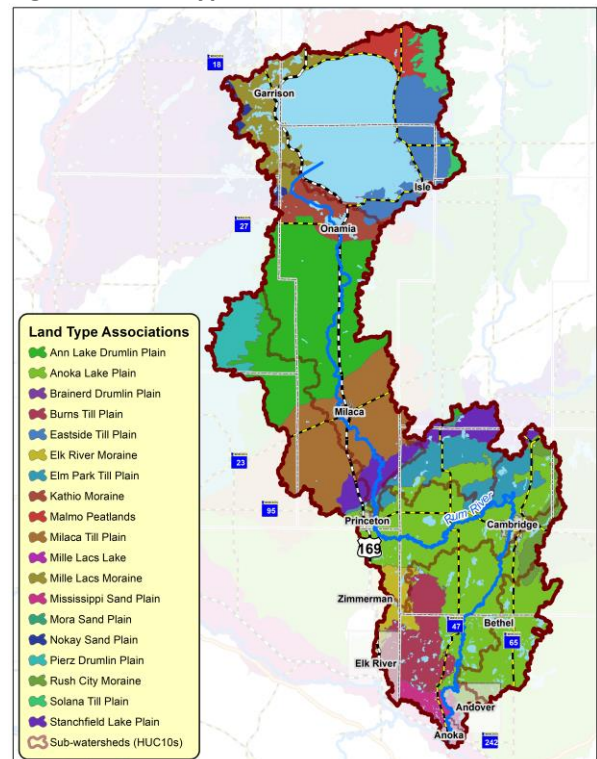
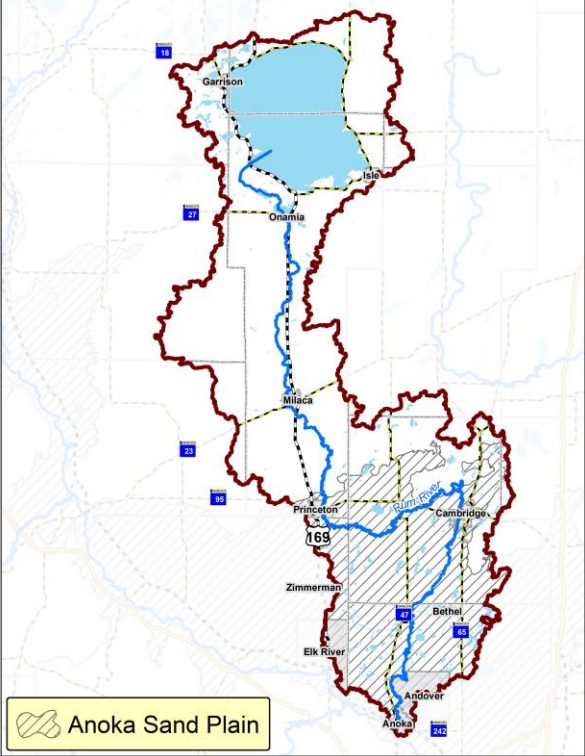


Figure 6. Anoka Sand Plain.



Forest Cover and Composition

Figure 7. Historic vegetation cover, Marschner.

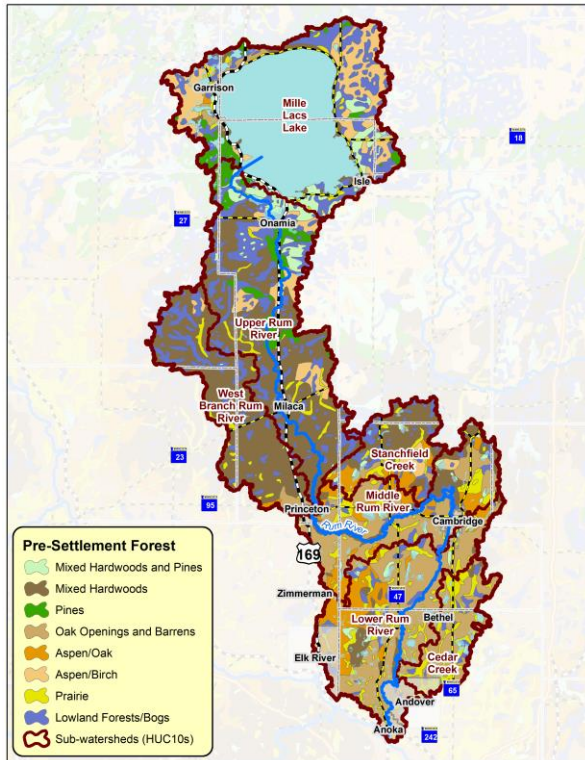


Figure 8. Historic vegetation class, MnDOT.

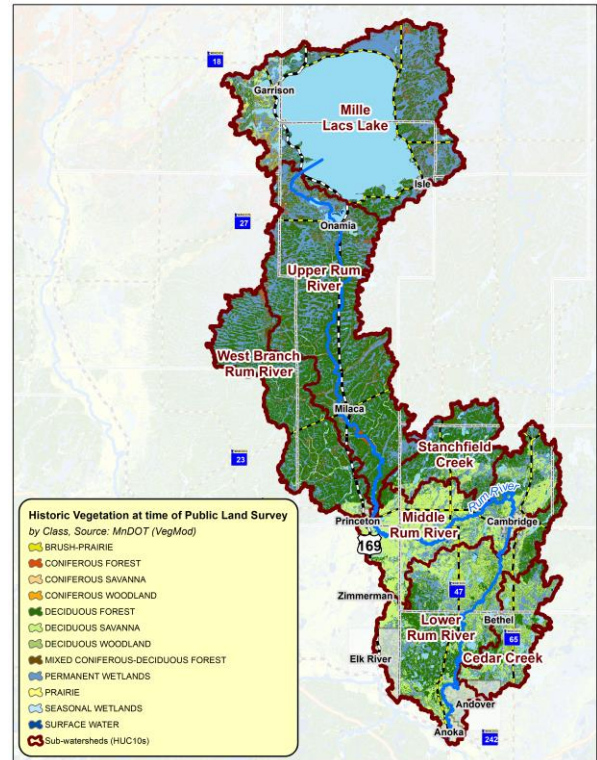


Figure 9. Land cover, 2013.

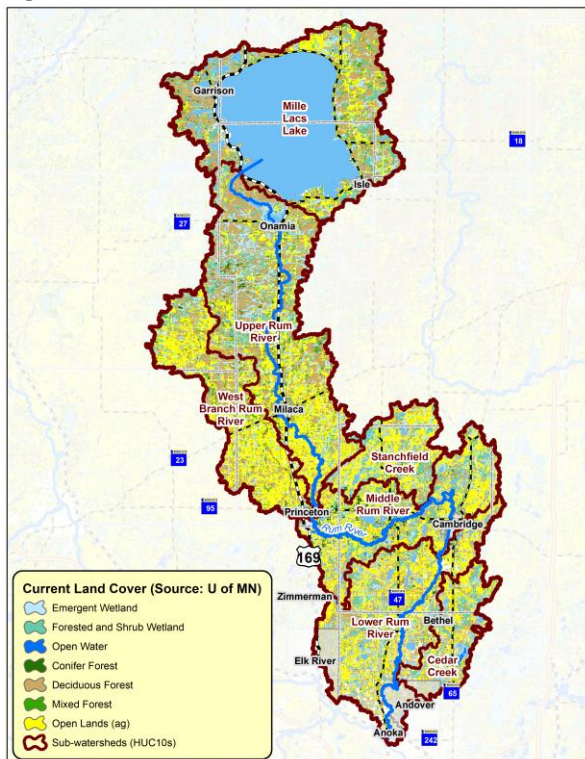


Figure 10. Potential native plant communities.

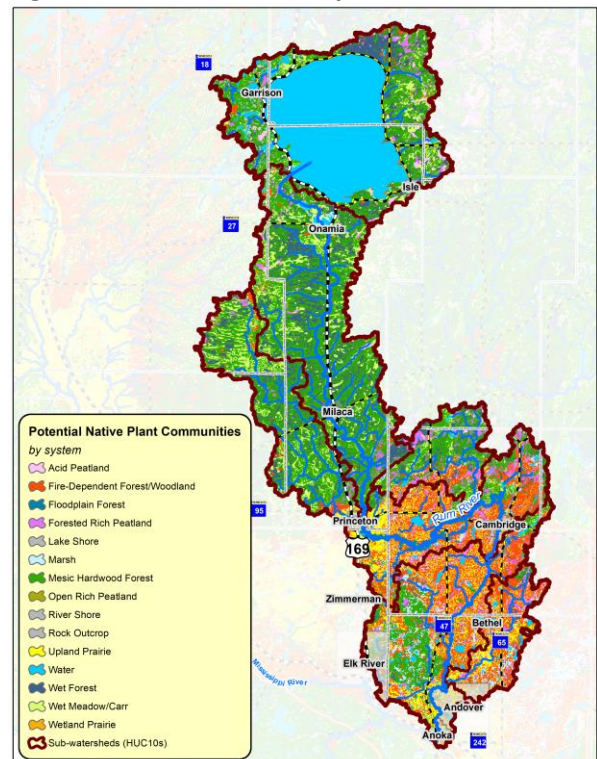


Figure 11. Change in aspen abundance.

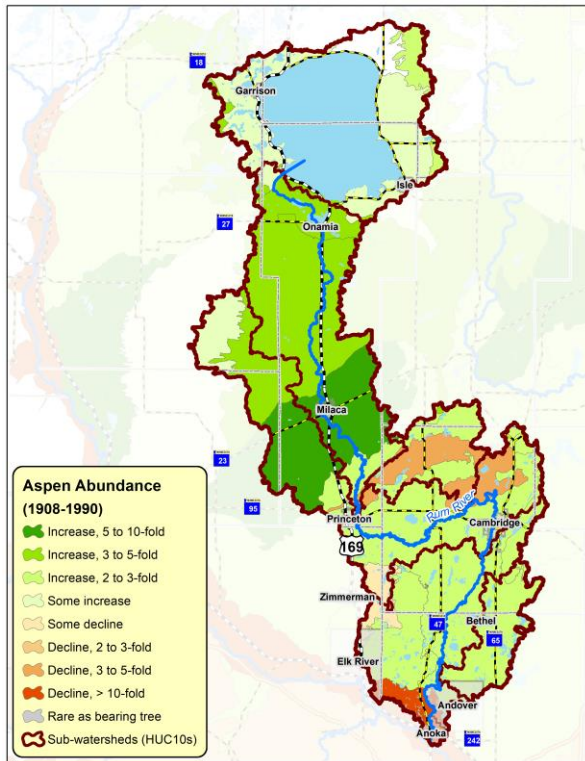


Figure 12. Change in red oak abundance.

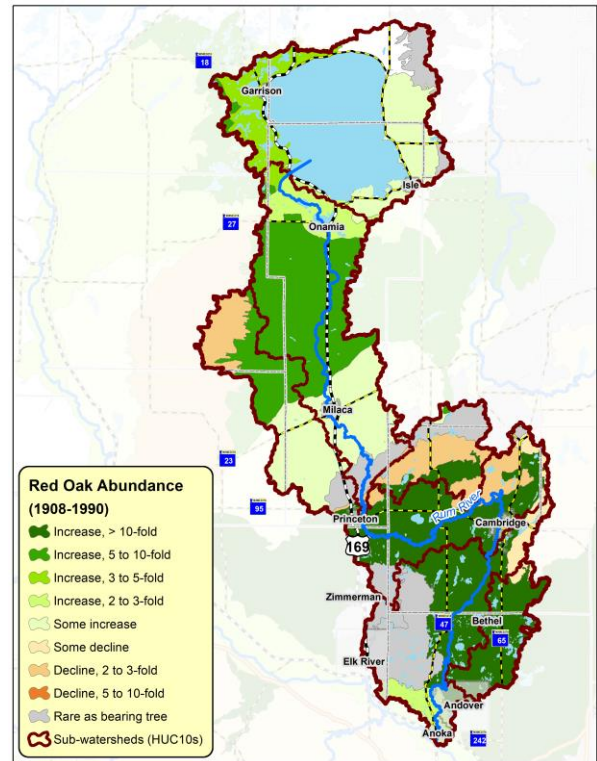
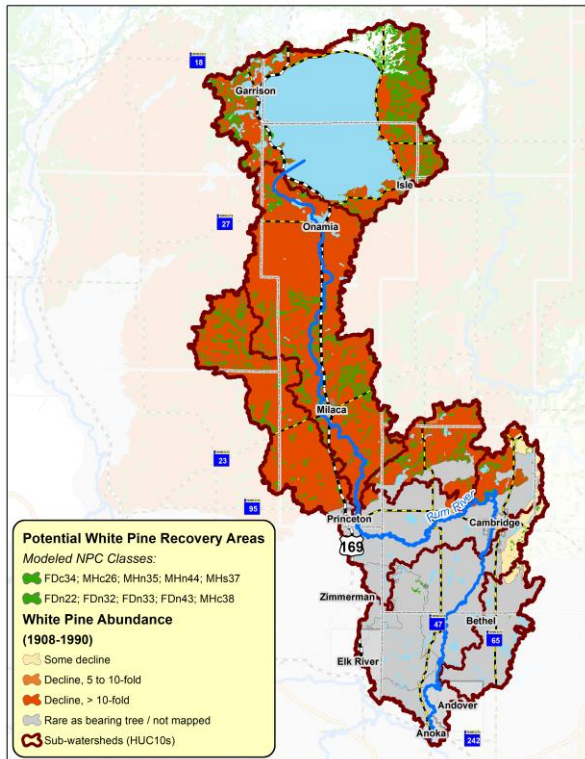


Figure 13. Potential white pine recovery areas.



Lakes and Streams

Figure 14. Lakes.

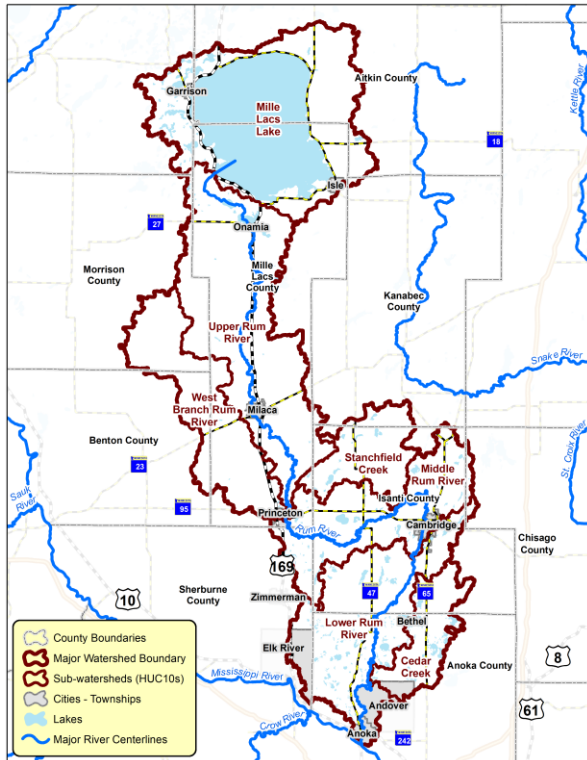


Figure 15. Water quality trends, MPCA data.

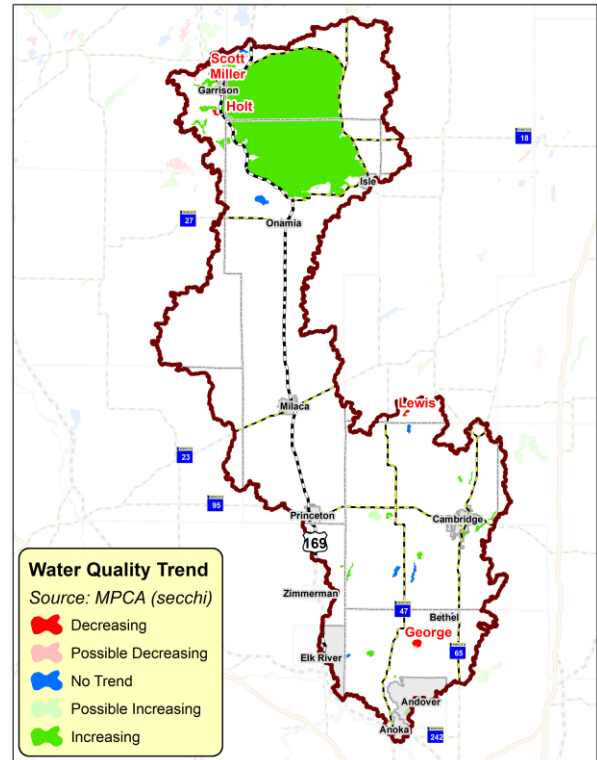


Figure 16. Stream impairments.

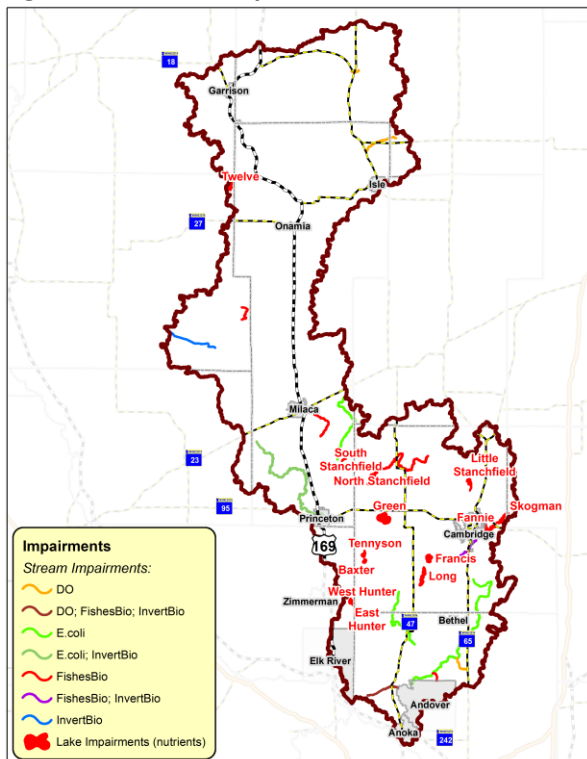


Figure 17. Phosphorus sensitive lakes.

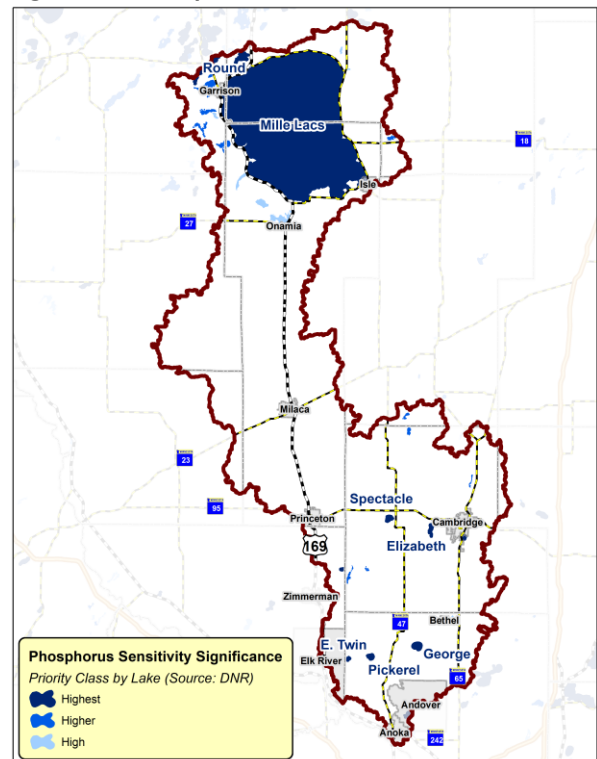


Figure 18. Lakes of biological significance.

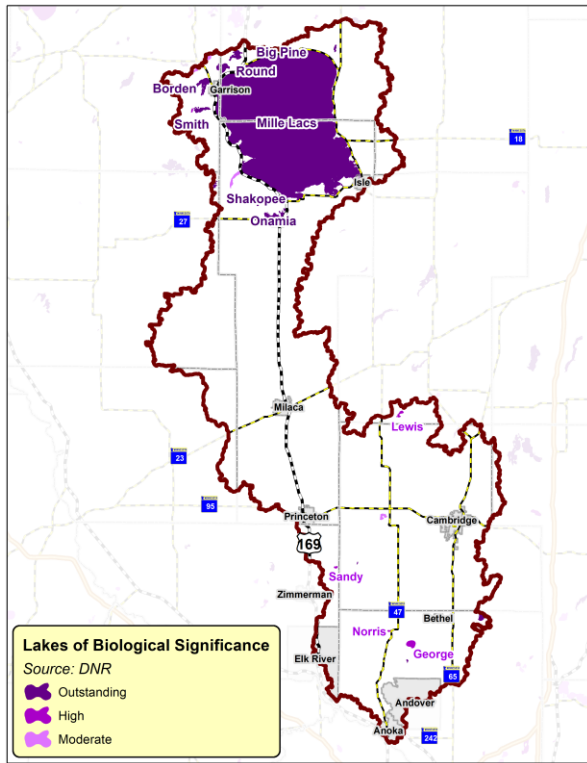
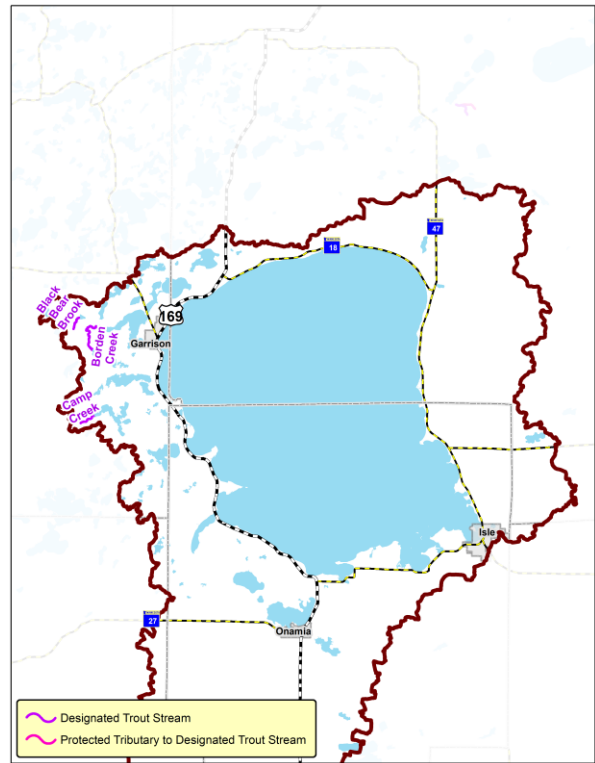


Figure 19. Trout streams and tributaries.



Forest and Watershed Disturbance

Figure 20. Forest disturbance areas by year.

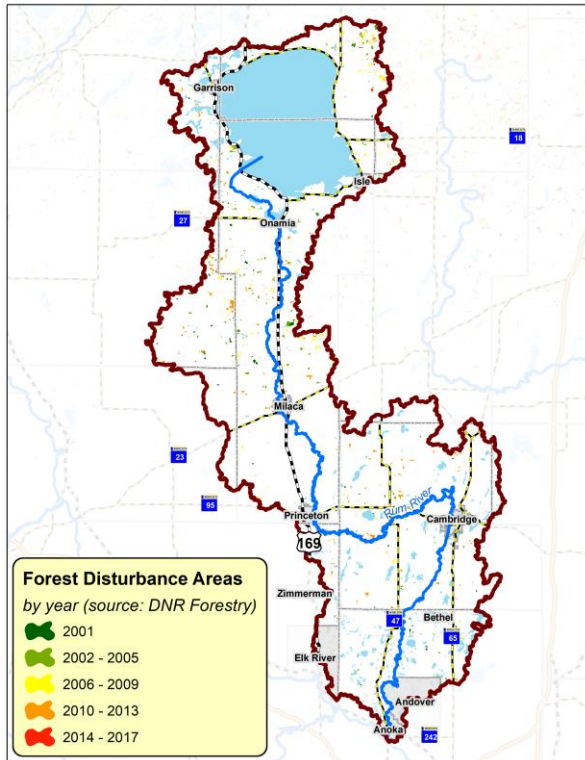


Figure 21. Disturbed land cover by catchment.

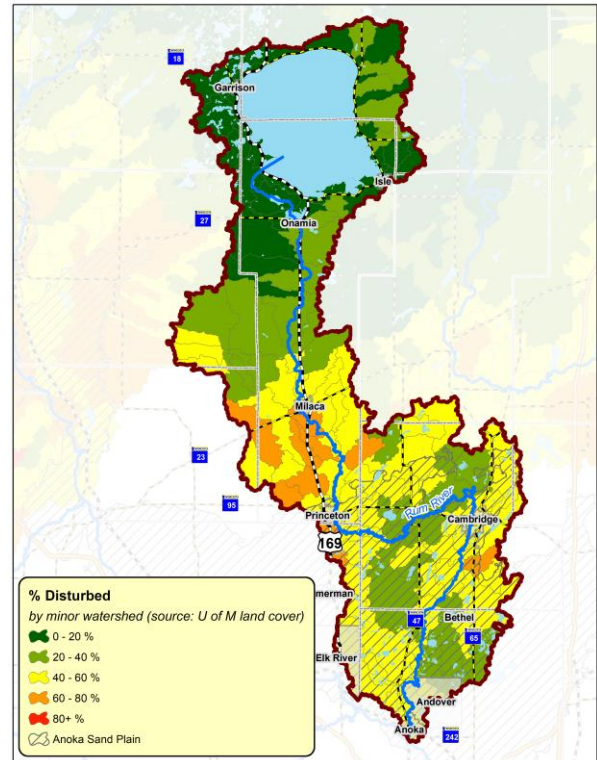
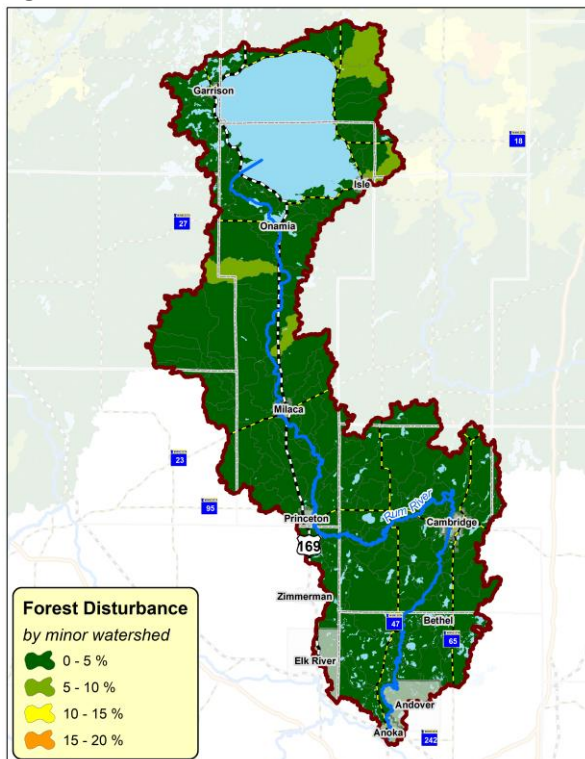


Figure 22. Minor watershed forest disturbance.



Protection

Figure 23. Protected lands.

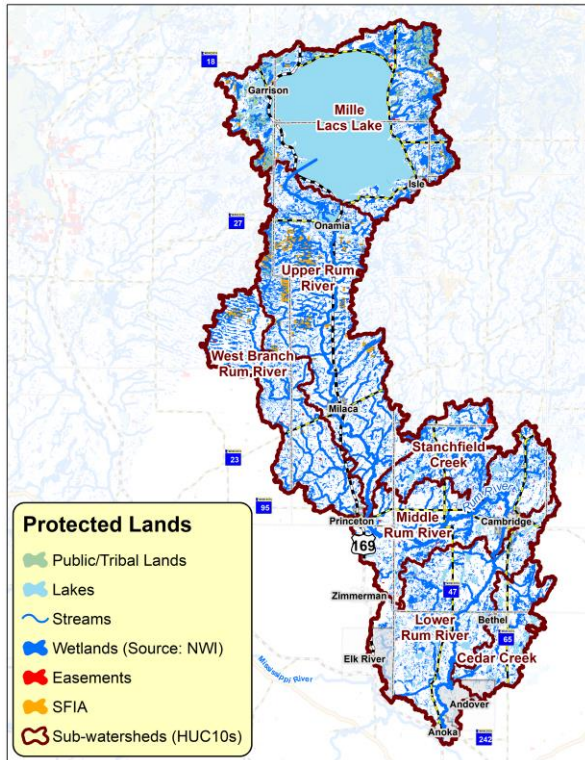


Figure 24. Public and tribal land ownership.

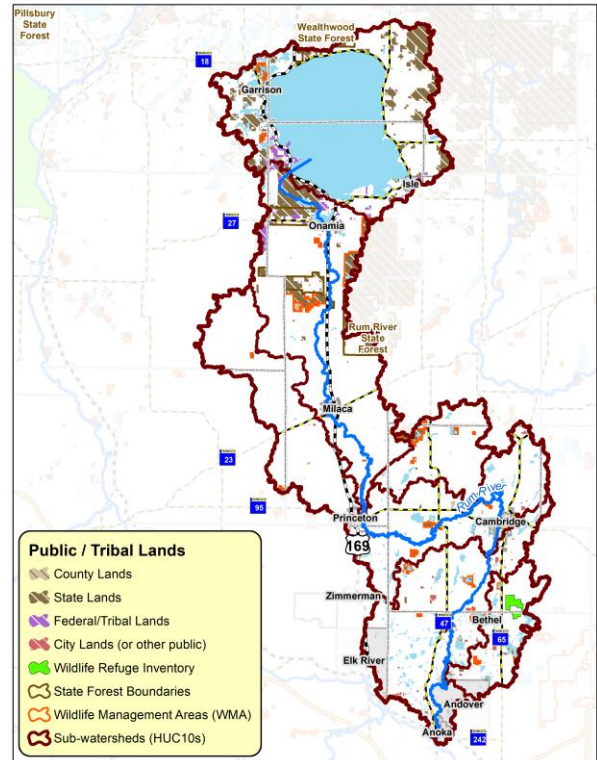


Figure 25. Subwatershed protection levels.

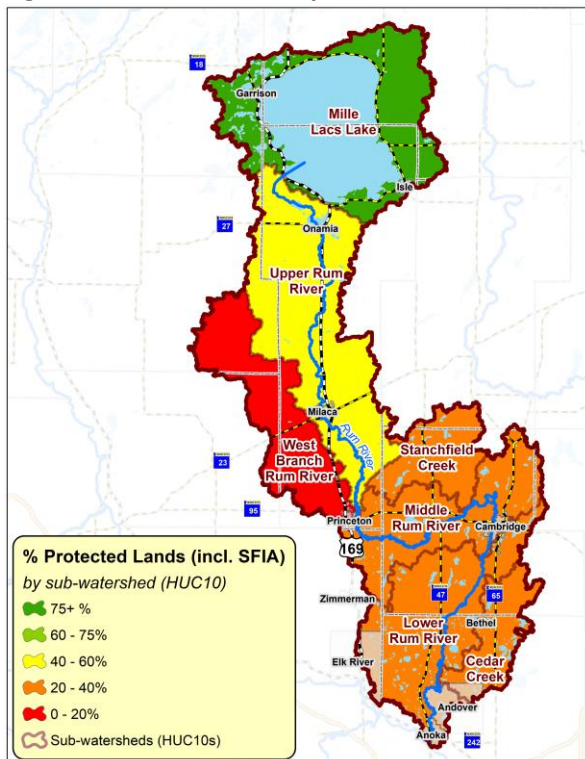


Figure 26. Minor watershed protection levels.

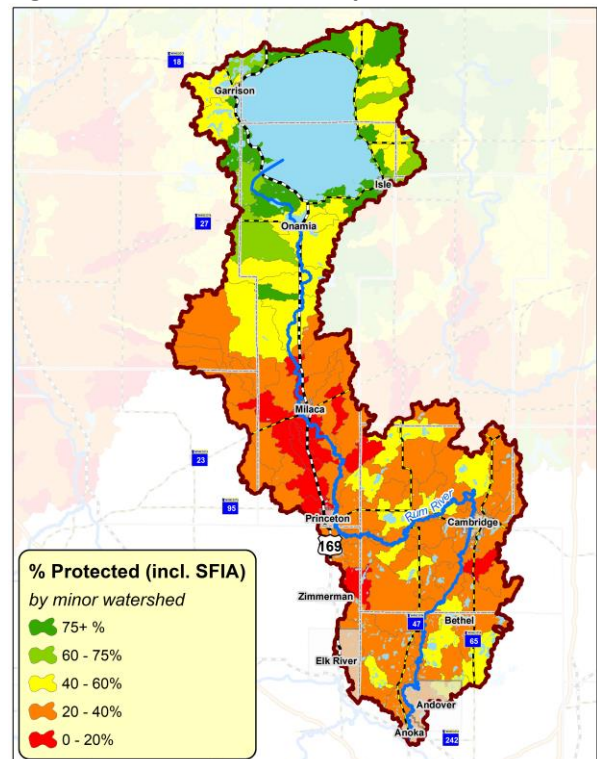


Figure 27. Potential to protect by minor watershed.

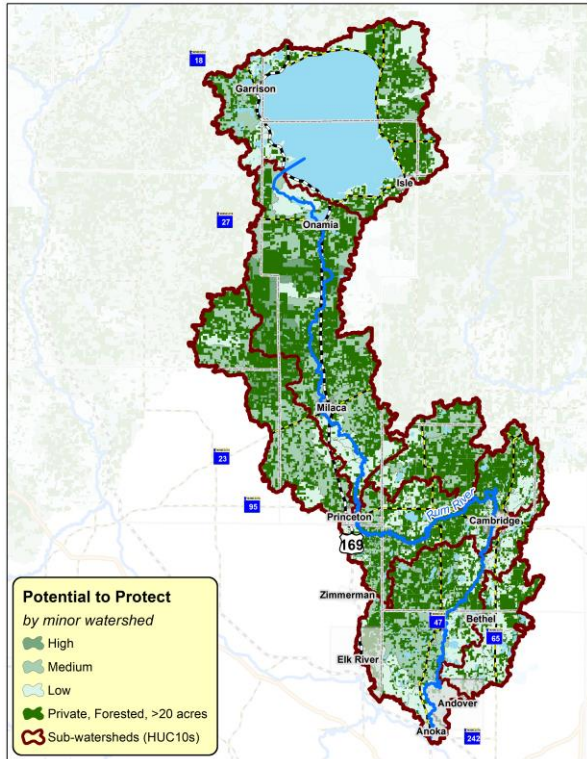
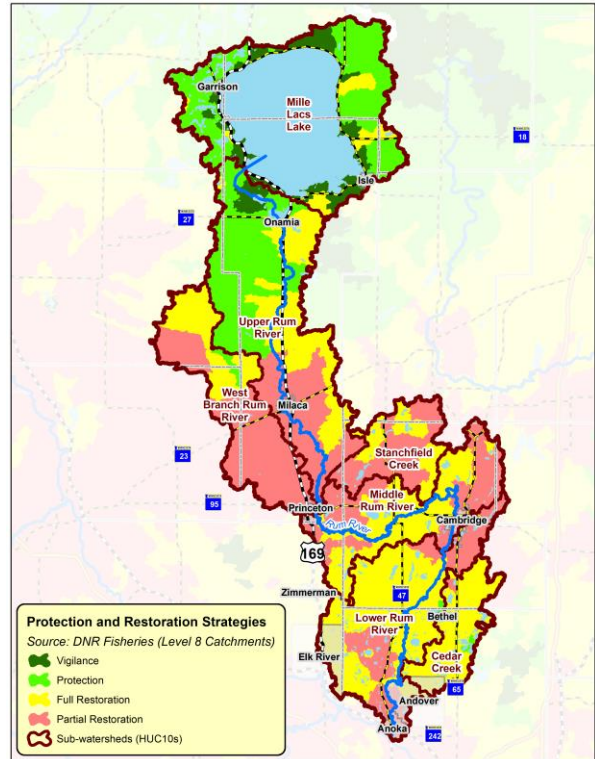


Figure 28. Protection/restoration classifications.



Conservation Priorities

Figure 29. Lessard-Sams Outdoor Heritage Council priorities.

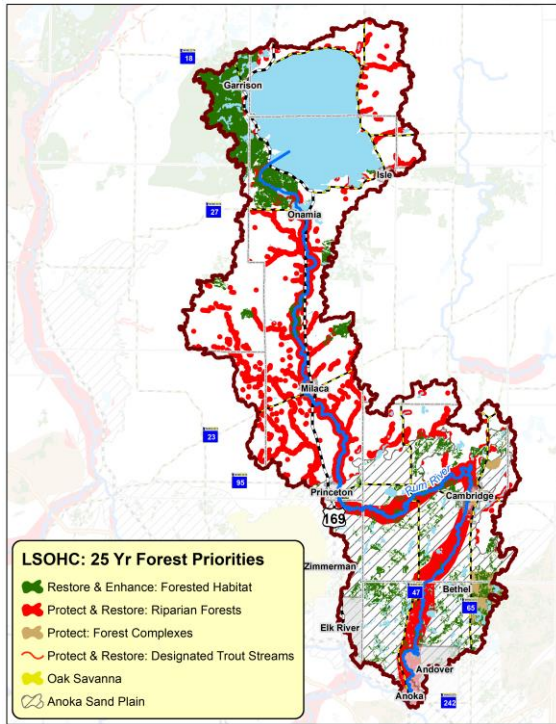


Figure 30. DNR Wildlife Action Network rankings.

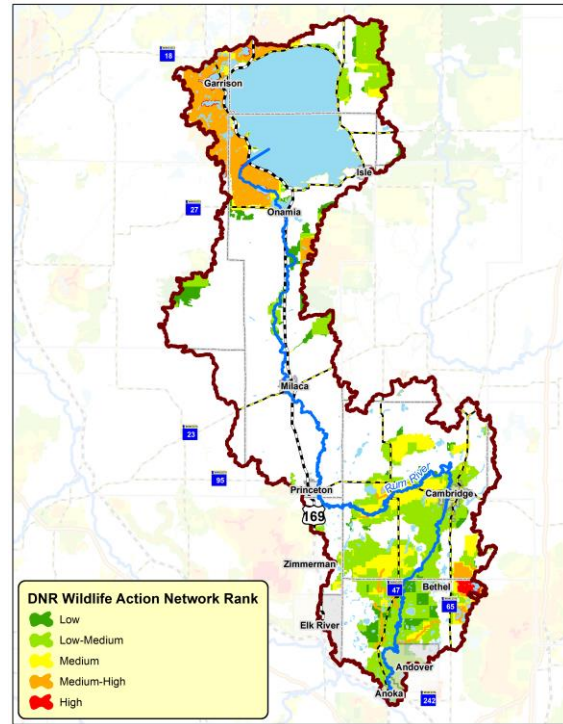


Figure 31. DNR Forests for the Future composite scores.

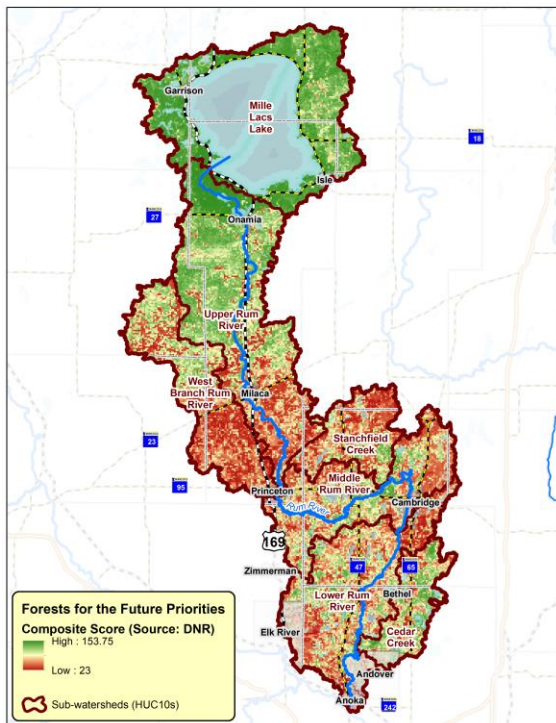


Figure 32. DNR Forests for the Future composite scores by minor watershed (HUC 14).

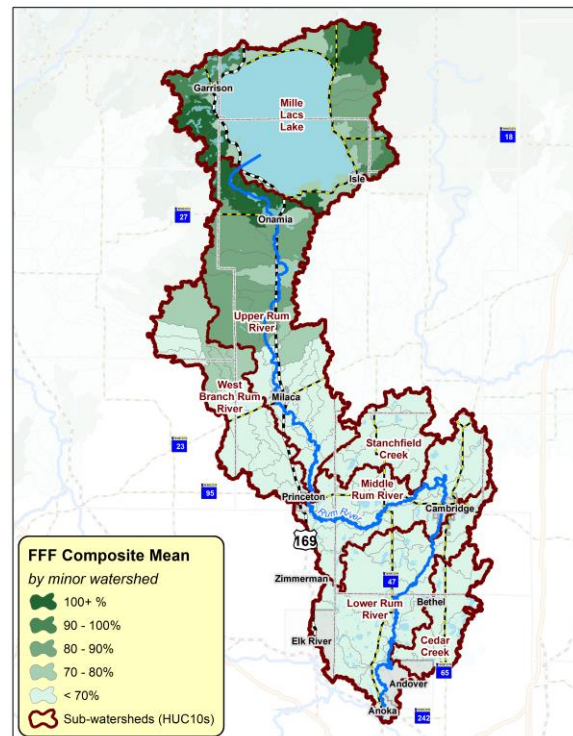
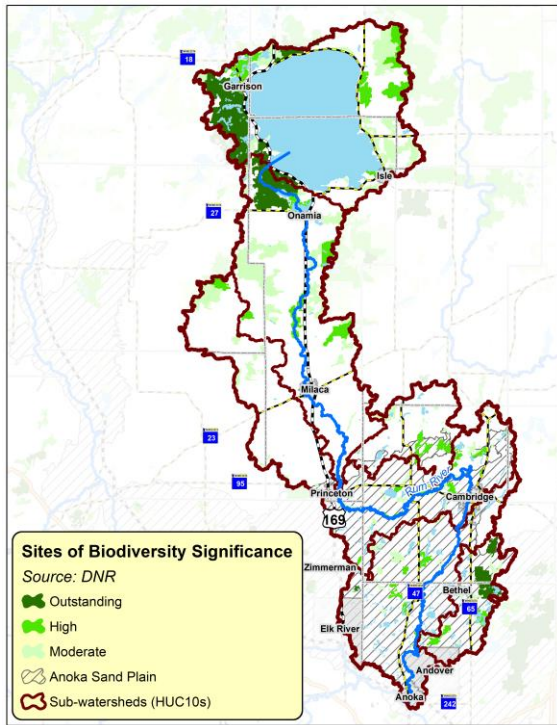


Figure 33. Minnesota Biological Survey (DNR) sites of biological significance.



Other

Figure 34. Priority PFM focus areas.

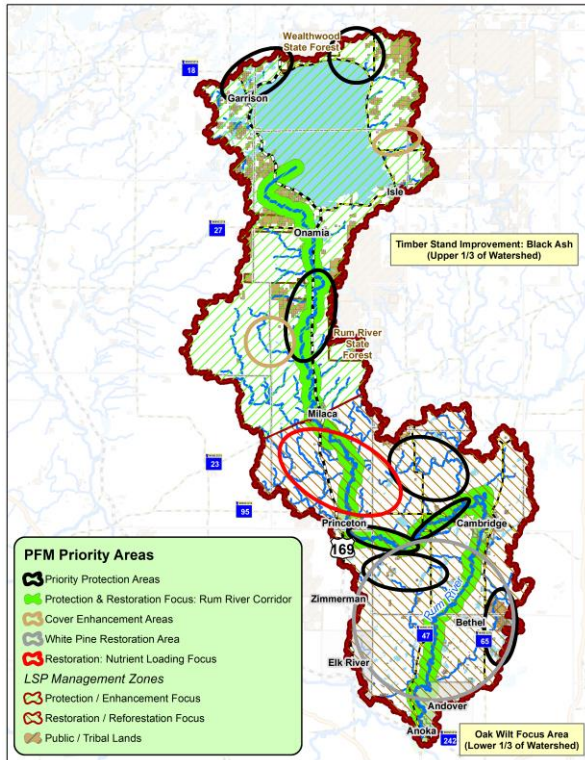


Figure 35. Forest stewardship plan areas.

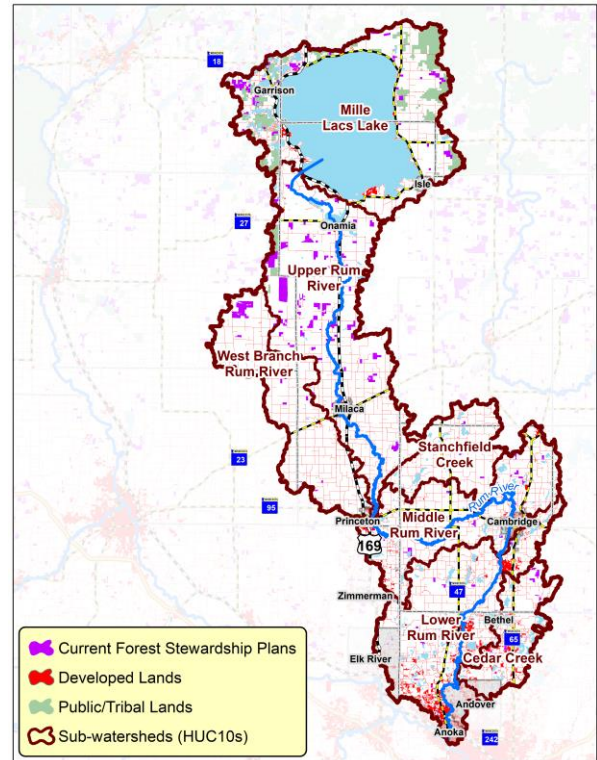


Figure 36. Population change, 2000-2010.

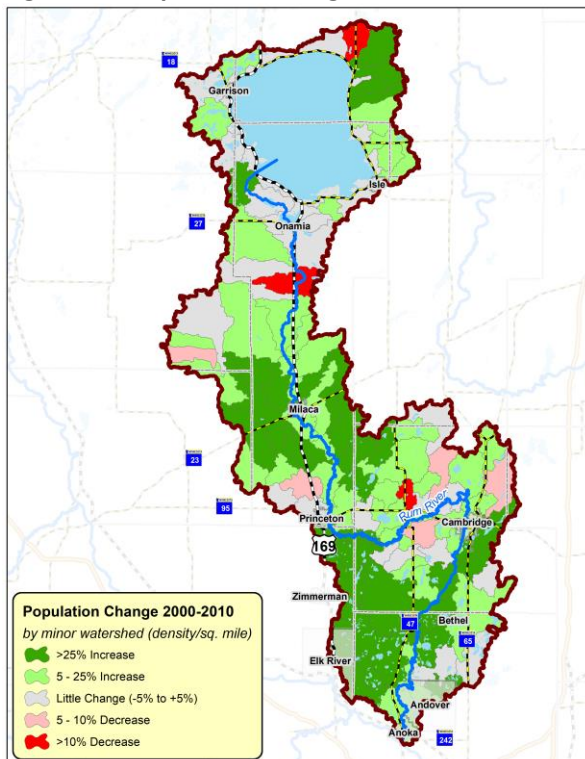
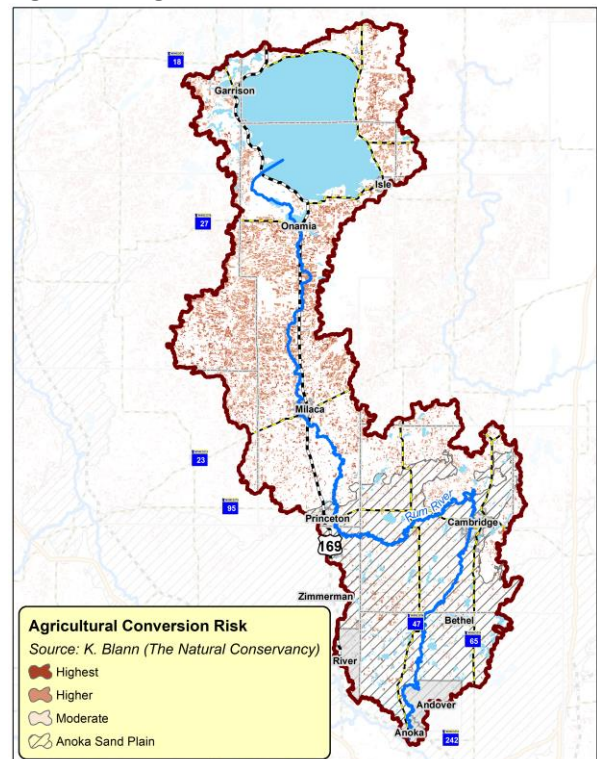
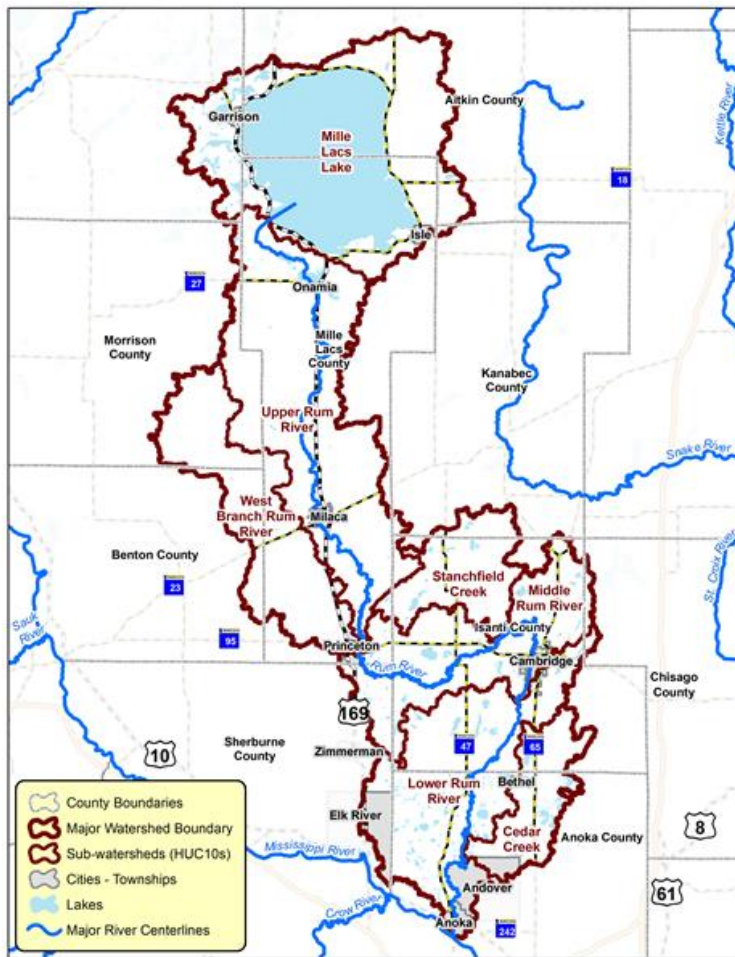


Figure 37. Agricultural conversion risk areas.



Subwatershed Analysis

Developing water resource protection strategies within a watershed context is a logical, scientific approach because it acknowledges what landowners have known for years: that upstream activities affect those downstream. The question becomes at what scale is appropriate? Watersheds are classified at many scales, from region and basin scales down to smaller watershed and sub-watersheds, including minor watersheds and catchments. The Rum River Major Watershed is divided into 7 smaller or “sub” watershed units (HUC10 scale) as shown in the map below. Within each of these HUC10 sub-watersheds, are 5 to 23 minor watersheds, which are on average are 10,038 acres (15.7 sq. miles). Although major watersheds can be analyzed and modeled, it is difficult to implement since they typically cross municipal, county, and/or state boundaries.



The minor watershed is a sub-watershed unit of the HUC12 unit, which is a sub-watershed of the HUC10 unit. “The character of the minor watersheds drives the character of larger watersheds” (Sandy Verry, 2016). Implementation is also easier since many minor watersheds are within a single jurisdiction, focused on one or two primary surface water resources, and strategies can be better targeted and designed for optimal success and cost efficiencies. Each of the 75 minor watersheds are unique in their amount of protection, quality forest and water resources, and risk factors. These minor watersheds are highlighted in the following sections, which are organized by the HUC10 subwatershed unit. These HUC10 subwatersheds are summarized in the table below and on the following pages:

Subwatershed Characteristics

Below is a summary of the subwatershed and forest characteristics of the Mississippi Headwaters Major Watershed by subwatershed (HUC10):

Table 1. Subwatershed characteristics and indices of quality and risk.

| | Mille Lacs Lake | Upper Rum River | West Branch Rum River | Middle Rum River | Stanchfield Creek | Lower Rum River | Cedar Creek |
|---|---|---|---|---|---|---|---|
| # of minor wshds | 15 | 23 | 15 | 19 | 7 | 17 | 5 |
| % upland forest cover | 25% | 41% | 32% | 25% | 19% | 27% | 27% |
| % protected | 77% | 43% | 25% | 33% | 39% | 33% | 33% |
| Potential to protect | 10% | 22% | 25% | 6% | 4% | 6% | 5% |
| Land use disturbance | 11% | 31% | 50% | 45% | 44% | 46% | 46% |
| # of lakes | 51 | 23 | 5 | 60 | 15 | 206 | 90 |
| Avg. lake size | 2666 | 167 | 27 | 73 | 117 | 45 | 46 |
| Geomorphology | Moraine (w), till plain (e) | Till plain | Till plain | Lacustrin (lake bed) | Till plain | Lacustrin (lake bed) | Lacustrin (lake bed) |
| Primary land cover | Lakes & deciduous woodlands | Open lands / deciduous woodlands / wetlands | Open lands | Open lands / deciduous woodlands | Open lands / deciduous woodlands / wetlands | Open lands / deciduous woodlands / urban development | Open lands / deciduous woodlands / wetlands |
| Lake or stream based | Lake | Stream | Stream | Lake & stream | Lake & stream | Lake & stream | Lake & stream |
| Quality | High quality lakes, forest habitat | Forest habitat | Streams, forest habitat | Surface water, forest habitat | Surface water, forest habitat | Surface water, forest habitat | Surface water, forest habitat |
| Risks | Ag: animals & crops, development, water quality impairments/ declining trends | Ag: animals & crops, development, water quality impairments | Ag: animals & crops, development, water quality impairments | Ag: animals & crops, development, water quality impairments | Ag: animals & crops, development, water quality impairments | Ag: animals & crops, development, water quality impairments/ declining trends | Ag: animals & crops, development, water quality impairments/ declining trends |
| Acres to achieve protection goal | 10,811 | 42,508 | 24,420 | 7,656 | 3,375 | 10,392 | 2,978 |
| Cost to achieve protection goal | \$12,280,603 | \$46,411,778 | \$26,115,203 | \$11,721,592 | \$4,243,980 | \$18,454,476 | \$5,732,308 |
| Avg. land value (20+ acre, private lands) | \$1,513 | \$1,517 | \$1,493 | \$3,021 | \$2,316 | \$4,115 | \$3,983 |
| Avg. RAQ score | 3.4 | 2.2 | 1.3 | 1.8 | 1.6 | 2.0 | 2.8 |

Table 2. Composite Forests for the Future (FFF) scores and potential native plant communities.

| Name | FFF score (composite mean) | Fire-Dependent | Mesic Hardwood | Acid & Forested Rich Peatland | Floodplain & Wet Forest | Open wetlands (Marsh, Open Peatland, Wet Meadow) |
|------------------------|----------------------------|----------------|----------------|-------------------------------|-------------------------|--|
| Mille Lacs Lake | 84.6 | 3,993 1% | 74,783 28% | 14,111 5% | 22,081 8% | 17,453 7% |
| Upper Rum River | 79.3 | 2,093 1% | 133,496 59% | 7,796 3% | 46,424 20% | 35,608 16% |
| West Branch Rum River | 60.9 | 4,270 4% | 67,534 57% | 3,124 3% | 18,833 16% | 22,753 19% |
| Middle Rum River | 65.8 | 49,346 39% | 16,681 13% | 12,988 10% | 11,138 9% | 14,972 12% |
| Stanchfield Creek | 60.5 | 7,093 12% | 28,621 46% | 10,479 17% | 7,218 12% | 6,443 10% |
| Lower Rum River | 64.0 | 59,920 38% | 25,103 16% | 8,957 6% | 8,554 5% | 22,470 14% |
| Cedar Creek | 73.8 | 23,875 44% | 1,231 2% | 4,480 8% | 2,577 5% | 10,132 19% |
| Total (or avg for FFF) | 73.0 | 150,589 15% | 124,371 12% | 61,934 6% | 116,826 12% | 129,831 13% |

Lake Characteristics

Below is a summary of the lake characteristics of the Rum River Major Watershed by subwatershed (HUC10). More information on the lakes will be detailed in the individual subwatershed sections to follow.

Figure 37. Lake size distribution.

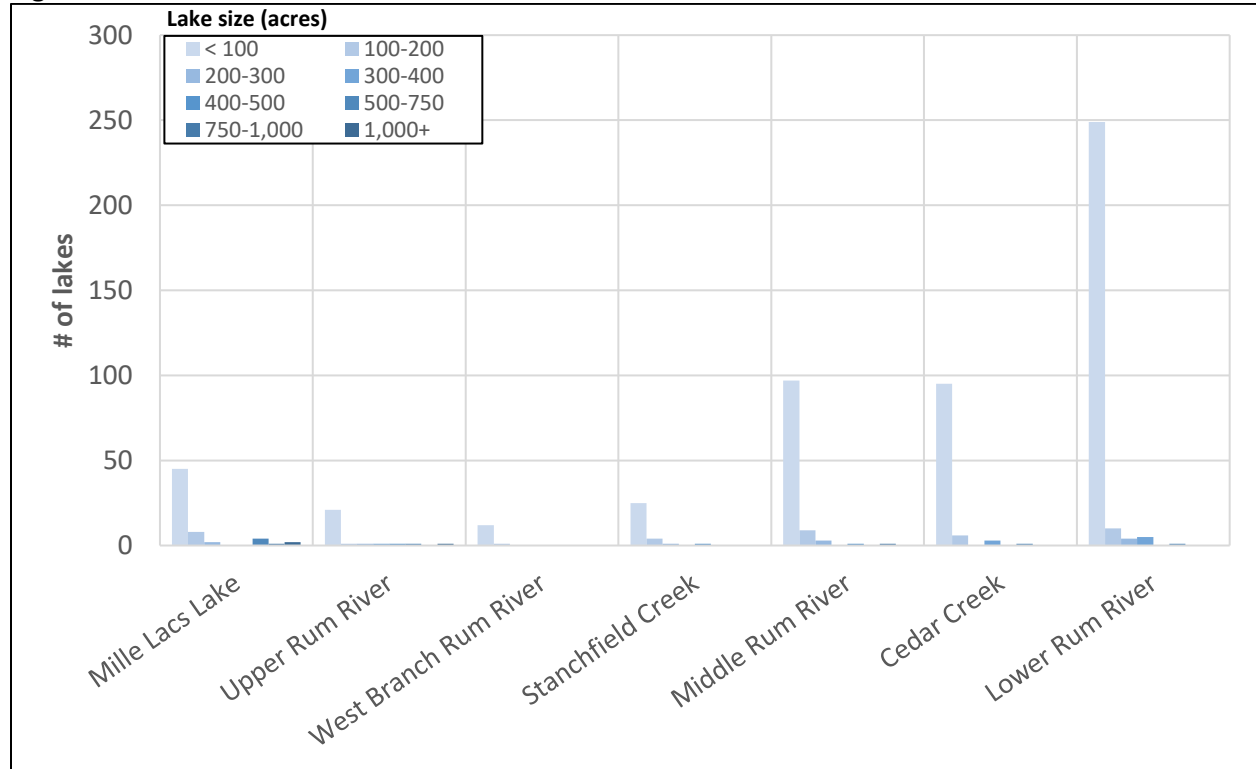


Table 3. Priority and at-risk lake estimates.

| Name | Lakes of phosphorous sensitivity significance | | | Lake of biodiversity significance | | | Lake water quality trends | | | Outstanding water resources | | |
|-----------------------|---|-----------|-----------|-----------------------------------|----------|-------------|---------------------------|-----------|-----------|-----------------------------|--------------------|------------------|
| | High | Higher | Highest | Moderate | High | Outstanding | Improving | Declining | Stable | Cisco/tullibee | Priority wild rice | Priority shallow |
| Mille Lacs Lake | 3 | 6 | 6 | 2 | 1 | 6 | 6 | | 5 | 3 | 11 | 4 |
| Upper Rum River | 3 | | | 1 | | 3 | | | | | 5 | 5 |
| West Branch Rum River | | | | | | | | | | | | |
| Stanchfield Creek | | 1 | 1 | | 1 | | | 1 | | | 4 | 4 |
| Middle Rum River | 2 | 1 | 3 | 1 | 1 | | 4 | | 1 | | 5 | 3 |
| Cedar Creek | 1 | | | | | 1 | | | | | 1 | 4 |
| Lower Rum River | | 4 | 3 | | 2 | 2 | 7 | 1 | 5 | | 6 | 14 |
| Totals | 9 | 12 | 13 | 4 | 5 | 12 | 17 | 2 | 11 | 3 | 32 | 34 |

Subwatershed No. 1 Mille Lacs Lake (HUC 701020701)

Description

The Mille Lacs Lake Subwatershed drains 416 square miles of Aitkin, Mille Lacs, Crow Wing, and Kanabec counties and it is the headwaters to the Rum River. It is also home to Mille Lacs Lake, which is one of the most important recreation lakes in Minnesota. The outlet to Mille Lacs Lake, and the beginning of the Rum River, is located on the southwestern side of the lake by Mille Lacs Kathio State Park. Land use in the Mille Lacs Lake Subwatershed is mainly forests and wetlands and a moderate amount of agriculture (13%).

Geography

The west side and the east side of the Mille Lacs Lake Subwatershed have noticeably different landforms. The west side is dominated by a hummocky end moraine formed by the Superior Lobe glacier. In contrast, the east side has a rolling to hilly terrain (till plains) separated by areas of level to gently rolling terrain (outwash plains). The northeastern end of the subwatershed intersects with the Malmo Peatlands LTA, which is composed of large peatlands interspersed with level to gently rolling uplands.

Figure 38. Elevation.

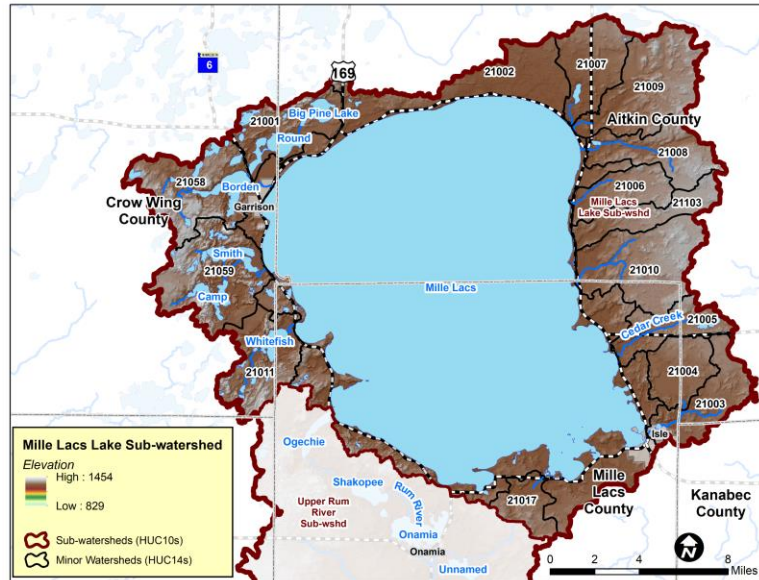
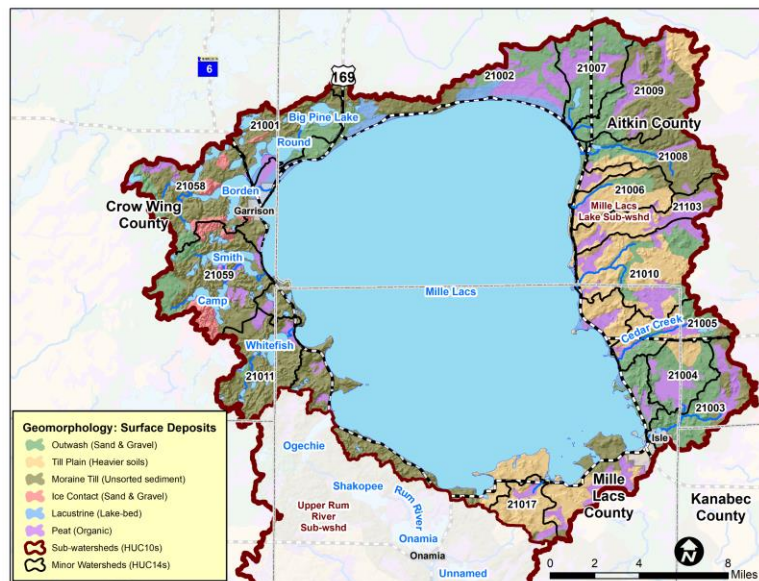


Figure 39. Geomorphological landforms.



Past, Current, and Potential Future Forest Conditions

The historical vegetation of the Mille Lacs Lake Subwatershed was mainly conifer swamps and northern hardwoods forests. Some oak savanna may also have been present along the western side of the subwatershed. Today the forest remains partially intact, although some conversion to pasture occurred on the east side of the lake, as well as to development in the several communities that surround Mille Lacs Lake. The current forest composition is mostly a mix of aspen/birch and maple/beech/birch forest type groups. Some oak/hickory forests may be found around the lakes on the western side of the subwatershed, and on the eastern side are a few patches of spruce/fir and elm/ash/cottonwood forests.

Estimates of the potential native plant communities (NPCs) indicate that most of the upland areas have the potential to support mesic hardwood NPCs. Wet forests NPCs may also have significant potential within the Malmo Peatlands LTA to the northeast of the lake.

Figure 40. Historic vegetation cover, Marschner.

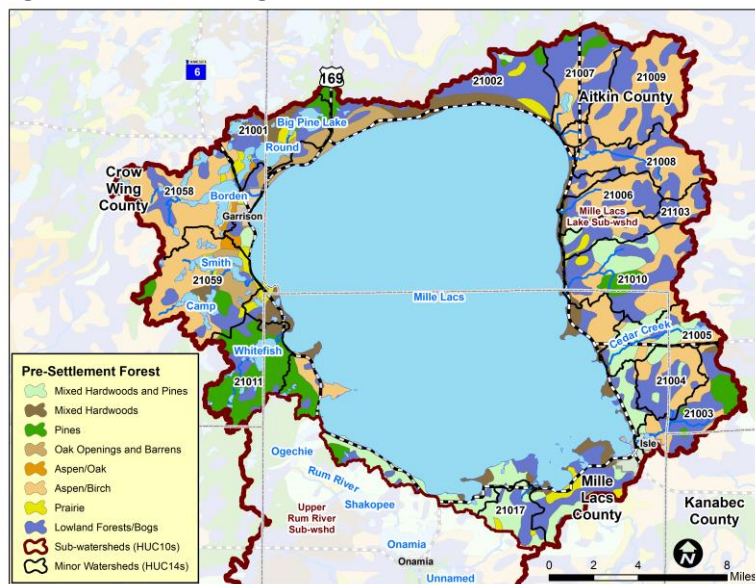


Figure 41. Land cover, 2013.

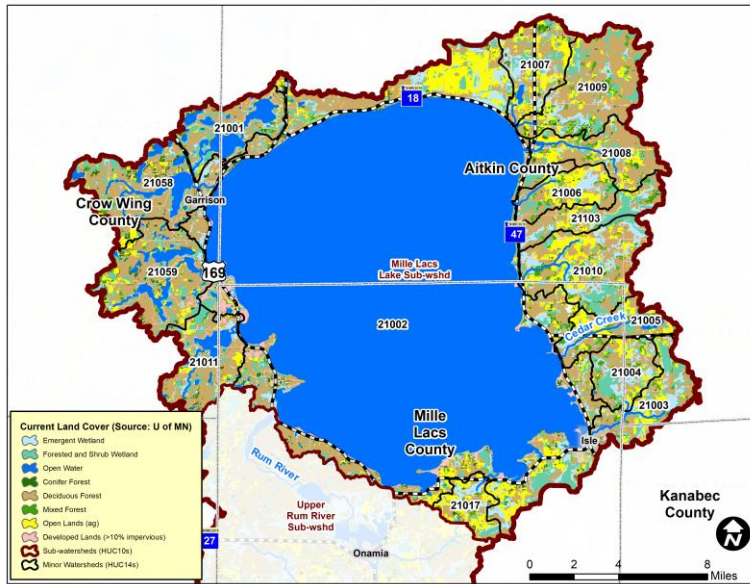
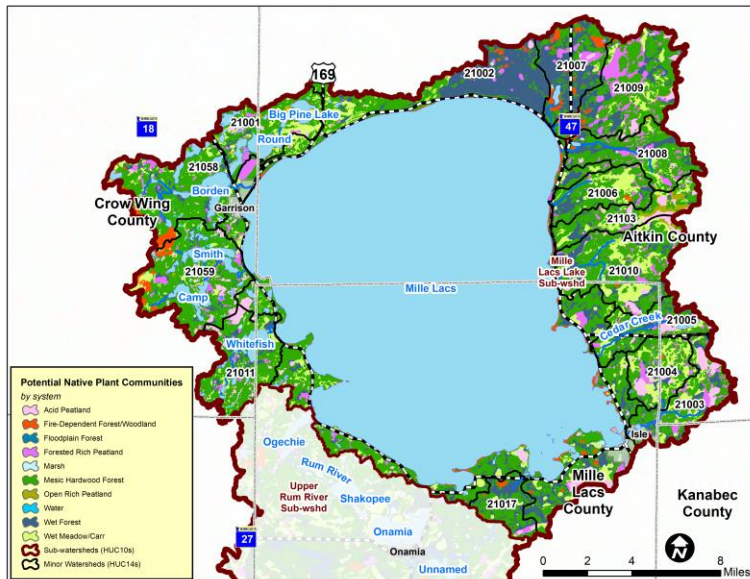


Figure 42. Potential native plant communities.

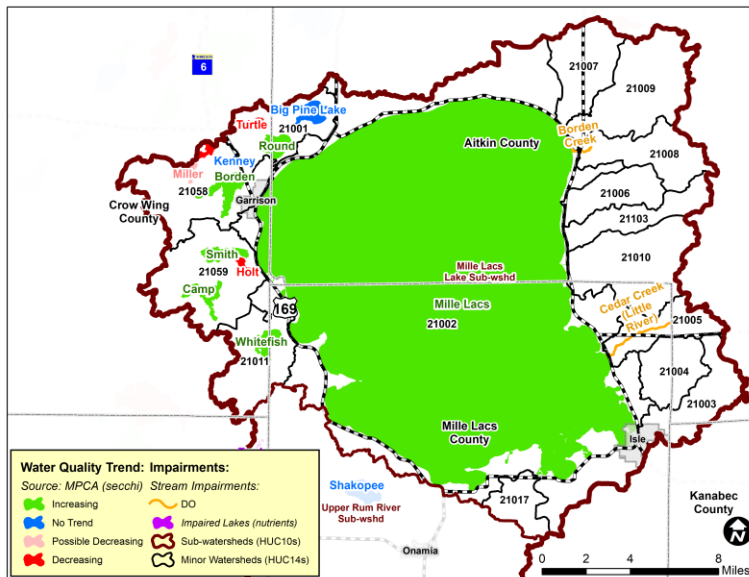


Water Resources Summary

The Mille Lacs Lake Subwatershed contains about 90% of the open water in the entire Rum River Major Watershed. As its name implies, it is also home to Mille Lacs Lake, which is among the most famous fisheries in the country. Many small and medium lakes are also present, and they are concentrated on the western side of the subwatershed. Of the lakes that have available water quality data, six are improving in clarity (including Mille Lacs), three are declining, and two are stable. It should be noted that the improving water quality trend in Mille Lacs may be related to the presence of invasive zebra mussels (*Dreissena polymorpha*). Zebra mussels are filter feeders and since their arrival in Mille Lacs the water clarity has substantially increased, which unfortunately has a negative impact on the light-sensitive walleye population that the lake is known for.

The Mille Lacs Lake Subwatershed also has seven lakes of high or outstanding biodiversity significance, as well as three cisco refuge lakes, 11 priority wild rice lakes, and four priority shallow lakes. Additionally, this subwatershed contains 45 miles of streams, 5.8 miles of which are impaired by dissolved oxygen.

Figure 43. Water quality trends.



Protection Status

78% of the Mille Lacs Lake Subwatershed is currently protected, mostly by public waters as well as county land. This exceeds the subwatershed protection goal of 75%, and therefore the Mille Lacs Lake Subwatershed is a low priority for forest land protection.

Figure 44. Protected lands.

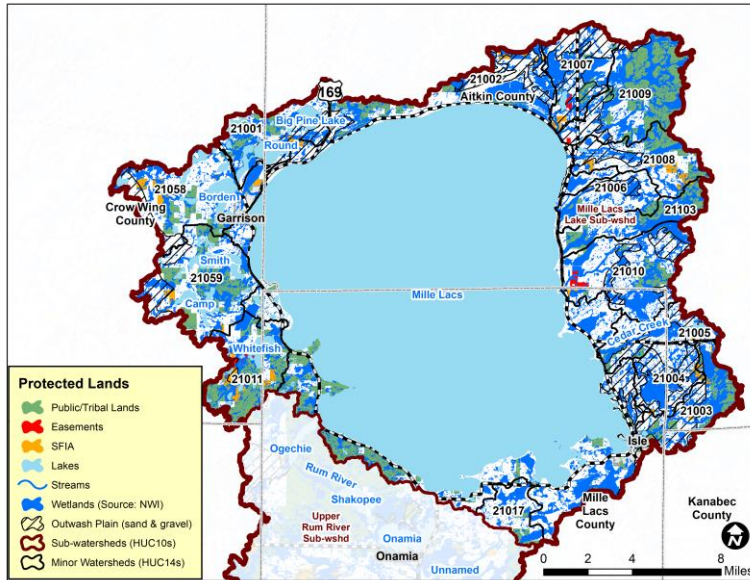
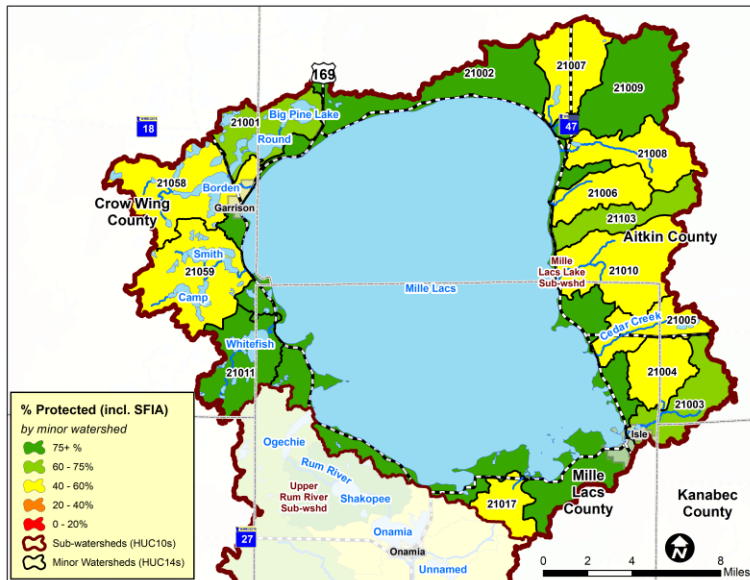


Figure 45. Minor watershed protection levels.



Subwatershed No. 2 Upper Rum River (HUC 701020702)

Description

The Upper Rum River Subwatershed drains 356 square miles of Mille Lacs, Morrison, Kanabec, and Isanti counties and receives water from the Mille Lacs Lake Subwatershed. On a map the subwatershed appears tall and narrow with the Rum River running through the middle of it from north to south. Towards the northern part of the Upper Rum River Subwatershed the Rum River flows through a heavily forested landscape and past popular recreation destinations such as Mille Lacs Kathio State Park and parts of the Rum River State Forest. Near the lower half of the subwatershed the landscape transitions from forests to farmland, and the Rum River eventually exits the subwatershed by the City of Princeton.

Geography

The Upper Rum River Subwatershed has a few different geographical regions that are arrayed from north to south. The area just to the south of Mille Lacs Lake and around Onamia is an end moraine with rolling terrain. South of that but north of Milaca and Highway 23 is the Ann Lake Drumlin Plain LTA. This LTA is characterized by rolling hills formed by the Superior Lobe glacier. Drumlins are common and oriented in either an east-west or southwest-northeast direction. In this area wetlands are common, are long and narrow, and often occur in the low areas between drumlins. Near Milaca and Highway 23 there is a noticeable drop in elevation and the terrain transitions into a rolling loess covered till plain. Lastly, at the very southern end of the subwatershed is a gently rolling to level lake plain that had been occupied by Glacial Lake Hugo.

Figure 46. Elevation.

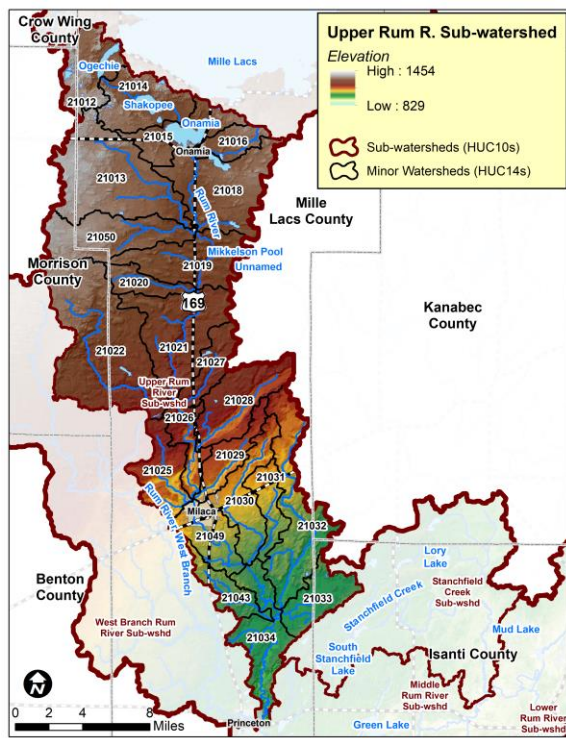
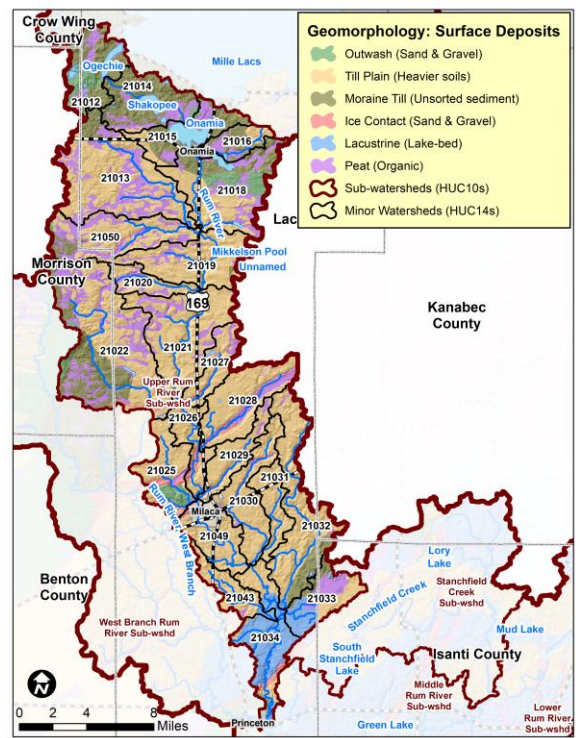


Figure 47. Geomorphological landforms.



Past, Current, and Potential Future Forest Conditions

The historical vegetation of the Upper Rum River Subwatershed was mainly conifer swamps in the lowlands, and northern hardwoods or maple-basswood forests in the uplands. Today the forest remains somewhat intact in the northern half of the subwatershed, but in the southern half most of the forest has been converted to agriculture and only unconnected stands remain. The composition of the remaining forest is a diverse mix of elm/ash/cottonwood, aspen/birch, maple/beech/birch, and oak/hickory forest type groups.

Estimates of the potential native plant communities (NPCs) indicate that most of the upland areas have the potential to support mesic hardwood NPCs. The lowland areas may support wet forest or wet meadow/carr NPCs.

Figure 48. Historic vegetation cover, Marschner.

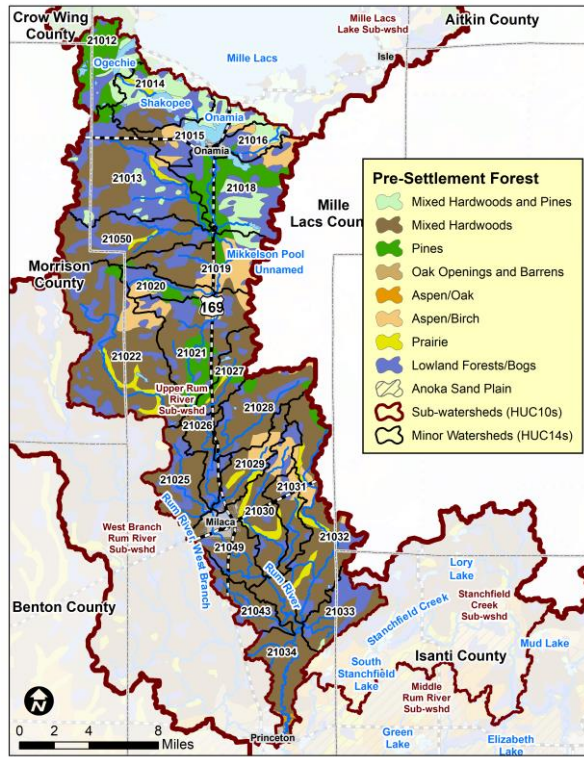


Figure 49. Land cover, 2013.



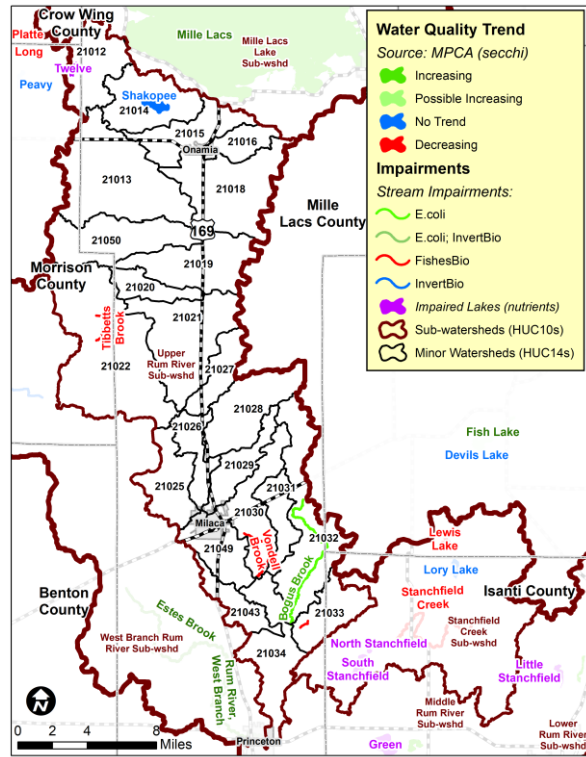
Figure 50. Potential native plant communities.



Water Resources Summary

The Upper Rum River Subwatershed is largely a stream-based watershed with relatively few lakes. As its name implies, it is home to the upper reaches of the Rum River. Shakopee Lake is the only lake in the Upper Rum River Subwatershed with available water quality data, and the trend is stable. This subwatershed also has four lakes of outstanding biodiversity significance, as well as five priority wild rice lakes and six priority shallow lakes. Additionally, this subwatershed contains 189 miles of streams, 21.1 miles of which are impaired by E-coli or fish bioassessments.

Figure 51. Water quality trends.



Protection Status

43% of the Upper Rum River Subwatershed is currently protected, mostly by wetlands as well as state-owned land. Generally, there is less protection in the southern half portion of the subwatershed than in the northern half. To reach the subwatershed protection goal of 53% an additional 22,402 acres need to be protected at an estimated cost of \$24,353,241. Fortunately, over 89,000 acres have the potential to protect, although the Rum River Landscape Stewardship Committee recommends prioritizing protection efforts on the Rum River corridor and minor watershed #'s 21019, 21021, and 21027.

Figure 52. Protected lands.

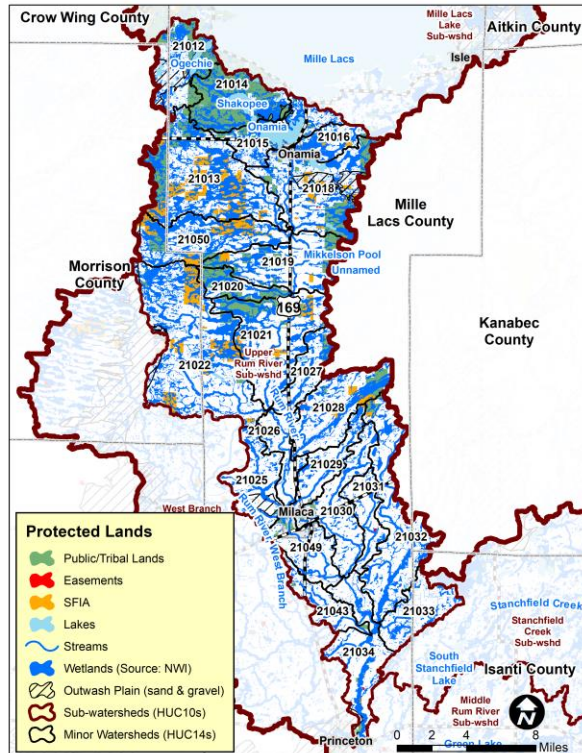
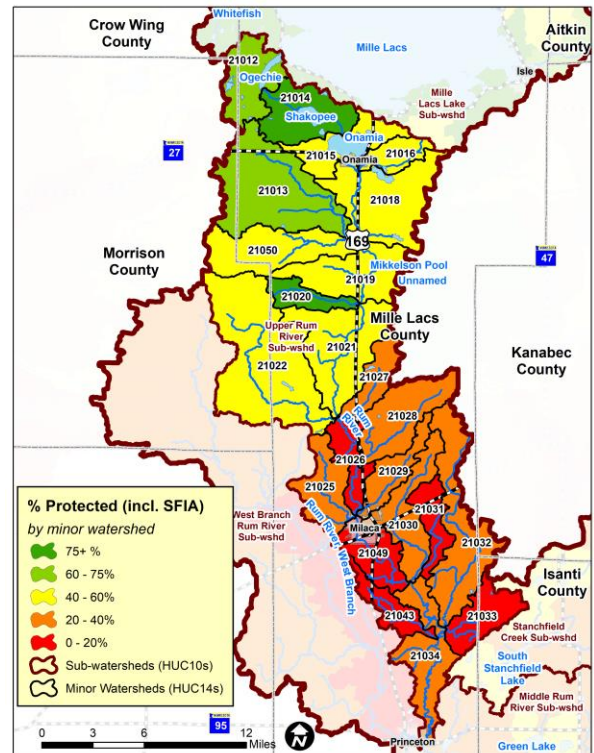


Figure 53. Minor watershed protection levels.



Subwatershed No. 3 West Branch Rum River (HUC 701020703)

Description

The West Branch Rum River Subwatershed is a tributary watershed to the Rum River and drains 185 square miles of Mille Lacs, Benton, and Morrison counties. The subwatershed is long and narrow with the West Branch Rum River running through the middle of it in a northwest-southeast direction. The dominant land use is agriculture, although a couple larger patches of intact forests and wetlands are present in the northern half of the subwatershed. The outlet of the West Branch Rum River is by the City of Princeton, which is located at the confluence of the West Branch Rum River and the main branch of the Rum River.

Geography

The West Branch Rum River Subwatershed, like the Upper Rum River Subwatershed to its east, has a few different geographical regions. The headwaters to the West Branch Rum River are in the northwestern portion of the subwatershed and the terrain is a rolling plain with abundant drumlins and wetlands orientated in an east-west direction. South of that area but north of Foreston and Highway 23 is the Ann Lake Drumlin Plain LTA, which is characterized by rolling hills and drumlins. The southern half of the West Branch Rum River Subwatershed is mostly in the Milaca Till Plain LTA and is largely covered by a rolling loess covered till plain. Lastly, at the southeastern end of the subwatershed is a gently rolling to level lake plain that had been occupied by Glacial Lake Hugo.

Figure 54. Elevation.

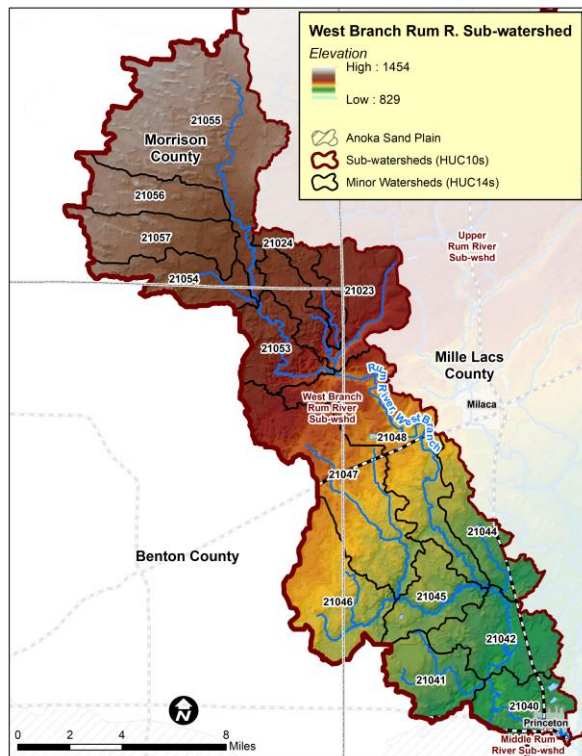
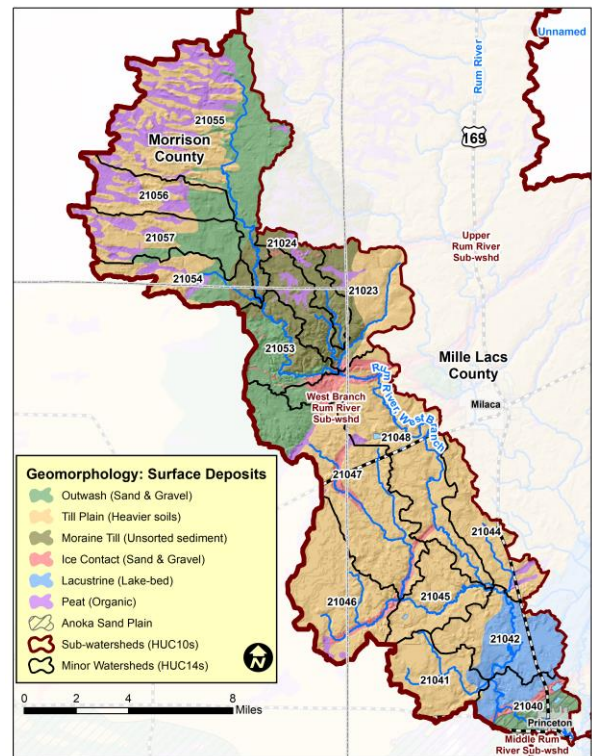


Figure 55. Geomorphological landforms.



Past, Current, and Potential Future Forest Conditions

The historical vegetation of the West Branch Rum River Subwatershed was mainly conifer swamps or lowland hardwood forests in the lowlands, and maple-basswood or northern hardwoods forests in the uplands. Today most of the forest has been converted to agriculture, although a few patches remain in the northern half of the subwatershed. The composition of the remaining forest is largely aspen/birch and maple/beechn/birch, although some elm/ash/cottonwood and oak/hickory forest type groups are present as well.

Estimates of the potential native plant communities (NPCs) indicate that most of the upland areas have the potential to support mesic hardwood NPCs. The lowland areas may support wet forest or wet meadow/carr NPCs.

Figure 56. Historic vegetation cover, Marschner.

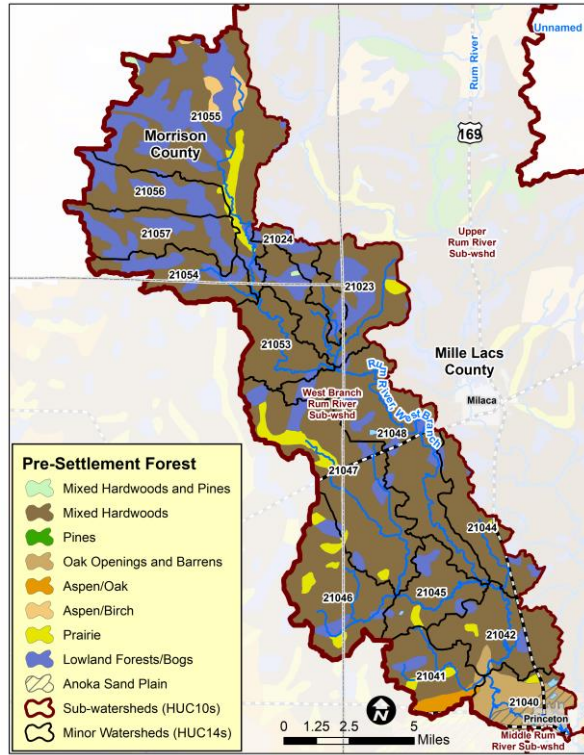
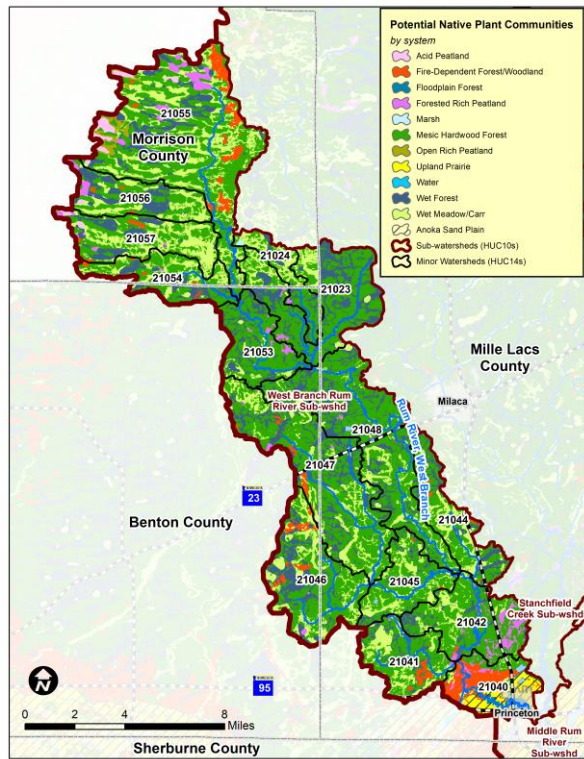


Figure 57. Land cover, 2013.



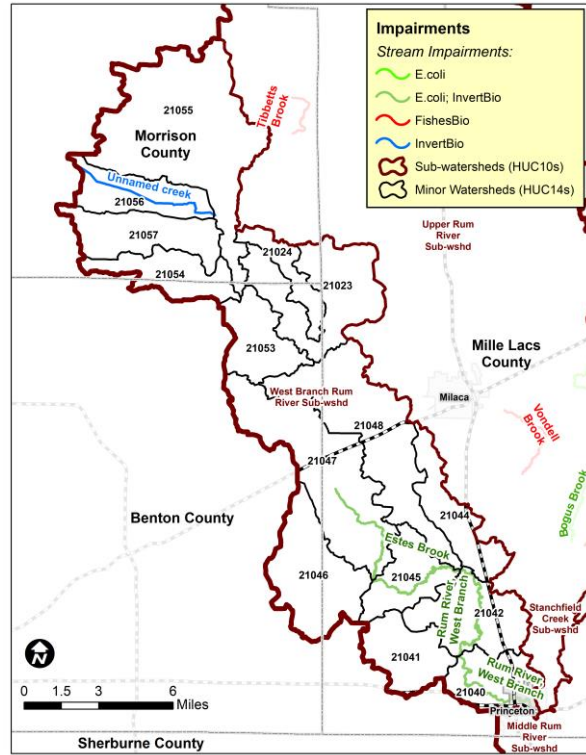
Figure 58. Potential native plant communities.



Water Resources Summary

The West Rum River Subwatershed is largely a stream-based watershed with relatively few lakes. As its name implies, it is home to the West Branch Rum River. This subwatershed has no lakes with water quality data nor any lakes with quality indicators (e.g. lakes of biodiversity significance, wild rice lakes, priority shallow lakes, etc.). The West Rum River Subwatershed does have 109 miles of streams, 35.9 of which are impaired by E-coli or invertebrate bioassessments.

Figure 59. Water quality trends.



Protection Status

19% of the West Branch Rum River Subwatershed is currently protected, mostly by wetlands. To reach the subwatershed protection goal of 29% an additional 11,465 acres need to be protected at an estimated cost of \$12,380,873. Fortunately, over 58,000 acres have the potential to protect, although the Rum River Landscape Stewardship Committee recommends prioritizing protection efforts on minor watershed #'s 7050, 7052, 7053, 7061, 7062, 7083, and 7084.

Figure 60. Protected lands.

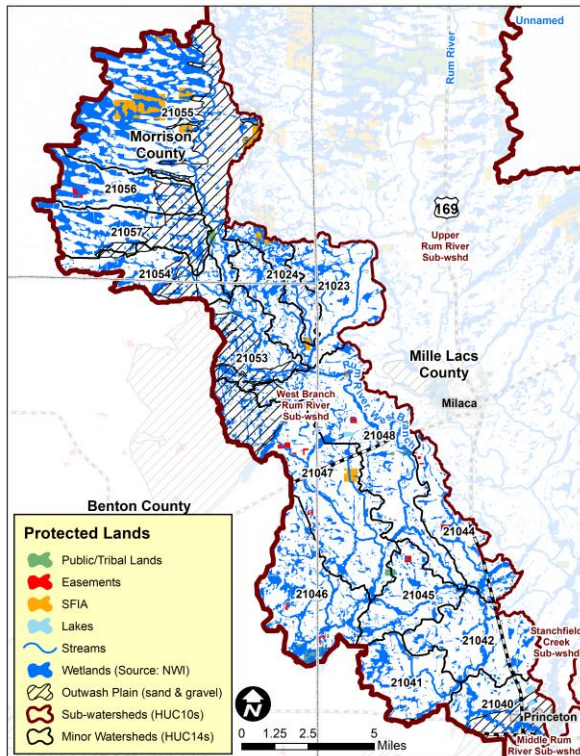
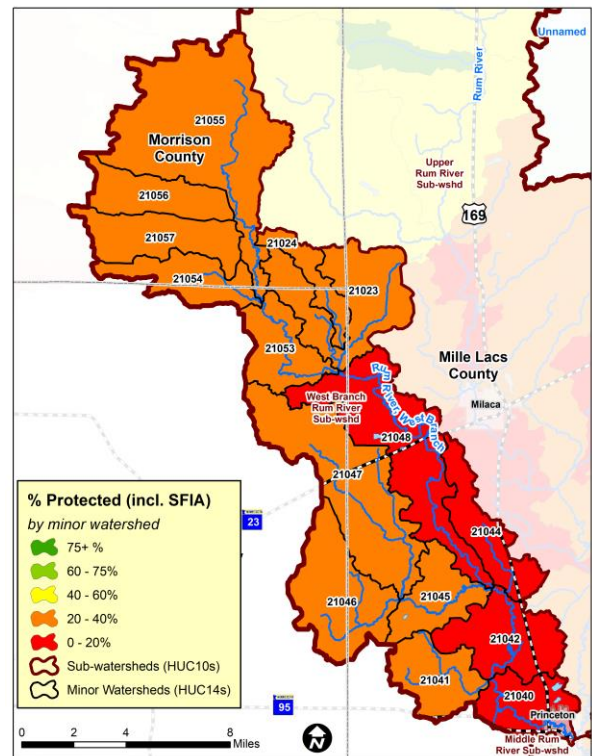


Figure 61. Minor watershed protection levels.

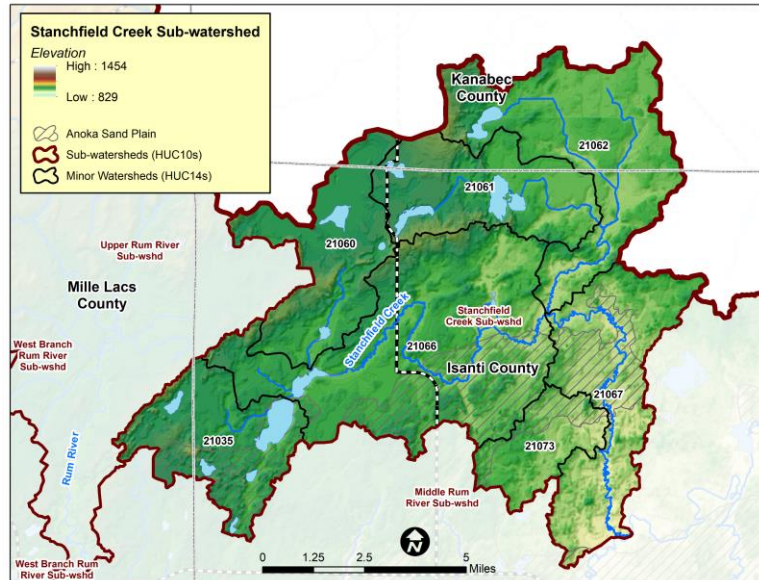


Subwatershed No. 4 Stanchfield Creek (HUC 701020704)

Description

The Stanchfield Creek Subwatershed is a tributary watershed to the Rum River and drains 96 square miles of Isanti, Kanabec, and Mille Lacs counties. The subwatershed is roughly triangular-shaped and the headwaters to Stanchfield Creek and its tributaries are located near the western and northern corners. The dominant land use is agriculture, although some relatively larger patches of forest and wetland cover are present near the lower reaches of Stanchfield Creek. The outlet to Stanchfield Creek and its merging with the Rum River is located near the southern corner of the subwatershed.

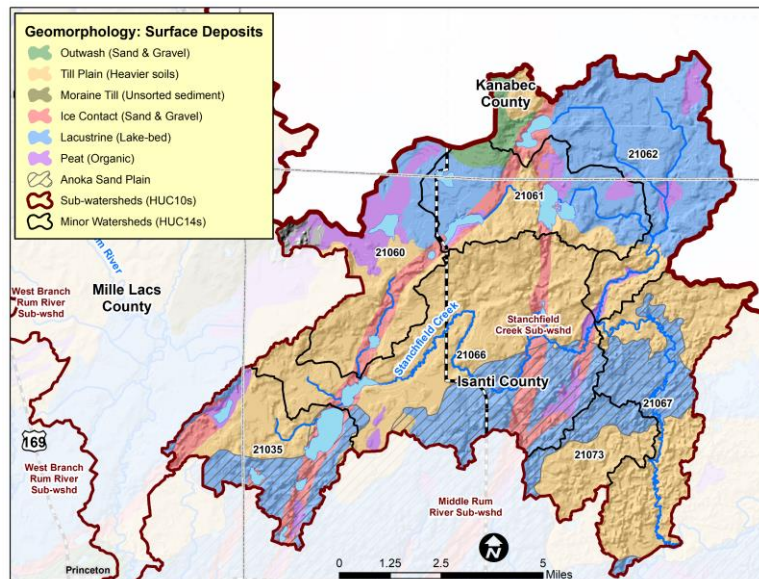
Figure 62. Elevation.



Geography

The Stanchfield Creek Subwatershed is largely split between till plain and lake plain landforms. The center of the subwatershed is part of the Elm Park Till Plain LTA, which is characterized by a rolling till plain formed by the Grantsburg Sublobe glacier. To the north and south of the Elm Park Till Plain LTA are level to gently rolling lake plains. Additionally, a few channels of ice contact deposits run across the Stanchfield Creek Subwatershed in a southwest-northeast direction.

Figure 63. Geomorphological landforms.



Past, Current, and Potential Future Forest Conditions

The boundary between the Laurentian Mixed Forest (LMF) and the Eastern Broadleaf Forest (EBF) provinces crosses the Stanchfield Creek Subwatershed, but the subwatershed is mainly on the LMF side. Historically, the uplands were maple-basswood, oak forest, or oak savannah while the lowlands were conifer swamps. Oak forest and oak savannah may have been more abundant on the EBF side while maple-basswood forests and conifer swamps were more abundant on the LMF side. Today most of the forest and savanna has been converted to agriculture, and the remaining forest exists as unconnected stands. The composition of the remaining forest is a mixture of elm/ash/cottonwood, maple/beech/birch, aspen/birch, and oak/hickory forest type groups.

Estimates of the potential native plant communities (NPCs) indicate that most of the upland areas on the LMF side have the potential to support mesic hardwoods NPCs, while uplands on the EBF side may support fire-dependent NPCs. The lowland areas have the potential to support forested rich peatland, wet forest, or wet meadow/carr NPCs.

Figure 64. Historic vegetation cover, Marschner.

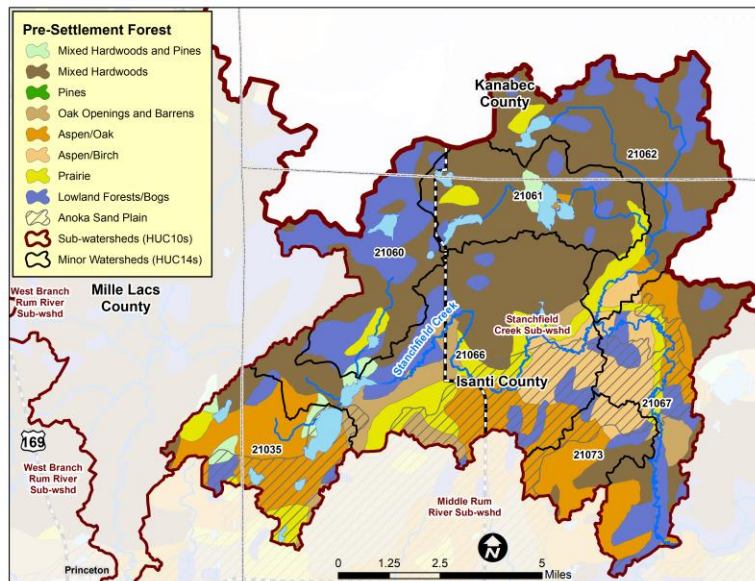


Figure 65. Land cover, 2013.

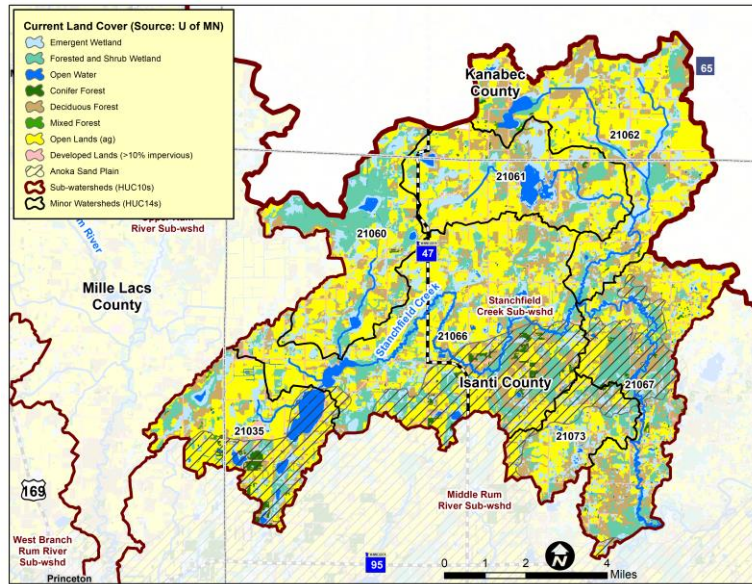
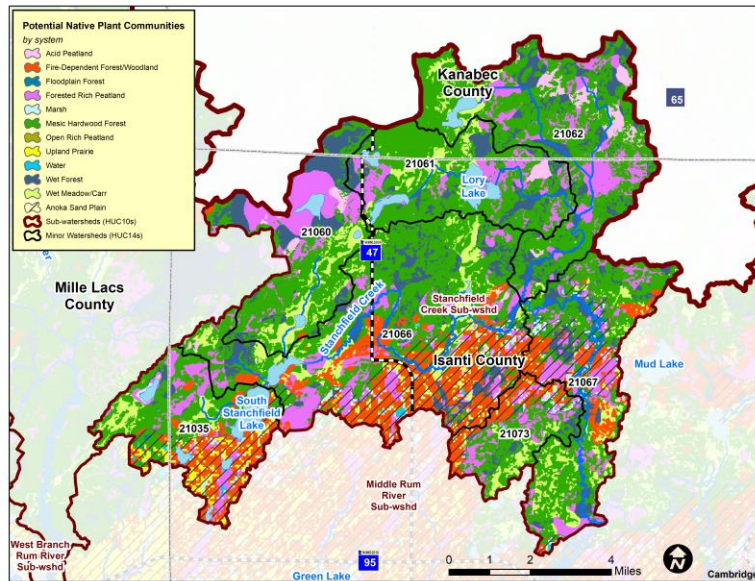


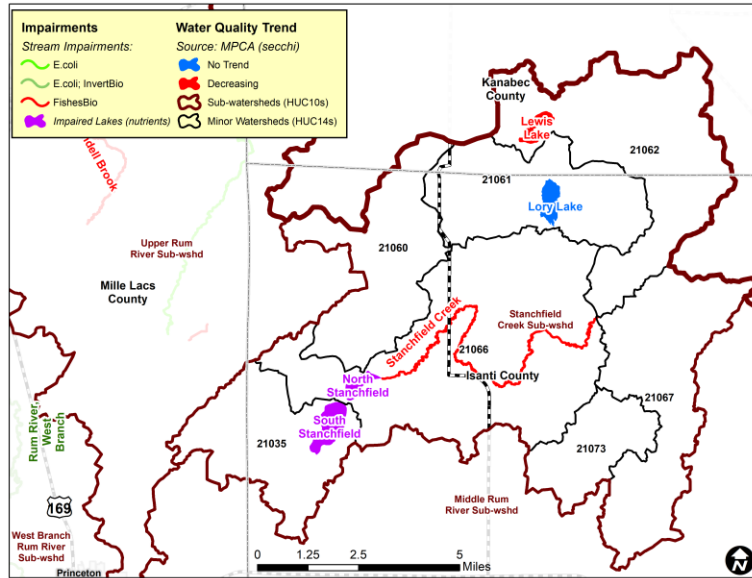
Figure 66. Potential native plant communities.



Water Resources Summary

The Stanchfield Creek Subwatershed is as its name implies, home to Stanchfield Creek, as well as several small and medium sized lakes near the subwatershed headwaters. Of the lakes with available water quality data, one is declining improving in water clarity, one is stable, and two are impaired by nutrients. This subwatershed also has one lake of high biodiversity significance, as well as four priority wild rice lakes and four priority shallow lakes. Additionally, the Stanchfield Creek Subwatershed contains 46 miles of streams, 14.9 miles of which are impaired by fish bioassessments.

Figure 67. Water quality trends.



Protection Status

33% of the Stanchfield Creek Subwatershed is currently protected, mostly by wetlands. To reach the subwatershed protection goal of 43% an additional 6,465 acres need to be protected at an estimated cost of \$\$8,577,251. Fortunately, over 16,000 acres have the potential to protect, although the Rum River Landscape Stewardship Committee recommends prioritizing protection efforts on minor watershed #'s 21060, 21062, 21066, 21067, and 21073.

Figure 68. Protected lands.

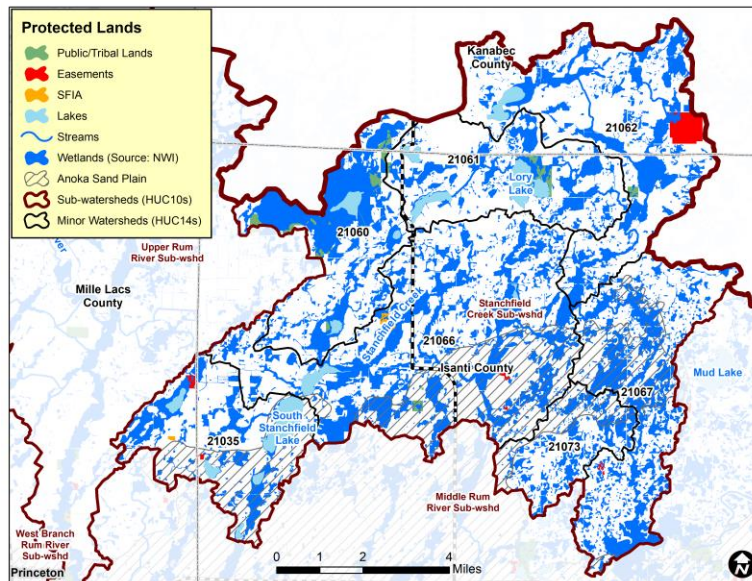
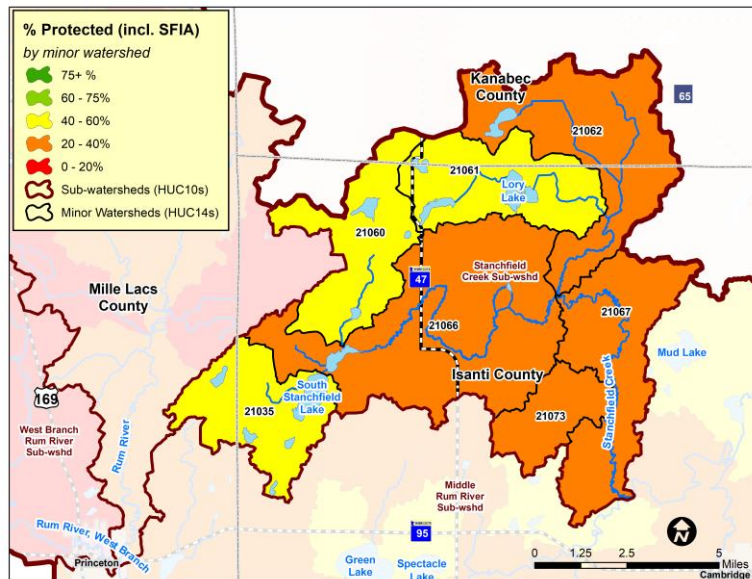


Figure 69. Minor watershed protection levels.

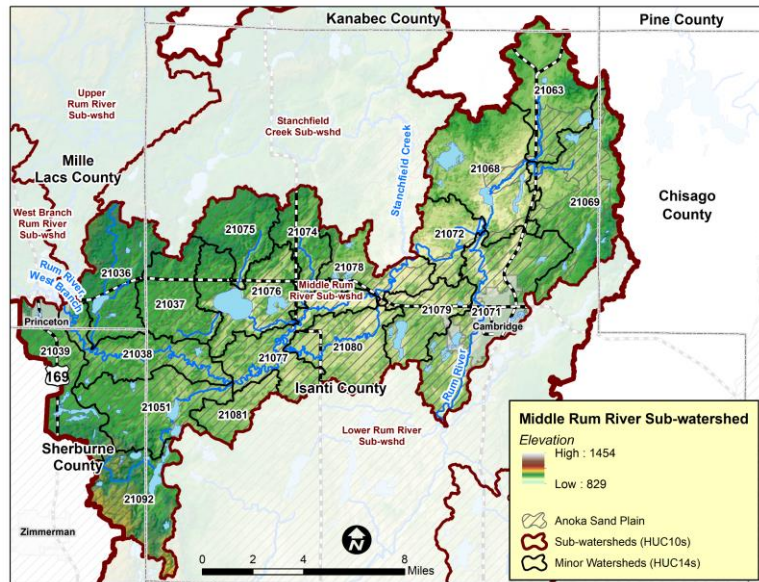


Subwatershed No. 5 Middle Rum River (HUC 701020705)

Description

The Middle Rum River Subwatershed drains 198 square miles of Isanti, Sherburne, Mille Lacs, Kanabec, and Chisago counties. It also receives water from the Upper Rum River, West Branch Rum River, and Stanchfield Creek subwatersheds. The subwatershed inlet is located at the City of Princeton, which is at the confluence of the West Branch Rum River and the main branch of the Rum River at the western end of the subwatershed. South of Princeton the Rum River turns east and meanders about 17 miles before turning south again where it flows past the city of Cambridge before exiting the subwatershed. Agriculture is the dominant land use in the Middle Rum River Subwatershed, although patches of forest and wetlands are present throughout the subwatershed, as well as along the Rum River corridor.

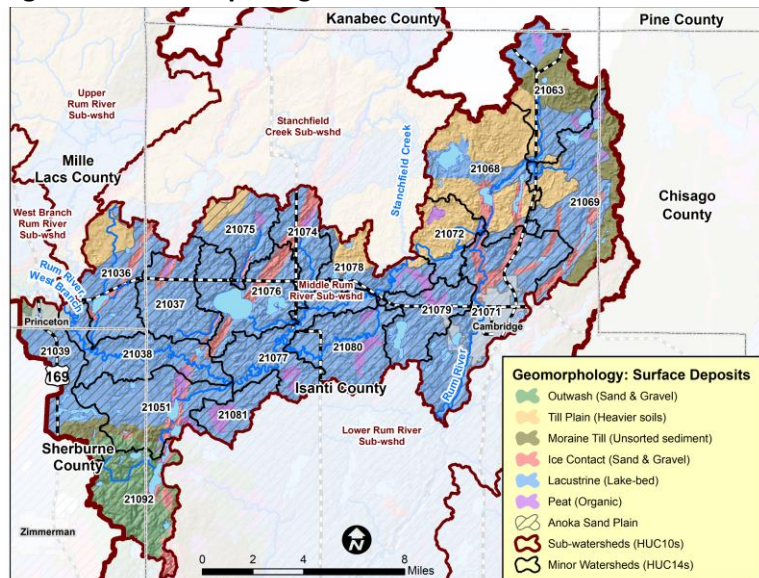
Figure 70. Elevation.



Geography

The Middle Rum River Subwatershed is mostly covered by a nearly level to gently rolling lake plain formed by melt water from the Grantsburg Sublobe. Some areas along the northern border to the subwatershed are covered by till plain, and the southwestern corner of the subwatershed is part of the Elk River Moraine. The Elk River Moraine is a rolling to steep pitted outwash plain formed by the Superior Lobe glacier.

Figure 71. Geomorphological landforms.



Past, Current, and Potential Future Forest Conditions

The boundary between the Laurentian Mixed Forest (LMF) and the Eastern Broadleaf Forest (EBF) provinces crosses the Middle Rum River Subwatershed, but the subwatershed is mainly on the EBF side. Historically, the uplands on the LMF side were maple-basswood forest, but on the EBF side the uplands were oak savanna. Additionally, the uplands on both sides had some oak forests and the lowlands were conifers swamps and marsh. Today most of the forest and savanna has been converted to agriculture or development; and the remaining forest exists in unconnected stands and the riparian corridor along the Rum River. The composition of the remaining forest is a mixture of pine (usually as plantations), oak/hickory, elm/ash/cottonwood, and aspen/birch forest type groups.

Estimates of the potential native plant communities (NPCs) indicate that most of the upland areas on the LMF side have the potential to support mesic hardwoods NPCs, while uplands on the EBF side may support fire-dependent or prairie (which includes oak savanna) NPCs. Additionally, the floodplain along the Rum River may support floodplain forest NPCs, while the lowlands elsewhere are more likely to support forested rich peatland, wet meadow, or marsh NPCs.

Figure 72. Historic vegetation cover, Marschner.

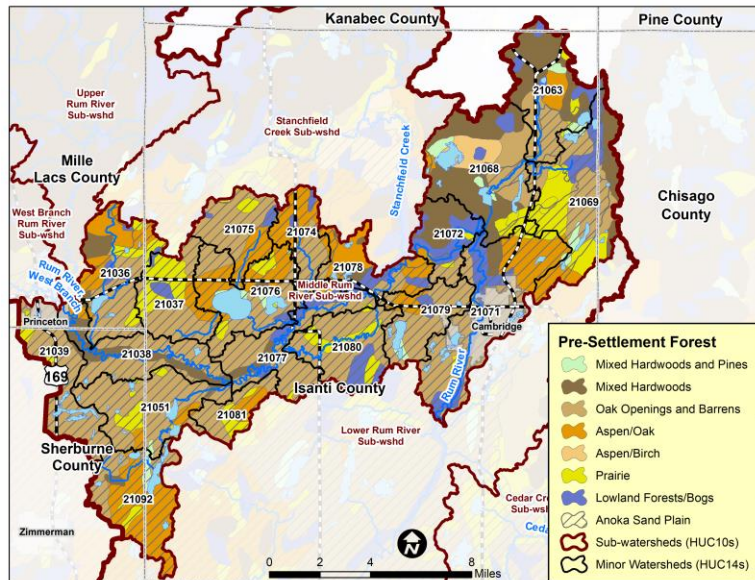


Figure 73. Land cover, 2013.

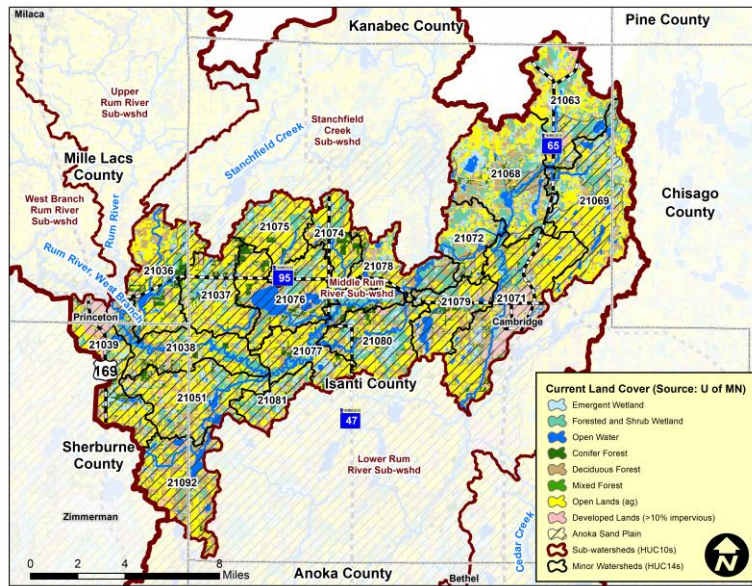
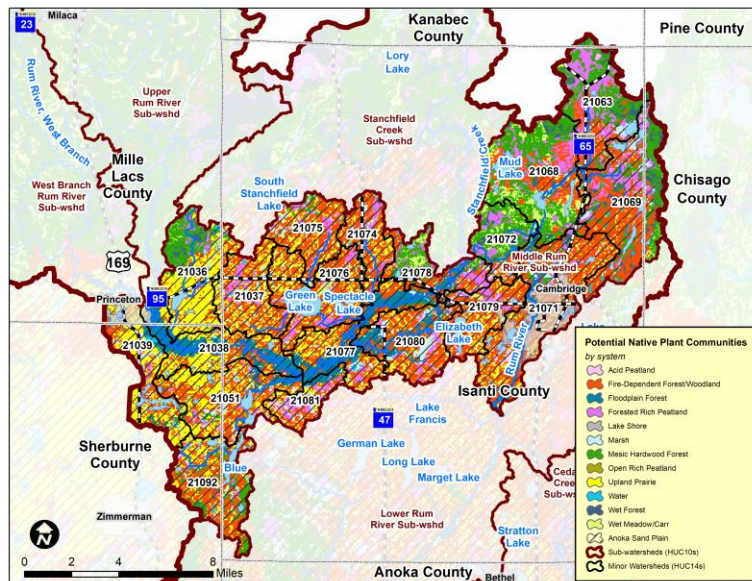


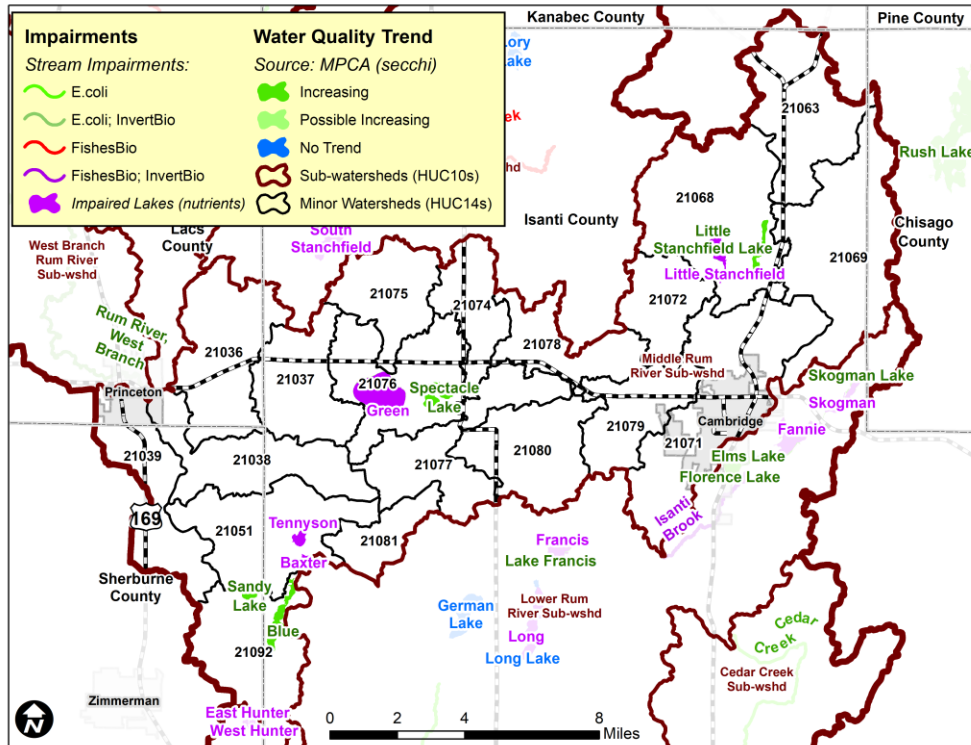
Figure 74. Potential native plant communities.



Water Resources Summary

The Middle Rum River Subwatershed is as its name implies, home to the middle reaches of the Rum River, as well as several small and medium sized lakes. Of the lakes with available water quality data, four are improving in water clarity, but four are impaired – mainly by nutrients. This subwatershed also has one lake of high biodiversity significance, as well as five priority wild rice lakes and three priority shallow lakes. Additionally, the Middle Rum River Subwatershed contains 91 miles of streams, none of which are impaired by anything other than mercury in fish tissue.

Figure 75. Water quality trends.



Protection Status

29% of the Middle Rum River Subwatershed is currently protected, mostly by wetlands. To reach the subwatershed protection goal of 39% an additional 13,007 acres need to be protected at an estimated cost of \$20,009,261. Fortunately, over 32,000 acres have the potential to protect, although the Rum River Landscape Stewardship Committee recommends prioritizing protection efforts on the Rum River corridor and minor watershed #'s 21038, 21051, 21077, 21078, 21080, 21081, and 21092.

Figure 76. Protected lands.

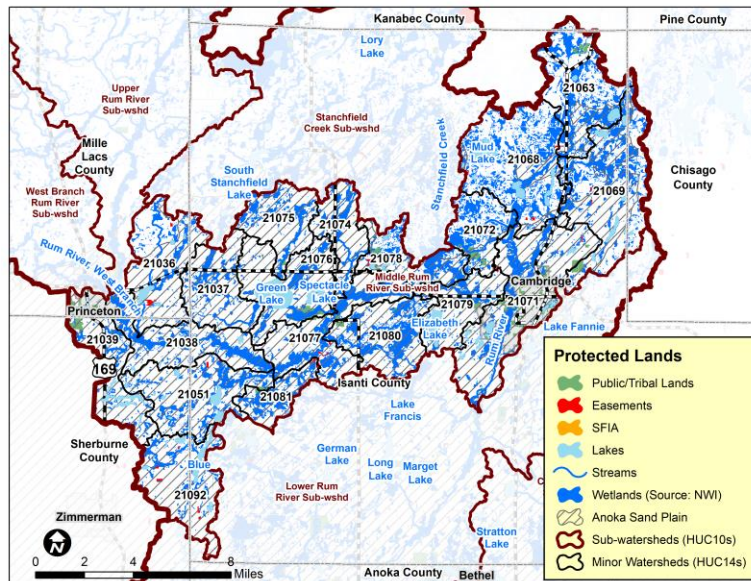
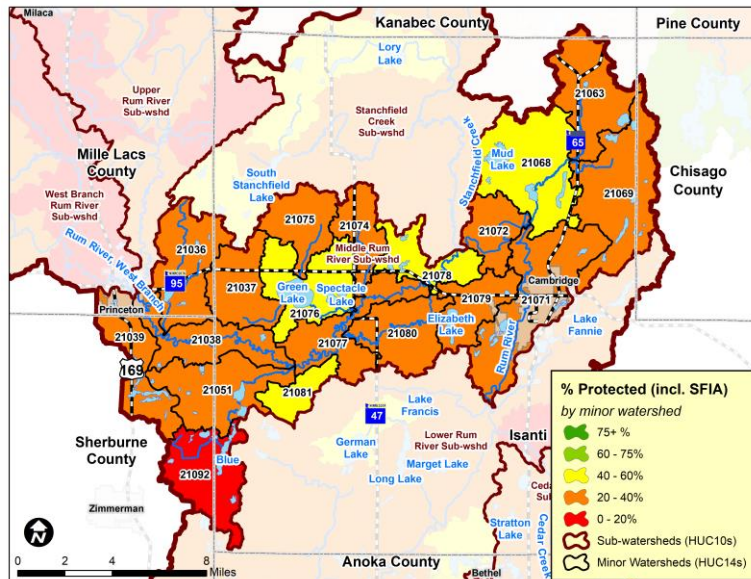


Figure 77. Minor watershed protection levels.



Subwatershed No. 6 Cedar Creek (HUC 701020706)

Description

The Cedar Creek Subwatershed is a tributary watershed to the Rum River and drains 84 square miles of Anoka and Isanti counties. The subwatershed is taller (north to south) than it is wide (east to west), with the headwaters to Cedar Creek located at its northern end. Cedar Creek runs south-southwest out of the headwaters and is joined by several smaller streams that flow out of the many lakes in the area before merging with the Rum River near the subwatershed’s southwestern end. Land use in the Cedar Creek Subwatershed is a mixture of wetlands, forests, agriculture, and development. Given the subwatershed’s location near the expanding metro area it is likely that development will continue to increase.

Geography

The majority of Cedar Creek Subwatershed is covered by the Anoka Lake Plain LTA, which is characterized by a nearly level to gently rolling lake plain formed by melt water from the Grantsburg Sublobe. The soil parent material is fine sand and some areas have been reworked by wind to form dunes. The headwaters to Cedar Creek are in the northern end of the subwatershed, and this area differs from the rest of the subwatershed in that it is within the rolling to steep terrain of the Rush City Moraine.

Figure 78. Elevation.

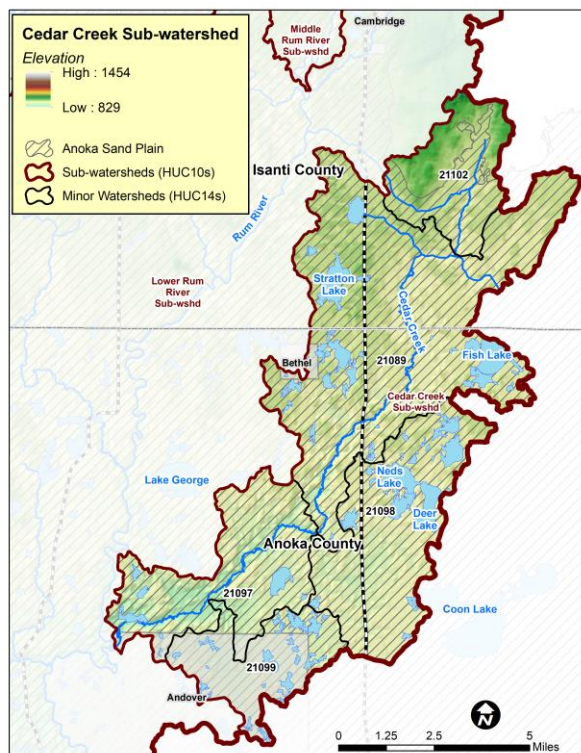
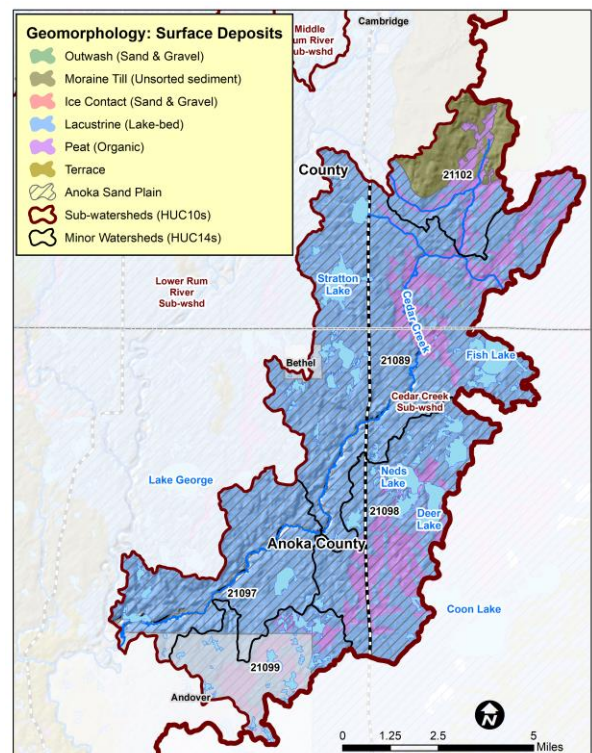


Figure 79. Geomorphological landforms.



Past, Current, and Potential Future Forest Conditions

The historical vegetation of the Cedar Creek Subwatershed was mainly oak savanna or oak forest in the uplands, and marshes or conifer swamps in the lowlands. Today most of the forest has been converted to agriculture or development, and the remaining forest exists as unconnected stands. The composition of the remaining forest is a mixture of elm/ash/cottonwood, maple/beech/birch, and oak/hickory forest type groups.

Estimates of the potential native plant communities (NPCs) indicate that most of the upland areas have the potential to support fire-dependent or prairie (which includes oak savanna) NPCs. The lowland areas may support marsh, forested rich peatland, wet meadow/carr, or wet forest NPCs.

Figure 80. Historic vegetation cover, Marschner.

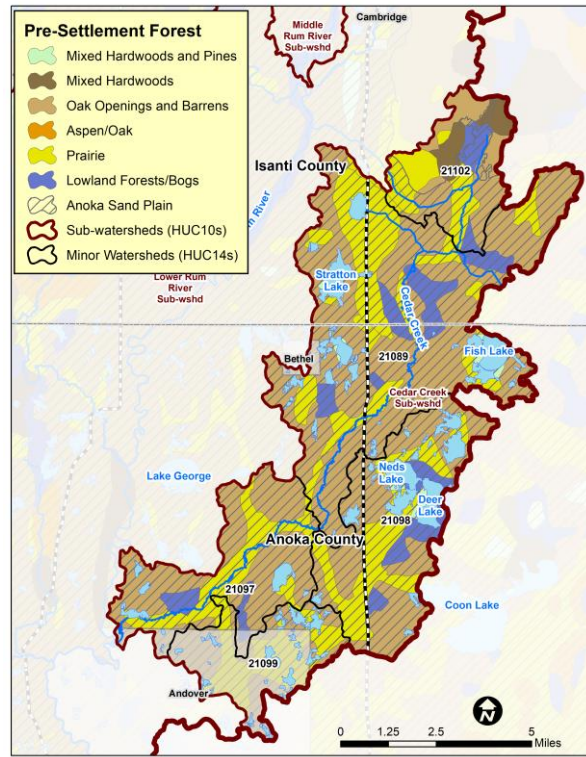


Figure 81. Land cover, 2013.

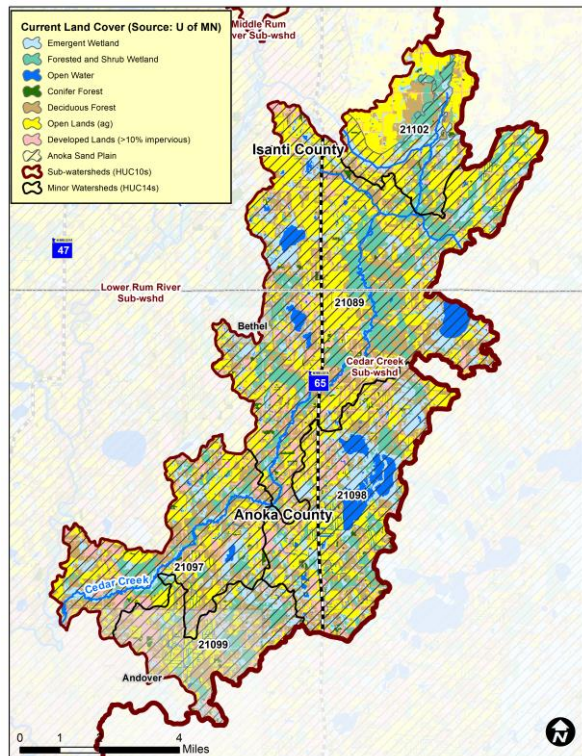
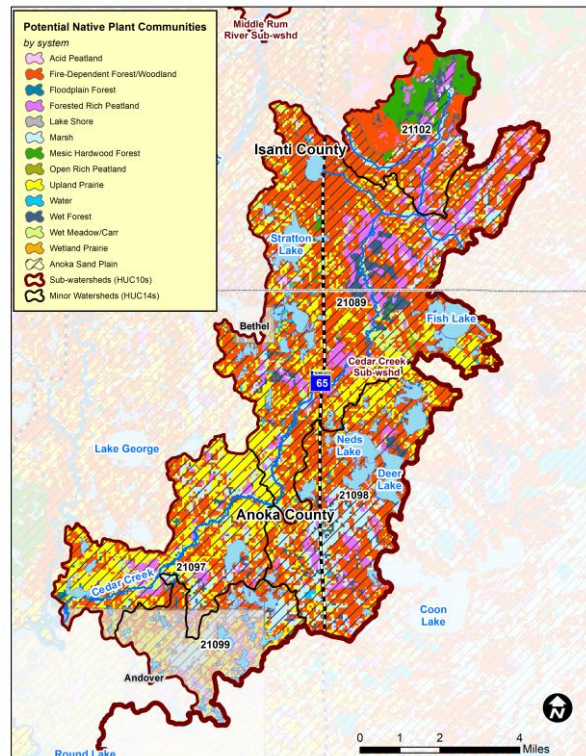


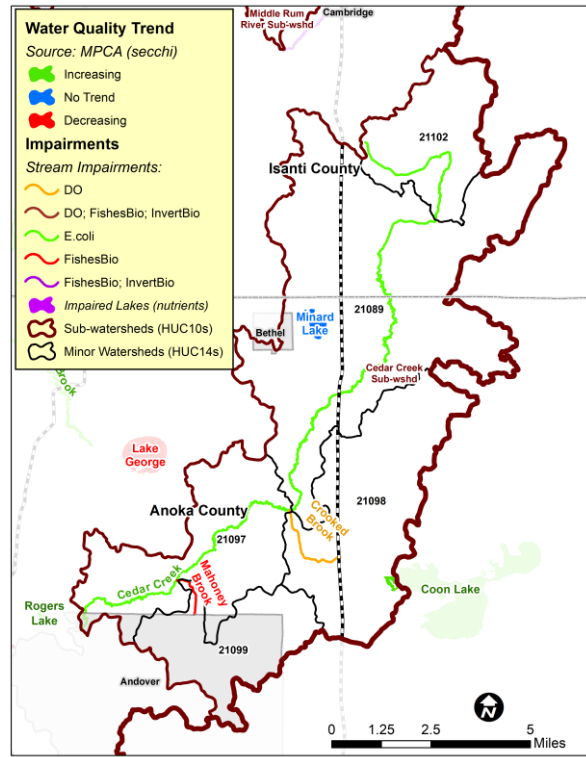
Figure 82. Potential native plant communities.



Water Resources Summary

The Cedar Creek Subwatershed is as its name implies, home to Cedar Creek, as well as many small lakes. Menard Lake is the only lake in this subwatershed with available water quality data, and the trend is stable. This subwatershed also has one lake of outstanding biodiversity significance, as well as two priority wild rice lakes and four priority shallow lakes. Additionally, the Cedar Creek Subwatershed contains 36 miles of streams, 32.1 miles of which are impaired by E-coli, dissolved oxygen, or fish bioassessments.

Figure 83. Water quality trends.



Protection Status

38% of the Cedar Creek Subwatershed is currently protected, mostly by wetlands and public land. To reach the subwatershed protection goal of 43% an additional 2,741 acres need to be protected at an estimated cost of \$5,007,908. Fortunately, nearly 9,000 acres have the potential to protect, although the Rum River Landscape Stewardship Committee recommends prioritizing protection efforts on minor watershed #'s 21089, 21098, 21102.

Figure 84. Protected lands.

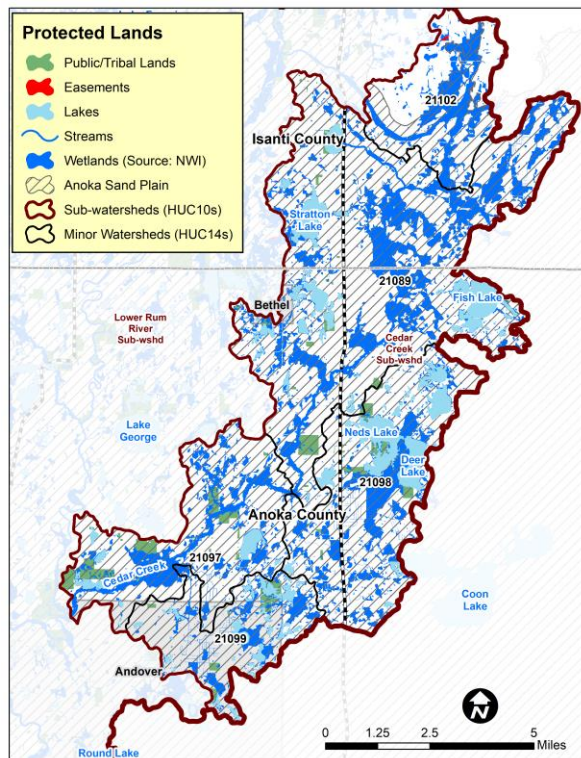
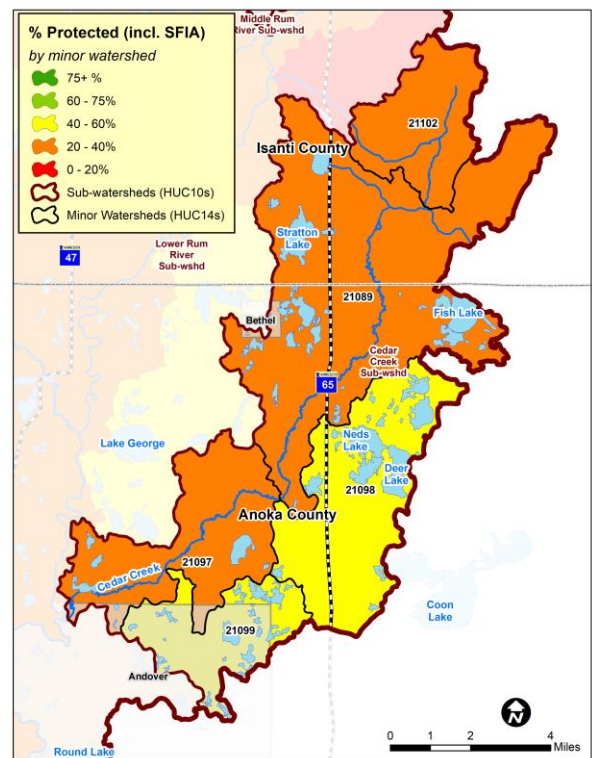


Figure 85. Minor watershed protection levels.



Subwatershed No. 7 Lower Rum River (HUC 701020707)

Description

The Lower Rum River Subwatershed drains 248 square miles of Anoka, Sherburne, Isanti, and Chisago counties. It also receives water from the Middle Rum River and Cedar Creek subwatersheds. The subwatershed inlet is located near the city of Isanti towards the subwatershed’s northern end. From there the Rum River flows south and is joined by several smaller rivers and streams before merging with the Mississippi River by Anoka and Champlin. Land use in the Lower Rum River Subwatershed is a mixture of wetlands, forests, agriculture, and development. Given the subwatershed’s location near the expanding metro area it is likely that development will continue to increase.

Geography

The Lower Rum River Subwatershed has a fairly diverse geomorphology. The northeast portion of the subwatershed (the area to the east of Highway 65) is a rolling to steep end moraine. The center of the Lower Rum River Subwatershed is a nearly level to gently rolling lake plain formed by melt water from the Grantsburg Sublobe. To the west of the lake plain is the Burns Till Plain LTA, which is characterized by a steep stagnation moraine formed by the Grantsburg Sublobe. Lastly, the southern end of the subwatershed intersects the Mississippi Sand Plain LTA, which has a nearly level to rolling terrain and is defined by outwash channels and post-glacial river terraces.

Figure 86. Elevation.

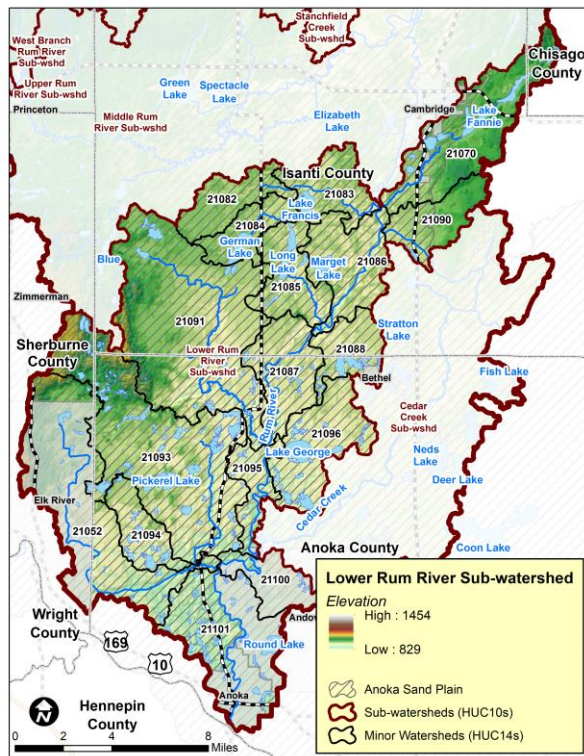
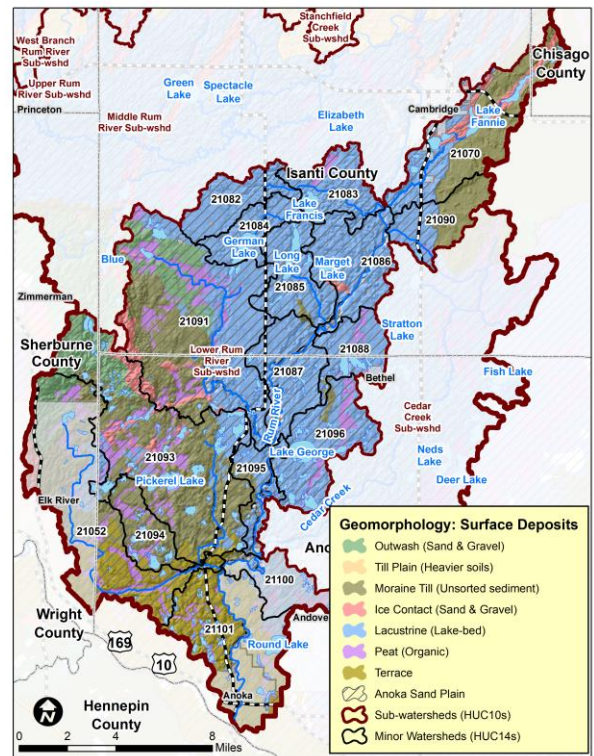


Figure 87. Geomorphological landforms.



Past, Current, and Potential Future Forest Conditions

The historical vegetation of the Lower Rum River Subwatershed was mainly oak savanna or oak forest in the uplands, and marshes or conifer swamps in the lowlands. Today most of the forest has been converted to agriculture or development, and the remaining forest exists as unconnected stands. The composition of the remaining forest is a mixture of elm/ash/cottonwood, maple/beech/birch, aspen/birch, and oak/hickory forest type groups.

Estimates of the potential native plant communities (NPCs) indicate that most of the upland areas outside of the Burns Till Plain LTA have the potential to support fire-dependent or prairie (which includes oak savanna) NPCs. Inside of the Burns Till Plain LTA the upland areas have the potential to support mesic hardwood NPCs. The lowland areas may support marsh, wet meadow/carr, forested rich peatland, or floodplain forest NPCs.

Figure 88. Historic vegetation cover, Marschner.

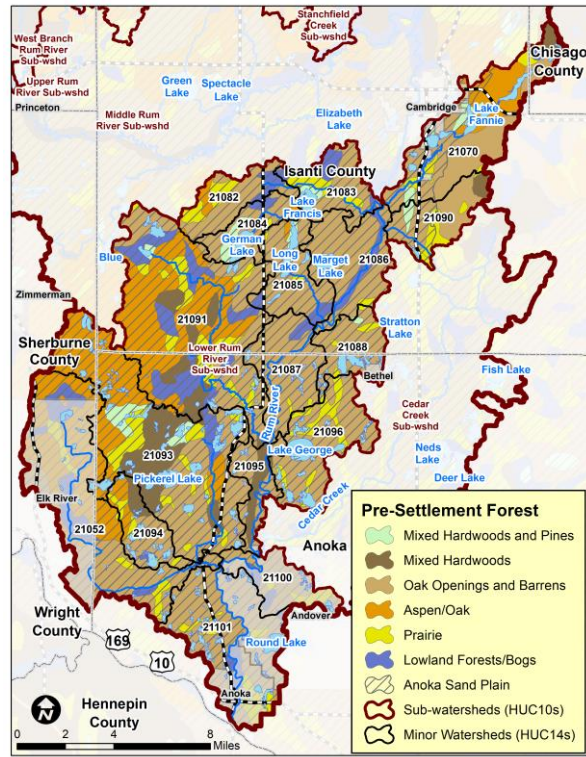


Figure 89. Land cover, 2013.

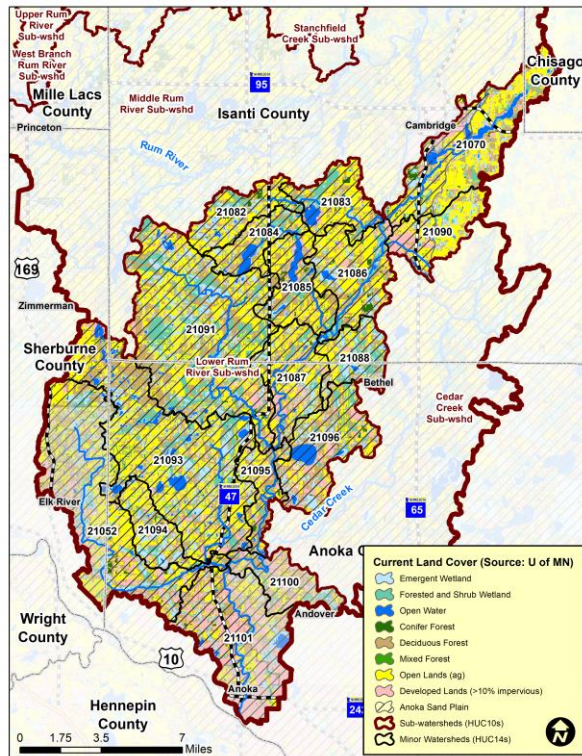
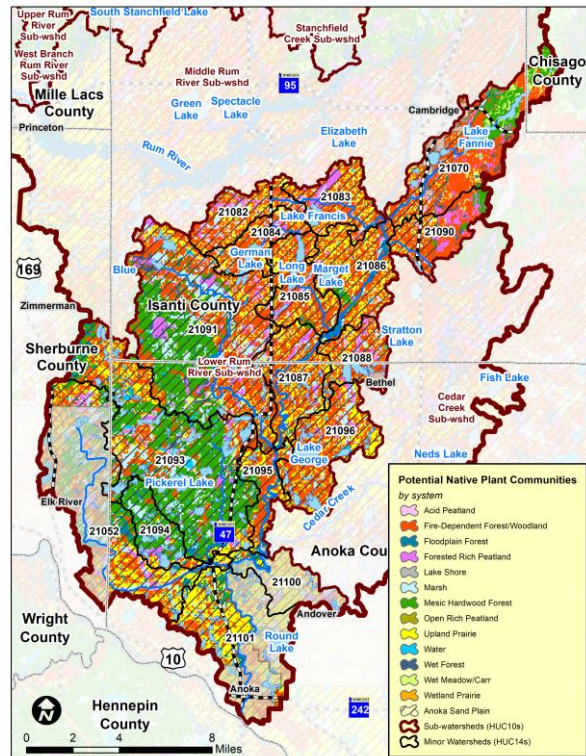


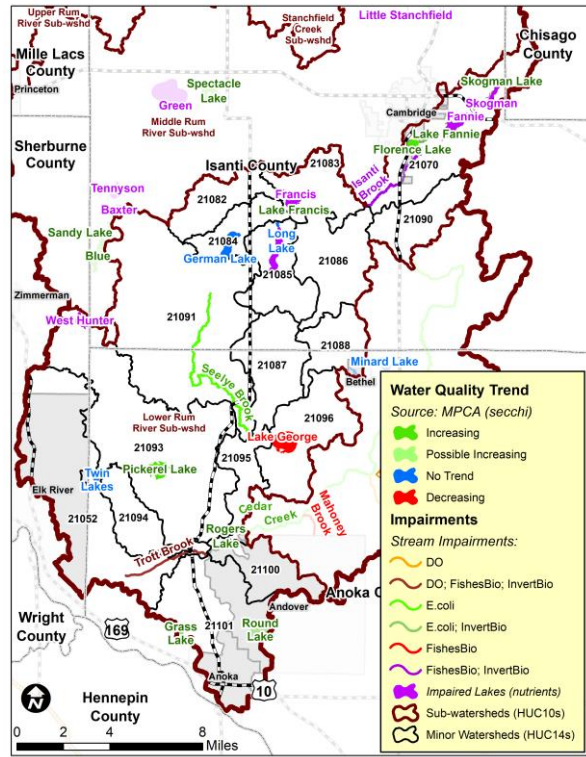
Figure 90. Potential native plant communities.



Water Resources Summary

The Lower Rum River Subwatershed is as its name implies, home to the lower reaches of the Rum River, as well as many small and medium sized lakes. Of the lakes with available water quality data, five are improving in water clarity, one is declining, two are stable, and five are impaired – mainly by nutrients. This subwatershed also has four lakes of high or outstanding biodiversity significance, as well as six priority wild rice lakes and fourteen priority shallow lakes. Additionally, the Lower Rum River Subwatershed contains 94 miles of streams, 21.8 miles of which are impaired by E-coli, fish bioassessments, invertebrate bioassessments, or dissolved oxygen.

Figure 91. Water quality trends.



Protection Status

27% of the Lower Rum River Subwatershed is currently protected, mostly by wetlands. To reach the subwatershed protection goal of 32% an additional 8,008 acres need to be protected at an estimated cost of \$14,947,234. Fortunately, nearly 38,000 acres have the potential to protect, although the Rum River Landscape Stewardship Committee recommends prioritizing protection efforts on the Rum River corridor and minor watershed #'s 21084, 21085, and 21091.

Figure 92. Protected lands.

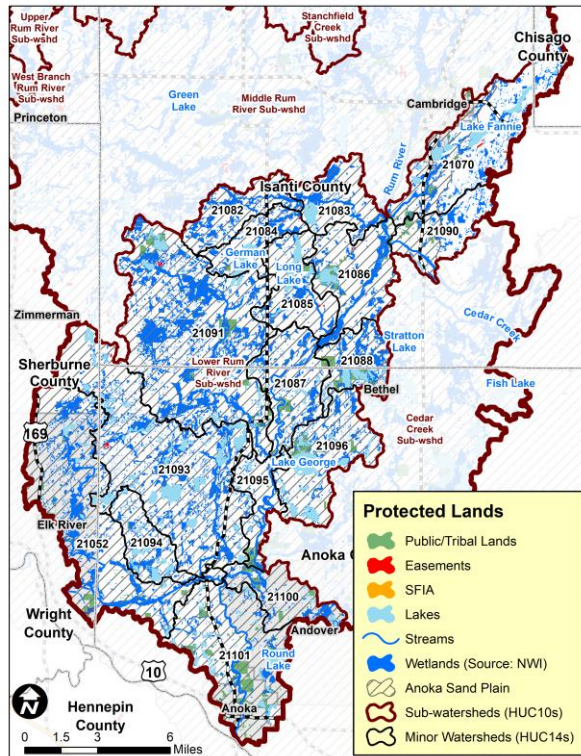
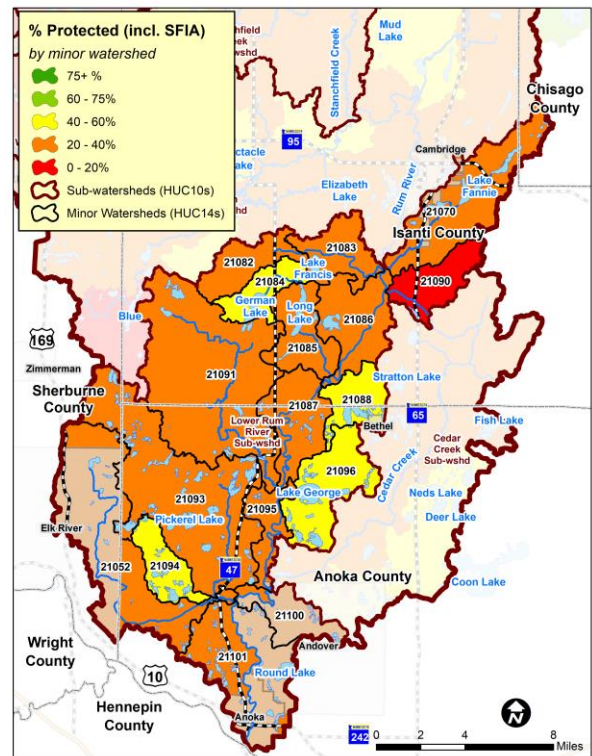


Figure 93. Minor watershed protection levels.



Ecological Pathway to Sustainable Forest Management

Below is the general sequence of concepts and products that will be developed for and/or integrated into the 2nd generation East Central Landscape Plan as a suggested ecological pathway to help land managers and owners work from the landscape scale down to the site level when planning specific forest management activities.

1. Ecological Classification System

- a. Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province
- b. Field Guide to the Native Plant Communities of Minnesota: The Eastern Broadleaf Forest Province
- c. DNR ECS website (<http://www.dnr.state.mn.us/ecs/index.html>)
- d. East Central Landscape Conditions and Trends Report (pp. 3.2-3.6)
- e. East Central Landscape Resource Atlas (pp. 31-34)
- f. East Central Landscape Plan (TBD)

2. Native Plant Communities

- a. Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province
- b. Field Guide to the Native Plant Communities of Minnesota: The Eastern Broadleaf Forest Province
- c. DNR NPC website (<http://www.dnr.state.mn.us/npc/index.html>)
- d. East Central Landscape Conditions and Trends Report (pp. 3.7-3.8)
- e. East Central Landscape Resource Atlas (pp. 57-58)
- f. East Central Landscape Plan - Appendix D (TBD)

3. Potential Native Plant Communities

- a. Geospatial Modeling of Native Plant Communities of Minnesota's Laurentian Mixed Forest (http://mn.gov/frc/docs/NPC_Technical_Report_Final_Jan2013.pdf)
- b. Mapping Potential Native Plant Communities of Minnesota's Laurentian Mixed Forest (http://mn.gov/frc/docs/Potential_Native_Plant_Communities_Summary_Final-Jan2014.pdf)
- c. Potential Native Plant communities of Minnesota's Eastern Broadleaf Forest (<https://data.nrri.umn.edu/data/dataset/cb6d64e5-fb67-4b05-b9cc-5bbebdb3568a/resource/43c8d895-709b-4b82-ae22-7dade35ac1df/download/nrri-tr-2019-01.pdf>)
- d. GIS data sources:
 - Laurentian Mixed Forest: <http://data.nrri.umn.edu/data/dataset/nemn-pnpc>
 - Laurentian Mixed Forest & Eastern Broadleaf Forest: <https://data.nrri.umn.edu/data/dataset/npc-ebf-lmf>
- e. East Central Landscape Conditions and Trends Report (pp. 3.8-3.12)
- f. East Central Landscape Resource Atlas (pp. 61-84)

4. Spatial Planning Category Inventory and Native Plant Community Crosswalks

- a. East Central Landscape Plan – Appendix E (TBD)
- b. NPC Crosswalks document (TBD)
- c. NPC Calculator (<https://conservancy.umn.edu/handle/11299/172734>)

5. Vegetation Management Framework - Goals and Strategies

- a. East Central Landscape Plan (TBD)

6. Climate Change Considerations

- a. Minnesota Forest Ecosystem Vulnerability Assessment and Synthesis: A Report from the Northwoods Climate Change Response Framework Project (http://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs133.pdf)
- b. Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers (https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs87-2.pdf)
- c. Climate Change Field Guide for Northern Minnesota Forests: Site-level consideration and adaption (https://forestadaptation.org/sites/default/files/ClimateChangeFieldGuide_NMNForests_HiRes.pdf)
- d. Climate Change Atlas (<https://www.fs.fed.us/nrs/atlas/>)
- e. East Central Landscape Conditions and Trends Report (pp. 3.20-3.25)
- f. East Central Landscape Plan – Appendix D Supplement (TBD)
- g. East Central Landscape Plan (TBD)

7. Silvicultural Considerations

- a. MN DNR Tree Suitability Table (<http://files.dnr.state.mn.us/forestry/ecssilviculture/treetables.pdf>)
- b. Silvicultural Interpretations (http://www.dnr.state.mn.us/forestry/ecs_silv/interpretations.html)
- c. NPC Tables and Figures (http://www.dnr.state.mn.us/forestry/ecs_silv/npcTables_Figures.html)
- d. Great Lakes Silvicultural Library (<https://silvlib.cfans.umn.edu/>)
- e. East Central Landscape Plan - Appendix D (TBD)
- f. East Central Landscape Plan - Appendix E (TBD)

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