

Minnesota's Aquatic Management Area Acquisition Plan 2008–2033

Shoreline Habitat, Angling, and Clean Water For Our Future

**Report to
Department of Natural Resources
Division of Fish and Wildlife**



**by
The Aquatic Management Area Acquisition Planning Committee
October 2007**

Fisheries Management Chief's Message

First I wish to thank Kristen Blann and Dave Thompson for chairing the committee and all committee members for their extraordinary personal commitment of time and energy.

Nearly one year ago, I asked this ambitious group of individuals to be members of an Aquatic Management Area (AMA) Planning Committee. I presented them with the challenges of setting acquisition goals for the AMA program, keeping in mind the pressures of competing interests for shoreland development, climate change, habitat loss, public access needs and water quality issues. At the time we thought that it might take 6 months to complete a plan. Driven by the need to fully understand all of the factors influencing the loss of shoreland habitat and threats to clean water, the project ended up taking 11 months. The Committee's perseverance through this extended period is greatly appreciated.

The recommendations in this report give guidance to the Division and set ambitious acquisition goals. Clearly the Division of Fish and Wildlife can't provide adequate shoreline protection solely on its own. A comprehensive shoreland protection approach will be required to compliment our efforts through partnerships, best management practices (BMPs), shoreland zoning regulations, conservation development practices, technical guidance, and incentives for individual shoreland owners.

We requested a 25-year plan because we felt that the time is coming when the only shoreland not developed will be that which is in public ownership or under permanent conservation easement. In other words, time is running short to protect remaining critical shoreland habitat and to insure that access is maximized on coldwater streams. Given the rate that shoreland is being developed and because of accelerating land costs, the ten year accelerated acquisition goals recommended by the Committee are particularly important. This will maximize remaining opportunities to acquire critical shoreland habitat.

The Committee has clearly met and exceeded its task, and we greatly appreciate their recommendations to the Department of Natural Resources. The recommendations are clear and the Department will strive hard to accomplish the goals set forth in this report.

Thanks again for this exceptional report.

Sincerely,

A handwritten signature in blue ink that reads "Ronald D. Fayer". The signature is written in a cursive, flowing style.

RONALD D. FAYER, FISHERIES MANAGEMENT CHIEF
Division of Fish and Wildlife

Table of Contents

Executive Summary	1
Co-Chairpersons' Reports	3
Charge	6
Committee Members	6
Attending Members	6
Plan Reviewers	6
Guest Presenters and Staff Support	6
Methods	7
Principles for Final Recommendations	8
Background	9
Acquisition Index	16
Recommendations – Statewide	18
Trout Stream Habitat	19
Lakes, River, and Stream Habitat	20
Regional Recommendations	21
Ecological Section 1 & 2, Arrowhead	22
Ecological Section 3, Peatlands	24
Ecological Section 4, Northern Prairie Parklands	26
Ecological Section 5, Red River Valley	28
Ecological Section 6, Northern Lakes	30
Ecological Section 7, Deciduous Transition	32
Ecological Section 8, Minnesota River Prairie	34
Ecological Section 9, Superior Uplands	36
Ecological Section 10, Southeast Blufflands	38
Individual Acquisition Criteria	40
Other Insights and Advice	42
Appendix A. Statutes and Rules Governing AMA Acquisitions	44
Classification and Purpose	44
Acquisition of Critical Habitat	45
Procedure in Acquiring Lands	45
Definitions	46
General Provisions for use of Aquatic Management Areas	47
Priorities for Acquisition and Improvement of Critical Habitat	48
Literature	50

Executive Summary

This report summarizes recommendations from the Aquatic Management Area (AMA) Acquisition Planning Committee for both short-term (2008–2017) and long-term (2018–2032) acquisition priorities and goals.

As defined in Minnesota Statute 86A.05, Subd. 14, “Aquatic management areas may be established to protect, develop, and manage lakes, rivers, streams, and adjacent wetlands and lands that are critical for fish and other aquatic life, for water quality, and for their intrinsic biological value, public fishing, or other compatible outdoor recreational uses”.

Based on the AMA definition and on issues and trends impacting riparian and aquatic habitats, the Committee identified four key principles for developing their recommendations:

- AMA acquisitions should protect riparian habitat and prevent habitat degradation from inappropriate or excessive development.
- AMAs should provide access for angling and nonmotorized recreation.
- AMA acquisition processes need to be efficient and effective.
- A successful AMA acquisition program depends on partnerships with nonprofit organizations, government agencies, and stakeholder groups.

The challenge before this Committee was to consider both the threats facing Minnesota’s streams, rivers, and lakes and the needs for better protection of these precious resources. To that end, the Committee developed a model for considering threats and needs on a regional basis. Five trends or characteristics were used to identify AMA acquisition needs in the state.

- Human demographics (population growth projected at 22% between 2000 and 2030)
- Recreational access to public waters through public accesses
- Lake and pond basin distribution
- Environmental values
- Angling opportunities

Acquisition recommendations are primarily based statewide by ecological regions, and secondly on two fundamental types of aquatic systems:

- Trout streams
- Lakes and warm-water rivers/streams

The statewide goal for protection of Minnesota’s 5,508 miles of coldwater stream habitat through public ownership should increase from the current 46% to 72 % by 2032. These public lands include federal, state, county, and municipal ownership. To achieve this goal, the vision for the AMA Acquisition Program is to acquire 1,500 miles of cold-water stream habitat in the next 25 years from willing sellers to provide sustainable populations of trout and greater opportunities for angling recreation for future generations. This vision would increase the portion of cold-water designated trout streams protected as AMAs from 11% (618 miles) in 2007 to 38% (2,118 miles) by 2032.

Due to increasing land costs and habitat loss, acquisition efforts should be accelerated over the next ten years by purchasing approximately 66% of the 25 year long-term goal or 1,000 miles in ten years at a rate of 100 miles per year. This may require approximately \$10 million per year from 2008–2017 and \$3.3 million per year between 2018–2032. Acquisitions should be concentrated in the southeast and northeast portions of the state where development and land use pressures, habitat fragmentation, and increased demand for outdoor recreation continue to expand.

This vision would increase trout stream AMAs from just over ½ foot of shoreland for each of Minnesota’s 5.1 million citizens (2007) to nearly 2 feet for each of Minnesota’s projected 6.3 million citizens (2030). Accessibility for Minnesota’s growing urban populations would be tremendously increased.

The statewide goal for protection of Minnesota’s 64,000 plus miles of lake and warmwater stream shorelands through public ownership should increase from the current 34% to 39 % by 2032. These public lands include federal, state, county, and municipal ownership. These goals are based on the assumption that there will be no loss of shoreland that is currently under public protection. To achieve this goal, the vision for the AMA Acquisition Program is to acquire 1,100 miles of lake and warm-water stream habitat in the next 25 years from willing sellers to provide sustainable populations of fish and other aquatic species and greater opportunities for angling recreation for future generations. This vision would increase the portion of lake and warm-water streams and rivers protected as AMAs from 0.3% (216 miles) in 2007 to 2% (1,316 miles) by 2032.

Due to increasing land costs and habitat loss, acquisition efforts should be accelerated over the next ten years by purchasing approximately 70% of the 25 year long-term goal or 750 miles in ten years at a rate of approximately 75 miles per year. This may require approximately \$25 million per year from 2008–2017 and \$7.7 million per year between 2018–2032. Acquisitions should be concentrated in the north central lakes and transition area between the prairie/grassland and forested portions of the state where development and land use pressures, habitat fragmentation, and increased demand for outdoor water-based recreation continue to expand.

This vision would increase warm-water AMAs from the current 2.6 inches of shoreland for each of Minnesota’s 5.1 million citizens (2007) to approximately just over 1 foot for each of Minnesota’s projected 6.3 million citizens (2030). Accessibility for Minnesota’s growing urban populations would be tremendously increased.

The Committee recognizes that the need to protect and better manage aquatic resources in Minnesota is huge. Public ownership and protection of these resources is currently accomplished through state ownership (AMAs, state parks, wildlife management areas, state forests, Board of Water and Soil Resources [BWSR] Reinvest In Minnesota [RIM] easements), federal ownership (U.S. Fish and Wildlife Service [USFWS] easements, U.S. Forest Service lands), and local government units (Metropolitan Council, county and municipal parks, watershed districts, lake improvement districts) employing fee title acquisition and conservation easements. A holistic and comprehensive approach is needed using a suite of tools including best management practice (BMP) guidelines, shoreland regulations and incentives, zoning ordinances, conservation development, technical guidance for lakeshore owners, expansion of “lake improvement districts” and lake associations, donation of lands, expanded acquisition of fee title and conservation easements by non-profits. We need to refine and expand these tools by looking for new funding and partnership opportunities (state wildlife grants, revised estate tax structures, etc.). Our future tools need to be complimentary and must reflect the broad range of interests in shoreland protection and management.

Shoreland habitat protection is an essential component in preserving the cleanwater legacy that Minnesota’s citizens and visitors are used to experiencing. Aquatic management area acquisitions continue to provide a critical foundation for shoreland protection and management while providing public access to Minnesotans who fish, boat, observe wildlife, and recreate on this state’s waters. These goals and visions should be considered “floating caps” so that as new and progressive funding opportunities are created, these goals and visions can not only be met but ideally exceeded by 2032.

Co-Chairperson Kristen Blann Report

I would like to begin by expressing my sincere thanks to each and every person that contributed his or her time and input to the Aquatic Management Area Acquisition Planning Committee. We are very pleased to have reached consensus on a plan that recommends significant expansion of the AMA program over the next 25 years.

In Minnesota, a land blessed with an abundance of waters, protecting our water resources routinely ranks high on the list of public policy priorities for citizens, and the majority of citizens support additional funding for protection for Minnesota's lakes and rivers. Yet the needs continue to grow with the demands and pressures on existing water resources. Minnesota's citizens currently have access to little more than 1/3 of the state's shoreline miles through public ownership, administration, or easements. Much of the publicly owned shoreland is in northeastern Minnesota, away from the state's major population centers. In central Minnesota, where many popular fishing and recreational lakes are located, the percentage of publicly owned or protected lakeshore is significantly less.

The AMA Acquisition Planning Committee felt strongly that AMAs are and should be an important tool for achieving greater protection of Minnesota's lakes and streams, as well as providing greater access to the public. Since their establishment by the Legislature in 1992 as part of the Outdoor Recreation System, AMAs have rapidly become one of the most successful state programs providing public access to our state's lakes, rivers, streams, and wetlands while simultaneously providing protection for aquatic and shoreland habitats. The Committee recommended a long-term (25 year) goal for the AMA program of protecting at least 2% (1,316 miles) of the state's warmwater lake and stream shoreline and 38% (2,118 miles) of coldwater stream miles.

The Committee also emphasized that although AMAs have a critical role to play protecting valuable shoreland and fish habitat, they cannot be the sole approach to lake and river protection. Rather, AMAs should be a component of a larger, integrated approach to sustainable, comprehensive water resource protection that must include public, private, and non-profit partnerships, funding, and cooperation at federal, state, and local levels. Given the relatively small percentage of lake and stream shore feasible to acquire, the AMA program cannot by itself ensure the water quality and habitat protections needed to sustain healthy lake, river, and stream ecosystems over the long run. Achieving the vision of comprehensive water resource protection will require diverse tools, partners, and strategies. In addition to AMAs, many existing and potential programs, entities, and tools have critical roles to play in protecting aquatic habitats and maintaining environmental quality, e.g. agricultural best management practices (BMPs), watershed management, County Water Plans, shoreland regulations, local zoning, conservation development, and donation or acquisitions of fee title and/or conservation easements by other agencies and nonprofits (e.g., BWSR, Watershed Districts, Lake Improvement Districts, Lake Associations, Minnesota Land Trust, The Nature Conservancy). Indeed, many of the most successful AMA acquisitions to date have been made possible through the cooperation, support, and funding of many of these partners, programs, and donors, both public and private.

I thank the many private citizens who dedicated many, many hours of their own time to develop these recommendations, especially Co-chair Dave Thompson for his valuable insights and contributions to the plan and report. Organizations that were represented or that provided valuable staff and support for the process included Ducks Unlimited, Izaak Walton League, Leech Lake Watershed Area Foundation, Minnesota Conservation Federation, Minnesota Land Trust, Minnesota Outdoor Heritage Alliance (MOHA), Minnesota Waters, The Nature Conservancy, Northerns Inc., Trout Unlimited, and the Trust for Public Land. The Committee's work benefited tremendously from informative presentations and analysis from an array of agency personnel from the USFWS, BWSR, Minnesota Pollution Control Agency, and Minnesota Department of Natural Resources [MN DNR] Section of Fisheries Management, Ecological Resources, Wildlife Management Section, and GIS. Finally, I wish to recognize the enormous amount of work and dedication of Kathy DonCarlos and Mike Halverson of MN DNR in putting together the process, plan, and report.

We hope that the people of Minnesota and their representatives will embrace our vision for the future of Minnesota's lakes, streams, and rivers, so that future generations will be able to enjoy and continue the great outdoors legacy of this beautiful state. Minnesota's richness of waters serves in so many ways to shape our culture and quality of life as citizens. Our ability to bequeath this quality of life to our children and grandchildren rests on how well we protect and manage this source of wealth now and into the future.

Kristen Blann



“Yet the needs continue to grow with the demands and pressures on existing water resources.”

Co-Chairperson Dave Thompson Report

The AMA Acquisition Planning Committee has accomplished an extensive examination of critical habitat losses confronting lake, stream and river management in Minnesota. With Minnesota's recreational, agricultural, and commercial development increasing, it is extremely important that critical lake, stream, and river habitat be preserved, not only for protection of the eco-systems surrounding these waters, but to insure angler access to these waters.

Throughout this examination, the Committee has been made aware of the vast impacts to waters and fisheries due to development on or near our sensitive watersheds. This report compiles months of DNR staff time and Committee examination, to offer a formulated broad strategy to enhance and protect our water resources. This effort must multi-faceted and include the following:

- Public and private partnerships must be expanded to maximize resources.
- An aggressive funding program must be implemented to acquire as much of this critical habitat as possible.
- An inventive marketing program must be formulated to entice private donation of property into conservation easements.
- Property tax shelters for land donations should be developed to encourage property owners to put shoreline into easements.
- State and Local units of Government must implement greatly improved land use statutes and ordinances to protect our waters from destructive land use practices. Our present standards are no longer sufficient.

It is very important to note that the solution for protection are not all acquisition oriented. Most of our critical habitat and eco-systems can be enhanced at no cost to the state and its citizens. The AMA Plan is only one tool that will be used to stop the deterioration of the shoreline.

I would personally like to thank the DNR Commissioner and the Section of Fisheries Management for organizing and dedicating Fisheries staff time for this purpose. I also want to acknowledge the other state and federal government agencies that provided staff for Committee participation. These include: USFWS and BWSR. The conservation organizations that are dedicated every day to the preservation and enhancement of our natural resources have again provided staff and organizational resources to accomplish this report. My thanks go to The Nature Conservancy, Trust for Public Land, Minnesota Land Trust, Minnesota Waters, and Minnesota Conservation Federation. There were several private citizen volunteers representing their respective organizations that have invested time and resources to this Committee and I cannot thank them enough for their energy and dedication to this effort. These include Roger Goeschel, MOHA; Burton Scripture, Northern Inc.; Mark Reisetter, Trout Unlimited; and Doug Payne, Leech Lake Watershed Area Foundation.

I ask the Minnesota Governor, DNR Commissioner, Fisheries Management staff, Minnesota Legislators, present and future, to use this report and its recommendations in immediate and future budget and program planning.

Dave Thompson

Charge

The AMA Acquisition Planning Committee (APC) will be asked to recommend: (a) long-term acquisition priorities and goals, and (b) short-term acquisition priorities and goals.

The plan will address acquisition needs for the long-term (25 years, 2008–2033) and the short term (10 years, 2008–2017).

APC will be requested to submit a report summarizing their recommendations by June 1, 2007.

Committee Members

Attending Members:

Kristen Blann, The Nature Conservancy (Co-Chairperson)
Gary Botzek, Minnesota Conservation Federation
Kevin Brennan, USFWS, Fergus Falls Wetland District
Roger Goeschel, Minnesota Outdoors Heritage Alliance
Todd Holman, The Nature Conservancy
Steve Klotz, Lanesboro Area Fisheries Supervisor (also presenter)
Robert McGillivray, Minnesota Waters and Trust for Public Land
Doug Payne, Leech Lake Watershed Area Foundation
Jane Prohaska, Minnesota Land Trust
Mark Reisetter, Trout Unlimited, Win-Cres Chapter
Burt Scripture, Northerns Inc
Dan Steward, Board of Water and Soil Resources
Dave Thompson, Resort Owner (Co-Chairperson)

Plan Reviewers:

Susan Schmidt, Trust for Public Land

Guest Presenters and Staff Support

Lyn Bergquist, DNR Fish and Wildlife/GIS Coordinator
Daren Carlson, DNR Ecological Resources/Ecologist-GIS Analyst
Ian Chisholm, DNR Ecological Resources/Stream Habitat Program Supervisor
Carmen Converse, DNR Ecological Resources/MCBS Program Supervisor
Mike Halverson, DNR Fish and Wildlife/Fisheries Habitat and Development Coordinator
Peter Jacobson, DNR Fish and Wildlife/Coldwater Fisheries Research
Beth Knudsen, DNR Ecological Resources/Research Analyst
Paul Radomski, DNR Ecological Resources/Project Consultant
Jeff Risberg, Pollution Control Agency/Planning Director
Jack Skrypeck, DNR Ecological Resources/Chief (Retired)
Al Stevens, DNR Fish and Wildlife/Fisheries Program Coordinator
Hannah Texler, DNR Ecological Resources/Regional Plant Ecologist
Matt Ward, DNR Fish and Wildlife/Fisheries Specialist
Kathy DonCarlos, DNR Fish and Wildlife/Planning

Methods

Meetings and Process

A series of six meetings was conducted from January through August 2007, in the St. Cloud, Forest Lake, Longville, and Twin Cities areas. The first meeting briefed members on the mandate, history, and current status of the AMA system. Subsequent meetings featured guest speakers addressing issues, which impact the AMA acquisition program and goals. A component of most meetings included a profile of key or recently acquired AMA units through electronic presentations including maps, features, and background information. The June meeting in Longville allowed members to visit the Woman Lake AMA and consider the importance of shoreline protection in areas experiencing rapid human population growth.

An approach for describing the need for protecting aquatic habitat in Minnesota was discussed at the fourth meeting and results of that model in conjunction with acquisition goals were then presented at the fifth meeting. Refinement of acquisition goals took place at the sixth meeting. Editing of the final report took place using email communications. The general approach for the meetings follows.

January 29, 2007

- Need for AMA acquisition plan
- Mandate, history, current status of AMA program
- Acquisition procedures and project criteria
- FY06/07 spending plan

March 8, 2007

- AMA acquisition plan principles
- Draft outline for final report
- Information desired by the Committee to set AMA acquisition goals
- Public and protected riparian habitat in Minnesota; BWSR and DNR
- Climate change impacts on coldwater fish resources; DNR Fisheries and Wildlife (FAW)
- Lake surveys and lake classification system; DNR FAW
- Trout Stamp expenditures; DNR FAW

April 19, 2007

- Prioritizing sites of aquatic biological significance; DNR County Biological Survey
- Natural Heritage data for AMA planning; DNR Ecological Resources
- State Wildlife Action Planning; key river reaches; DNR Ecological Resources
- Evaluation tools for identifying sensitive lakeshore in Cass County; DNR Ecological Resources
- The Nature Conservancy lake classification and conservation prioritization; TNC
- Watershed assessment tool for streams; DNR Ecological Resources
- Impaired Waters; Pollution Control Agency

May 9, 2007

- Trout habitat management in southeast and northeast Minnesota; DNR FAW
- Developing an approach for describing aquatic habitat threats and benefits
- Developing a model for identifying AMA acquisition goals
- Marketing the AMA program to potential sellers

June 13, 2007

- Model for trout AMA acquisitions and developing goals for AMA acquisitions
- Model for warmwater AMA acquisitions and developing goals for AMA acquisitions
- Woman Lake AMA field tour

August 24, 2007

- Refine both short and long term goals for AMA acquisition.

Analyses

The DNR Fisheries Geographic Information System (GIS) Program completed analyses of threats and benefits for riparian habitat in Minnesota. Five factors were used to develop an acquisition model or index, which characterizes the need for protecting shoreland habitat in Minnesota. The index utilizes Ecological Classification System sections, which are units, defined by the origin of glacial deposits, regional elevation, distribution of plants, and regional climates. Minnesota has ten sections; however, for purposes of these analyses, two sections (Sections 1 and 2) were combined for a total of nine sections (see Figure 3). Acquisition index factors include: (1) current and projected human population growth per section acres, (2) number of public accesses per shoreline mile, (3) lake and pond basin acres per section acres, (4) number of aquatic features in the Natural Heritage database per section acres, and (5) number of fish species per inventoried basin square miles (see Table 1).

Principles for AMA Acquisition Recommendations

The Committee identified four principles for developing their recommendations.

1. AMA acquisitions should protect riparian habitat and prevent habitat degradation from inappropriate or excessive development. The Committee felt that as much shoreland should be protected as possible through both fee title acquisitions and easements by public agencies and nonprofit organizations and through regulations for privately owned lands. Protecting critical shoreline habitat not only benefits fish and other aquatic species, but healthy sustainable ecosystems also provide human benefits such as clean water, reduced erosion to property, and a sense of well being.
2. AMAs should provide access for angling and nonmotorized recreation. Minnesota citizens should be able to access lakes, streams, and rivers without having to actually own land.
3. AMA acquisition processes need to be efficient and effective. Although the charge of this Committee did not include a review of the agency's acquisition procedures, the group did recognize the importance of streamlined and efficient acquisition procedures for both the staff and willing sellers. Further, the Committee emphasized the need to develop education programs for potential sellers on topics such as tax benefits.
4. Finally, a successful AMA acquisition program depends on partnerships with nonprofit organizations, government agencies, and stakeholder groups.

Background

Minnesota Lakes, Rivers, and Streams Overview

Lakes in Minnesota were formed primarily by erosion and deposition during periods of glaciation that occurred 100,000 to 150,000 years ago. This happened in a number of ways. Ice gouged and scraped the surface of the earth, leaving many depressions that eventually filled with water. Buried ice blocks melted after the glacier retreated, and the resulting depressions also became lakes. In some areas, glacial till or moraines, blocked natural drainage pathways and created lakes. There are 37,500 miles of shoreline along Minnesota's lakes and wetlands, of which 14,300 miles are located on the types of lakes that most frequently attract development.

Rivers and streams are nature's vehicle for draining excess water from Minnesota's varied landscape. The state's great river systems—the Red River of the North, Mississippi, St. Croix and Minnesota—provide water for many purposes: hydropower, irrigation, drinking water, recreation, and fishing resources. There are 69,585 miles of waterway in Minnesota, of which 27,000 miles are perennial rivers and streams of the type that might attract development. Designated trout streams make up 5,508 miles of that total.

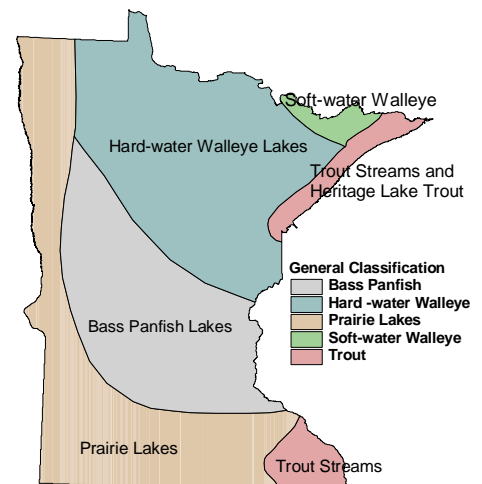
Clearly, glacial lakes and associated drainage features are regionally and nationally significant economic and cultural natural resources and yet they are increasingly threatened by a number of human-driven factors affecting sustainable fish and wildlife habitats. Agriculture is a predominant land-use practice in the southern and western portion of Minnesota. Residential and urban development is the predominant land uses in the central portion. Forestry and mining are the predominant land-use practices in the northeast portions of the state.

Minnesota Angling

Minnesota's \$10 billion-a-year tourism industry is based on Minnesota's water resources, and water quality and fishing are key components of the tourism industry, providing 2.5 billion dollars annually in direct expenditures to the state's economy. Minnesota has approximately 1.13 million licensed anglers or about 21% of Minnesota's 2006 estimated population, one of the highest anglers per capita rating in the country. There were also 279,000 nonresident angling licenses sold in 2006, for a total of over 1.4 million licenses. Insuring that Minnesota's tourism industry remains healthy is critical to the state's economy.

The Minnesota Department of Natural Resources has classified Minnesota lakes and streams based on the naturally reproducing game fish populations (Figure 1). Trout, which require cool water, are found mainly in the northeast and southeast. Walleye, bass, and panfish are found in northern and central Minnesota lakes. Prairie lakes may contain game fish, but they are subject to periodic winterkill because of the shallow depth of these lakes.

Figure 1
General Classification
Fishing Lakes and Streams in MN



Threats to Healthy Lakes, Rivers, and Streams

Paleolimnology provides insight into how European settlement beginning in the mid-1800s has impacted lake-water quality. Water quality began declining as wide-scale conversion of the landscape from prairie and transitional forest to today's familiar row-crop agriculture and highly impervious urban population centers occurred. Through better land management, some watershed perturbations can be slowed or even reversed; and water quality can actually be improved.

One trend that is not as clearly reversible is conversion of lake and streamshore to residential development, a trend that has greatly accelerated over the past 30 years. This trend is driven by convergent factors of changing population demographics, an increasingly mobile society, and various economic forces. Over the past 20 years, Minnesota and other states with glacial lakes have experienced high increases in population while surrounding states have grown much more slowly or have even lost population. Patterns of growth tend to be away from agriculture and urban core areas and toward suburbs and lake-rich areas such as central and northern Minnesota. Additionally, many people are traveling across the region between their primary residences in one part of the state to their lake cabins in another.

As residential development increases around lakes, human behaviors and activities in the immediate riparian area bordering the banks of lakes, streams, and rivers lead to increased nutrient inflow and physical alteration of aquatic habitats. Shoreline property ownership generally conveys a suite of property rights unique to riparian owners that govern lake bottom ownership, in-lake habitat removal, and general recreational surface water access and use. In exercising their riparian rights, lakeshore residents may, and often do, adversely alter lake habitats. Lakeshore residents generally recognize the consequences of certain detrimental behaviors, but many also knowingly conduct activities that adversely impact lake water quality as well as fish and wildlife habitats for reasons including personal aesthetics, peer pressure, economics of lakeshore property, and lack of understanding of cumulative impacts.

Human habitation along the shore usually has a cumulative effect on fish and wildlife habitat, water quality, and biota of lake ecosystems. Shoreline development has been estimated to have reduced emergent and floating aquatic plant abundance by 20 to 28 percent (Radomski and Goeman 2001). In addition, shoreline development resulting in impervious or high run-off surfaces and lawns, increases both the amount of runoff and the quantity of nutrients reaching a lake. Nutrient levels increase and water clarity decreases due to pollutant runoff, poor stormwater management, and shoreline phosphorus inputs from shoreland septic systems and lawns to the lake. In addition to water quality degradation, shoreline development results in a loss of fish and wildlife habitat causing the decline of fish and wildlife populations.

Of the approximately 225,000 residential lake lots in Minnesota, more than 25 percent have a lawn mowed down to the lake (Payton and Fulton 2004) resulting in nutrient runoff, diminished water quality, and loss of fish and wildlife habitat. Rainwater runoff from "lawn to lake" shoreline was measured to be 5 to 10 times higher than forested shorelines. Important to lake water quality, the "lawn to lake" shoreline allows 7 to 9 times more phosphorus to enter the lake than a more natural, native-vegetated shoreline (Dennis 1986; Bernthal 1997; Gracyk et al. 2003).

Minnesota has more surface waters than any other of the 48 contiguous states and good water quality is critical to the tax base and economic assets of the state (Minnesota PCA 2007). Water clarity is strongly related to the price people are willing to pay for lakefront property. One study in the lakes area shows that a 3-foot increase in water clarity has an economic worth of \$50 per foot for lake frontage, or about \$5,000 for a typical 100-foot lot (Krysel et al. 2003). People are willing to pay more to live on a lake that is protected from degradation and is lightly developed.

The lakes area of Minnesota has experienced a rate of growth that was twice the statewide average between 1990 and 2000. During the late 1970s and 1980s the trend was to convert seasonal lakeshore dwellings into year-round lake homes. Now, with the advent of the Internet and a diverse economy, many people are able to work and live in lake districts across the state. As a result, there are an ever-increasing number of large modern homes being built on lakes. Statewide development appears to be increasing at an average rate of over 4,000 homes per year (Cohen and Stinchfield 1984; Minnesota DNR 1989). The DNR estimate for total lakeshore dwelling in 2004 was about 225,000 residences for all lakes in the state (Minnesota DNR 1989).

Water quality is strongly related to the price people are willing to pay for lakefront property. Studies show that there is a direct positive correlation between water clarity and market value of shoreland properties in Maine, Vermont, New Hampshire, and Minnesota (Dzuik 2005; Michael et al. 1996). People are also willing to pay more for property on a lake protected from degradation and poor development. Shoreland zoning restrictions increased the value of land on lakeshores from 13 to 24% in Vilas County, Wisconsin (Schnaiberg et al. 2002).

Shoreline development regulations tend to be most restrictive on natural development lakes and least restrictive on General Development Lakes. In 2003, mean development density was 4.0 homes per mile for natural development lakes, 11.2 homes per mile for recreational development lakes, and 18.5 homes per mile for general development lakes. The Brainerd lakes area is one of the nation's fastest growing micropolitans (4th fastest growing mini metro area in the Midwest and 28th nationally; U.S. Census Bureau 2005).

Protecting lakes contributes to broad-scale economic benefits. Tourism in Minnesota's central lakes region is largely based on water resources. Clean water and lakes draws visitors and is important for quality of life for local residents. The value of Minnesota lakes to local economies was estimated to be \$506 - \$830 per lake acre (in 1985 dollars) from fishing, lodging, and other recreation related activities (Todd 1990).

With today's economic and development trends, shoreland owners feel increasing pressure to sell their land. Small resort owners, nonprofits camps, forest land owners, family estates and mining companies are all pressured by the changing economy, growing populations, and interest in developing shorelands for second and new dwellings. How we respond to these trends today will have huge cultural, ecological, and economic impacts for future generations of Minnesotans.

It is of critical importance to better protect our lakes for there are no new glaciated lakes being formed. Our lakes are aging, being degraded by human impacts, and are gradually losing their recreational and intrinsic values. We need to take care not to accelerate the aging process by taking better care of our lakes and streams now.

Obviously the pressure on aquatic resources in Minnesota is huge and complex. A multi-faceted approach is needed; including education, stringent shoreland regulations, better private management of shoreland habitat, and permanent protection through public acquisition and easements. Strides are being made at all fronts, but time is running out. After shorelands are developed, most opportunities for permanent protection and public access are lost. Public opinion surveys show that Minnesotans rank protection of surface water as their top environmental priority (Minnesota PCA 2007).

National and State Focus on Clean Water

There are several important national and statewide efforts in place to protect and restore Minnesota's aquatic resources. Congress passed the **Clean Water Act** in 1972 to protect and restore water quality and to ensure it is safe for swimming and fishing. Water testing shows that pollutants contaminate an unacceptable number of our lakes and rivers (40% of those tested). Congress takes this threat seriously and has provided substantial funding to help reverse this trend.

Despite decades of progress in cleaning up water pollution, hundreds of Minnesota's lakes, rivers and streams are still not healthy enough for people to use safely and enjoy (Figure 2). These "impaired" waters do not meet water-quality standards and pose risks to people, aquatic life, and recreation. They can contain too much sediment, bacteria, mercury, phosphorus, and other contaminants.

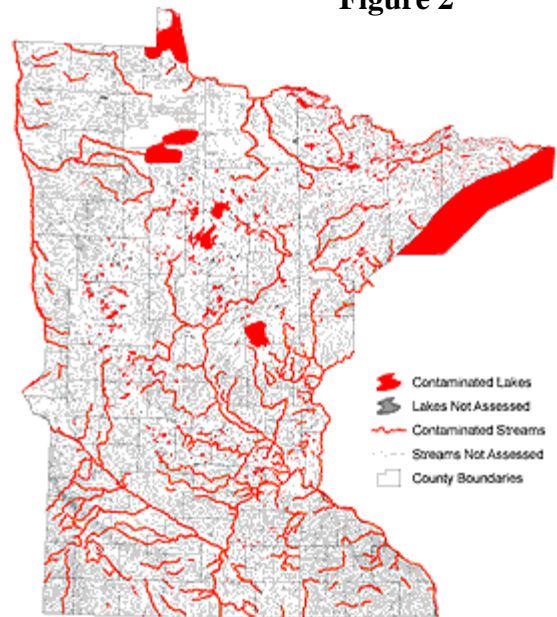
The **Conservation Reserve Program (CRP)** is an easement program established in 1986 by the federal Farm Bill to keep certain marginal agricultural lands out of crop production, to protect soil and water quality, and to support fish and wildlife habitat. Since establishment, the program has enrolled in Minnesota 4,798 easements on 178,872 acres to protect highly erodible cropland and restore wetland basins. Increases in corn prices tend to reduce incentives for additional CRP enrollment.

The 2002 Farm Bill established the **Conservation Reserve Enhancement Program (CREP)**, an offshoot of CRP, to permanently protect environmentally sensitive cropland. Since its inception, 100,000 acres have been enrolled along in the Minnesota River Watershed and another 100,000 combined acres are targeted for CREP 2 in the Red River, Upper Mississippi, and Missouri Watersheds.

There is continued work to update shoreland development standards. Currently a great amount of work has gone into developing **Alternative Shoreland Management Standards** as part of the Clean Water Initiative. They have been designed to

1. provide guidance for the wise development of shorelands of public waters and thus preserve and enhance the quality of surface waters;
2. preserve the economic and natural environmental values of shorelands; and
3. provide for the wise use of water and related land resources of the state.

Figure 2



The Relationship Between Clean Water and Shoreland Habitat

Even more efforts need to be taken to protect Minnesota's lakes, rivers, and streams. DNR's Fish and Wildlife **Aquatic Management Area (AMA)** program supports all of these other programs by providing a mechanism to permanently protect and restore shoreline habitat, which is not only critical for the general health of aquatic systems, but also for sustainable fish and wildlife habitats and populations.

The near shore, riparian areas adjacent to lakes and rivers are considered one of the richest zones for aquatic organisms, mammals, and birds. (Castelle et al. 1992). This area has an overlap of ecological zones between upland and aquatic habitats where species from both zones live. A 2003 study found that the amount of natural vegetated buffer along trout streams was an important variable for high stream quality and condition, and they conclude that buffers help ameliorate some of the negative effects of urban development (Wang et al. 2003). Emergent aquatic vegetation is particularly effective in tying up and removing pollutants from the water (Dennison and Tilton 1993).

There is a definitive link between fish assemblages and impervious surface cover. Sedimentation and toxic pollutant runoff to streams and lakes increases with imperviousness, which reduces fish reproductive success and survival. In addition, increased imperviousness results in increased stream water temperatures and reduced base flow. Increases in imperviousness also affect species richness. In Minnesota and Wisconsin, trout streams degraded quickly when 6 to 11 percent of the watershed was impervious, demonstrating how even low levels of urban development can damage these streams (Wang et al. 2001).

According to a recent survey, most respondents felt that the lake environment on their favorite lakes was getting worse rather than better. Fishing, scenic quality, water quality, and the condition of the shoreline was rated as only "fair to poor" (Anderson et al. 1999). Fish and wildlife diversity is a clear indicator of habitat quality and clean water; in fact, there are clearly direct links between shoreline habitat and clean water.

Many chemicals easily adsorb or attach to individual sediment particles. Eroded particles frequently carry pollutants and nutrients, such as nitrogen and phosphorus, into lakes and streams. In addition, the sediment itself can be a pollutant, since it can impair the feeding and reproduction of many forms of aquatic life. Buffers act as filters by reducing the amount of sediment reaching the water.

Aquatic Management Areas (AMA's)

Fishing is a key component of Minnesota's tourism industry. The demand for shoreline property is high, and riparian areas are rapidly being developed. As part of the Outdoor Recreation Program, Fisheries' acquisition of riparian parcels called Aquatic Management Areas (AMAs) ensures that critical fish and wildlife habitats will be conserved, non-motorized public access to water resources will always be available, and habitat development on previously disturbed areas can take place. Acquisition of AMAs is a critical step towards maintaining Minnesota's reputation for providing excellent fishing opportunities and an outstanding quality of life for those who visit and live here.

The AMA program, created by the 1992 Legislature as part of the Outdoor Recreation Act, administers hundreds of shoreland miles on lakes and streams across Minnesota. The program provides angler and management access, protects critical shoreland habitat, and provides areas for education and research.

Current MN Statute and Rule recognizes that AMA acquisition requires a two-pronged approach. One approach is for trout-stream angling and management access in the form of permanent easements. This does not preclude however, fee title acquisition on trout streams. The other approach is for lakes and warmwater streams in the form of fee title acquisition, permanent access easement, and conservation easement. These two approaches to acquisition require two different geographic emphases. Minnesota trout streams are located mainly along the North Shore of Lake Superior and in the southeast counties of Minnesota. Lake resources in greatest need of protection are concentrated in the central portion of the state.

Recent Fisheries Acquisition Spending Plans (Fiscal Years 2006–2008) set strategic goals for both types of acquisition.

- Trout Streams—continue to acquire permanent management and angling easements on Minnesota's designated trout streams as management needs develop, as opportunities to make connections in angler corridors develop, and as annual funding allows.
- Continue to acquire appropriate fee title and conservation easements on lakes and warmwater streams whenever non-motorized public access to water resources is available, as parcels with critical habitat become available, as partnership opportunities arise, and as annual funding allows.

Statutes & Rules

A number of Statutes and Rules are in place to provide initial guidance for acquiring AMAs (see Appendix A). The lands that are acquired may be developed to manage lakes, rivers, streams, adjacent wetlands, and lands for aquatic life, water quality, intrinsic biological value, public fishing, and other compatible outdoor recreational uses.

- **MS 86A.05** Establishes Aquatic Management Areas as part of Minnesota's Outdoor Recreation System
- **MS 97C.02** Provides the authority to purchase and designate lands as AMAs
- **MS 84.0272** Describes the procedure for acquiring AMAs
- **MR 6270.0100** AMA Definitions
- **MR 6270.0200** Describes uses and types of AMAs
- **MR 6136.0700** Describes priorities for acquisition and further describes critical natural habitat

Acquisition Index

The challenge before this Committee was to consider both the threats facing Minnesota’s streams, rivers, and lakes and the needs for better protection of these precious resources. To that end, the Committee developed a model for considering threats and needs for each of the Ecological Classification System (ECS) Sections (see Figure 3). ECS Sections were used because these areas share common geological, ecological, and human use features.

Five trends or characteristics were used to identify AMA acquisition needs in the state. These trends or characteristics were standardized so that the sections could be compared and these factors were weighted equally to create an “index” (see Figure 4). The purpose of this index was to assist the Committee with identifying priority needs. After reviewing these trends, characteristics, and the final index of need, one can conclude that the need for better protection exists statewide with some areas of the state having greater needs than others.

Trend 1. Human demographics

The State Demographers Office projects Minnesota’s human population to increase by 22% between 2000 and 2030. The trend of current and projected population growth was characterized by developing a score for year 2000 populations for each section and a second score for projected population growth. These scores were standardized by section area. The average of these two scores resulted in a single score for each ECS Section (see Table 1).

Trend 2. Water access

Minnesotans have recreational access to public waters through public accesses. These are typically located on township, city, county, or state lands on streams, rivers, and lakes. This trend was characterized with a score based on the number of public access points per mile of shoreline for each ECS Section.

Figure 3

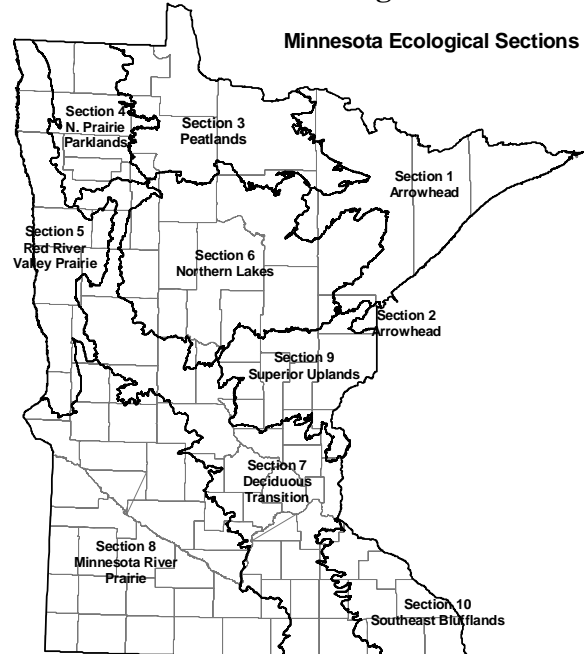
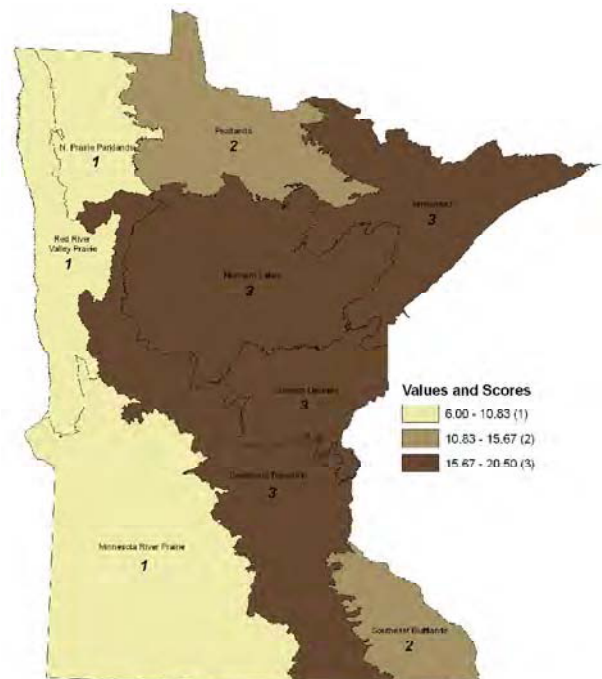


Figure 4 Acquisition Index by Ecological Classification



Trend 3. Watersheds

The Public Waters Inventory includes all basins, generally over 10 acres that have been assigned Division of Waters (DOW) numbers. In addition to this group, there are numerous smaller, but significant, ponds with potentially fishable resources. These two groups of water basins have been combined into a database called lakes and ponds. This trend or factor was characterized by calculating the number of basin acres per ECS Section acre and scoring accordingly.

Trend 4. Environmental

Environmental values of Minnesota’s streams, rivers, and lakes can be characterized by the number of aquatic features listed in the Natural Heritage database maintained by DNR Ecological Resources. This trend was characterized by calculating the number of aquatic features identified per ECS Section acre and scoring.

Trend 5. Game fish

DNR Fisheries manages game-fish populations based on recent fish inventories from stream, river, and lakes. This trend was characterized by calculating the number of unique fish species per inventoried basin acre and scoring.

To determine the score for each trend, the range of values was divided into five classes using the “Equal Interval” classification method in ArcMap. The Equal Interval Classification divides the total range of feature values, from minimum to maximum, into five equal subranges. Each subrange was then given a score of 1–5, with 5 indicating the highest need for additional acquisition. The comparative score is derived by setting “equal intervals” for the Section Totals with a scoring of “3” for the highest priority sections, “2” for high priority sections, and “1” for priority sections based solely on the five studied trends.

Table 1. Summary of trend scores for AMA acquisition index

	Sec 1& 2	Sec 3	Sec 4	Sec 5	Sec 6	Sec 7	Sec 8	Sec 9	Sec 10
	Arrowhead	Peatlands	Northern Prairie Parklands	Red River Valley Prairie	Northern Lakes	Deciduous Transition	Minnesota River Prairie	Superior Uplands	Southeast Blufflands
Population Change	1.5	2.0	1.0	1.0	3.0	4.5	1.0	3.0	2.5
Public Accesses	3.0	2.0	1.0	1.0	5.0	5.0	2.0	4.0	2.0
Lake & Pond Acreage	4.0	5.0	1.0	1.0	4.0	3.0	2.0	3.0	1.0
Natural Heritage Features	3.0	1.0	2.0	1.0	3.0	3.0	1.0	3.0	5.0
Fish Species	5.0	3.0	1.0	2.0	5.0	5.0	4.0	4.0	4.0
Section Total	16.5	13.0	6.0	6.0	20.0	20.5	10.0	17.0	14.5
Comparative Score	3	2	1	1	3	3	1	3	2

Statewide Recommendations

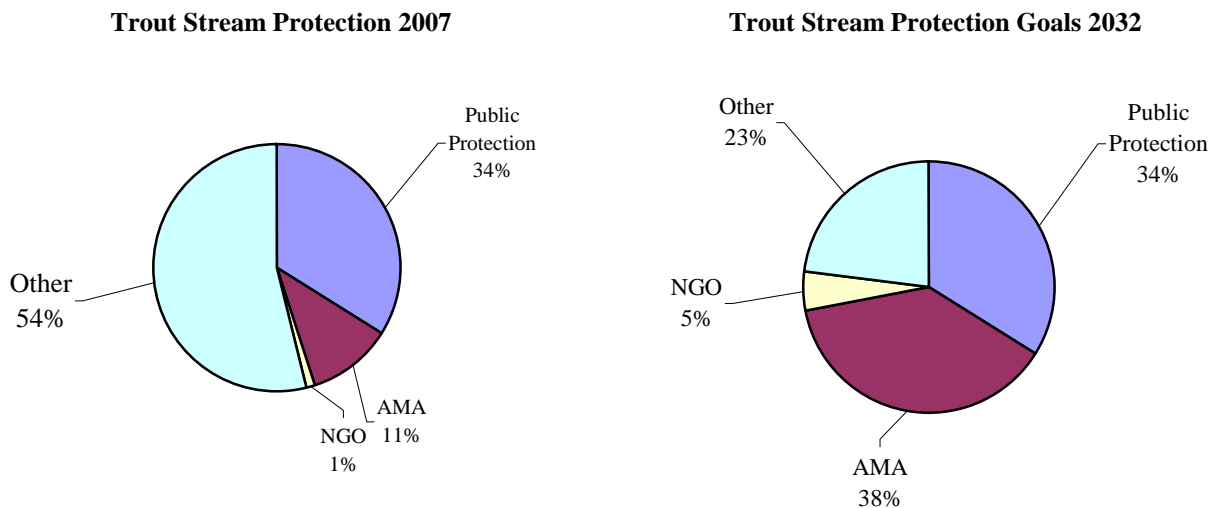
The Committee recognizes that the need to protect and better manage aquatic resources in Minnesota is huge. Public ownership and protection of these resources is currently accomplished through state ownership (AMAs, state parks, wildlife management areas, state forests, Board of Water and Soil RIM easements), federal ownership (USFWS easements, U.S. Forest Service lands), and local government units (Metropolitan Council, county and municipal parks, watershed districts, lake improvement districts) employing fee title acquisition and conservation easements. A holistic and comprehensive approach is needed using a suite of tools including best management practice (BMP) guidelines, shoreland regulations and incentives, zoning ordinances, conservation development, technical guidance for lakeshore owners, expansion of “lake improvement districts” and lake associations, donation of lands, expanded acquisition of fee title and conservation easements by non-profits. We need to refine and expand these tools by looking for new funding and partnership opportunities (state wildlife grants, revised estate tax structures, etc.). Our future tools need to be complimentary and must reflect the broad range of interests in shoreland protection and management.

Aquatic Management Area acquisitions continue to provide a critical foundation for shoreland protection and management while providing public access to Minnesotans who fish, boat, observe wildlife, and recreate on this state’s waters. The following goals and visions should be considered “floating caps” so that as new and progressive funding opportunities are created these goals and visions can not only be met but ideally exceeded by 2032.

The following goals for public protection of Minnesota’s critical aquatic resources and visions for the Aquatic Management Area system are based on this Committee’s opinions and reactions to the growing trends impacting our state’s finite precious resources. Goals and visions are considered separately for cold-water trout streams and lakes and warm-water streams. Both cold-water and warm-water systems are under increasing pressures and threats and are best considered separately. These goals are based on the assumption that there will be no loss of shoreland that is currently under public protection.

Trout Stream Habitat Recommendations

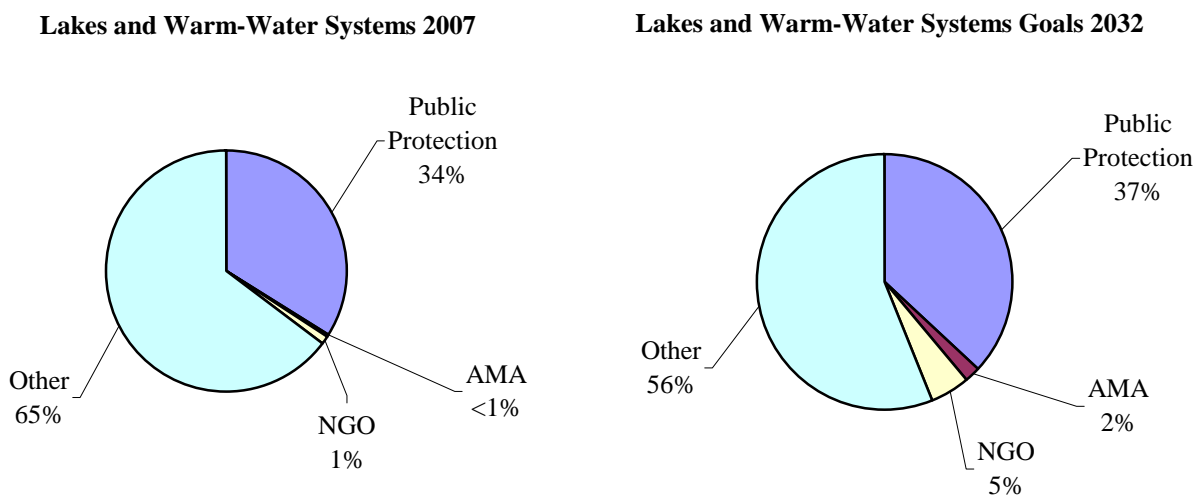
1. The statewide goal for protection of Minnesota’s 5,508 miles of coldwater stream habitat through public ownership or easement should increase from the current 46% to 72 % by 2032. These public lands include federal, state, county, and municipal ownership or easement. To achieve this goal, the vision for the AMA Acquisition program is to acquire 1,500 miles of cold-water stream easement or fee title in the next 25 years from willing sellers to provide sustainable populations of trout and greater opportunities for angling recreation for future generations. This vision would increase the portion of cold-water designated trout streams protected as AMAs from 11% (618 miles) in 2007 to 38% (2,118 miles) by 2032.



2. Acquisitions should be concentrated in the southeast and northeast portions of the state where development and land use pressures, habitat fragmentation, and increased demand for outdoor recreation continue to expand.
3. AMA acquisitions will include primarily angler access/DNR management easements but will also include fee title acquisitions depending on the specific properties and sellers’ interests.
4. Due to increasing land costs and habitat loss, acquisition efforts should be accelerated over the next ten years by purchasing approximately 66% of the 25 year long-term goal or 1,000 miles in ten years at a rate of 100 miles per year. This may require approximately \$10 million per year from 2008 – 2017 and \$3.3 million per year between 2018 – 2032.
5. This vision would increase trout stream AMAs from the current 7.5 inches of shoreland for each of Minnesota’s 5.1 million citizens (2007) to approximately 21 inches for each of Minnesota’s projected 6.3 million citizens (2030). Accessibility for Minnesota’s growing urban populations would be tremendously increased.

Lake and Warm-Water Stream and Rivers Recommendations

- The statewide goal for protection of Minnesota’s 64,077 miles of lake and warmwater stream and river shorelands through public ownership should increase from the current 34% to 39 % by 2032. These public lands include federal, state, county, and municipal ownership. To achieve this goal, the vision for the AMA Acquisition program is to acquire 1,100 miles of lake and warm-water stream habitat in the next 25 years from willing sellers to provide sustainable populations of fish and other aquatic species and greater opportunities for angling recreation for future generations. This vision would increase the portion of lake and warm-water streams and rivers protected as AMAs from 0.3% (216 miles) in 2007 to 2% (1,316 miles) by 2032.



- Acquisitions should be concentrated in the north central lakes and transition area between the prairie/grassland and forested portions of the state where development and land use pressures, habitat fragmentation, and increased demand for water based outdoor recreation continue to expand.
- AMA acquisitions will include primarily fee title acquisitions but will also include permanent conservation easements depending on the specific properties and sellers’ interests.
- Due to increasing land costs and habitat loss, acquisition efforts should be accelerated over the next ten years by purchasing approximately 70% of the 25 year long-term goal or 750 miles in ten years at a rate of approximately 75 miles per year. This may require approximately \$25 million per year from 2008–2017 and \$7.7 million per year between 2018–2032.
- This vision would increase warm-water AMAs from the current 2.6 inches of shoreland for each of Minnesota’s 5.1 million citizens (2007) to approximately 13 inches for each of Minnesota’s projected 6.3 million citizens (2030). Accessibility for Minnesota’s growing urban populations would be tremendously increased.

Regional Recommendations

Regional acquisition recommendations are described for each Ecological Classification System (ECS) section in Table 2. Each ECS section is profiled in this portion of the report as well describing the characteristic and unique soils, climate, and vegetation that provide varied recreational opportunities. An ecological perspective of the landscape is influencing much of DNR’s current management activities. Sections 1 and 2 are combined because of the small size of Section 2 and because it has many of the same attributes of Section 1.

Each section write-up is self-contained and describes the focus, goals, needs, recommendations, and justifications of the individual sections.

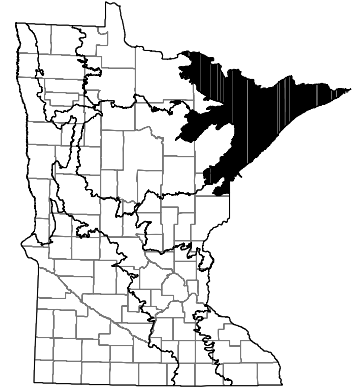
While trend scores found in Table 1 provide overall guidance for acquisition, there are unmeasured factors that provide additional guidance, such as “no-net-gain” policies for additional public land in some counties, abundance of shallow wildlife lakes vs. fishing lakes, abundance of “winterkill” lakes, regions where public protection is already significant, and regions that have few lakes to begin with. These additional considerations apply more to the lakes and warmwater stream portion than the trout stream portion and add a measure of reality to decision making.

Table 2. Regional Accelerated and Long-term AMA Acquisition Recommendations

	Sec 1 & 2	Sec 3	Sec 4	Sec 5	Sec 6	Sec 7	Sec 8	Sec 9	Sec 10	Totals
	Arrowhead	Peatlands	Northern Prairie Parklands	Red River Valley/Prairie	Northern Lakes	Deciduous Transition	Minnesota River/Prairie	Superior Uplands	Southeast Blufflands	
Acquisition Index	3	2	1	1	3	3	1	3	2	
Acquisition Index Targets	16%	11%	5%	5%	16%	16%	5%	16%	11%	100%
Proportion of Trout Streams Not Protected Through Public Ownership (2007)	41%	2%	0%	1%	11%	9%	3%	7%	26%	100%
Trout Stream Short-Term/Accelerated Annual Goals Based on Proportions of Unprotected Shoreland (miles/year for 2008–2017)	41	2	0	1	11	9	3	7	26	100
Lake and Warm-Water Stream Short-Term/Accelerated Annual Goals Based on Acquisition Index (miles/year for 2008–2017)	4	2	2	4	23	21	5	10	4	75
Trout Stream Long-Term Annual Goals Based on Proportions of Unprotected Shoreland (miles/year for 2018-2032)	12	1	0	0	4	3	1	2	10	33
Lake and Warm-Water Stream Long-Term Annual Goals Based on Acquisition Index (miles/year for 2018-2032)	1	1	1	1	7	6	2	3	1	23
AMA Acquisition Vision Total (total miles 2008-2032)	645	70	35	65	500	444	125	245	465	2,595

Aquatic Management Area Acquisition – Regional Recommendations Ecological Sections 1 & 2, Arrowhead

GENERAL DESCRIPTION: The Arrowhead section contains large areas of exposed bedrock, or shallow, fragile soils over bedrock. Lakes are present in large numbers. The entire Boundary Waters Canoe Area Wilderness is located within this section. Pre-settlement vegetation consists largely of coniferous upland species such as white pine, red pine, and jack pine. Topography is varied, ranging from level to steep. Landform consists of ground and end moraines, characterized by glacial till over bedrock and exposed bedrock.



AQUATIC SYSTEMS/WATERSHEDS: Fishing lake and stream types include Soft-water Walleye, Hard-water Walleye, Trout streams along the north shore of Lake Superior, and Heritage Lake Trout within Lake Superior. This Ecological Section is located within the Rainy River and Lake Superior drainage basins.

LAND USES: Dominated by forest and mining industries, recreation (hunting, fishing, boating, snowmobiling), and tourism. Seasonal housing on lakes and streams is increasing.

MAJOR POPULATION CENTERS: Duluth, Cloquet, Hibbing, Virginia, Ely, Silver Bay, Two Harbors, and Grand Marais.

SHORELAND CHARACTERISTICS:

Arrowhead 5,970,688 acres	Lake & Warmwater Streams	Trout Streams	Totals	Acquisition Index Score
Shoreline miles in section	14,593	3,128	17,721	
AMA protection (miles)	16	274	290	
Estimated other public protection (miles)	10,709	1,902	12,611	
Protected waters (acres)	NA	NA	554,457	
Percent PWI acres of section acres	NA	NA	0.091	4.0
Number of Public Accesses in section	NA	NA	472	
Number of Public Accesses per mile of shoreline	NA	NA	0.027	3.0
Population per acre	NA	NA	0.04	
Projected % Population Change (2000 – 2030)	NA	NA	+12.2	1.5
Natural Heritage Aquatic Features / Mile ²	NA	NA	0.16	3.0
Number of Fish Species Present	NA	NA	93	5.0
Acquisition Index				16.5

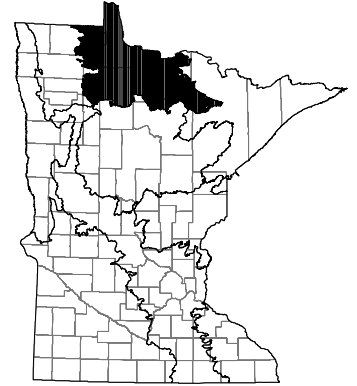
AMA LAND ACQUISITION NEEDS – ARROWHEAD

There is a significant amount of land already under public protection in this area and Counties are not eager to see more publicly owned land. Indices for both Natural Heritage features and fish species are high. This section is rich in designated trout streams, particularly along the North Shore of Lake Superior where most land still remains in private ownership.

The recreational demand on this area of the state will likely outpace the projected population change and additional public access to streams is a priority. Permanent angling and management easements, while maintaining private ownership, draw anglers to the area, bring additional dollars into the local economy, and provide the inroad to create permanent protection to shoreline habitat, which insures clean water for future generations. Additional lake and warmwater stream shoreline should still be acquired when extraordinary opportunities arise and County approval is obtained. There may be opportunities for Non-Government Organizations to acquire critical shoreline parcels in this area, to either be managed by them or turned over to the DNR as AMAs or other Outdoor Recreation Units.

Aquatic Management Area Acquisition – Regional Recommendations Ecological Section 3, Peatlands

GENERAL DESCRIPTION: This section consists of lowland bog dominated by spruce and tamarack to the west and an upland transition zone into the Canadian Shield on the east side. Pre-settlement vegetation consisted of forested and non-forested bog and mixed hardwood-conifer. Topography is level to gently rolling. Much of this section is located on the ancient bed of Glacial Lake Agassiz.



AQUATIC SYSTEMS/WATERSHEDS: Fishing lake classification is primarily Hard-water Walleye. Most of this Ecological Section is located in the Rainy River Drainage, with a small part located in the Red River Drainage. Both Lake of the Woods and Red Lake are located in this section.

LAND USES: Low productivity forest and farming on the western side, and recreation are the predominant land uses. Seasonal housing on lakes and streams is increasing.

MAJOR POPULATION CENTERS: International Falls, Baudette, Warroad, and Big Foot.

SHORELAND CHARACTERISTICS:

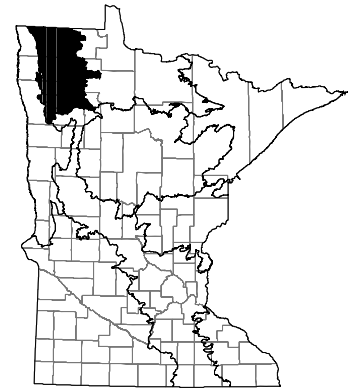
Peatlands 5,304,675 acres	Lake & Warmwater Streams	Trout Streams	Totals	Acquisition Index Score
Shoreline miles in section	3,659	161	3,820	
AMA protection (miles)	1	8	9	
Estimated other public protection (miles)	1,669	98	1,767	
Protected waters (acres)	NA	NA	604,952	
Percent PWI acres of section acres	NA	NA	0.114	5.0
Number of Public Accesses in section	NA	NA	61	
Number of Public Accesses per mile of shoreline	NA	NA	0.012	2.0
Population per acre	NA	NA	0.01	
Projected % Population Change (2000 – 2030)	NA	NA	+24.4	2.0
Natural Heritage Aquatic Features / Mile ²	NA	NA	0.06	1.0
Number of Fish Species Present	NA	NA	60	3.0
Acquisition Index				13.0

AMA LAND ACQUISITION NEEDS – PEATLANDS

There is a significant amount of land already under public protection in this area and some Counties are not eager to see more publicly owned land. Lake and warmwater stream protection is relatively low. With the exception of Lake of the Woods and Red Lake, the majority of lakes in this section are relatively small, shallow lakes - most suitable for wildlife. The index for Natural Heritage features is low in comparison with most other sections and the index for number of fish species is moderate. Of the 161 miles of trout stream, 53% is already protected. The recreational demand on this area of the state will likely outpace the projected population change and additional public access to fishing lakes and streams is a priority. Permanent angling and management easements on streams, while maintaining private ownership, draw anglers to the area, bring additional dollars into the local economy, and provide the inroad to create permanent protection to shoreline habitat, which insures clean water for future generations. Additional lake and warmwater stream shoreline should still be acquired when extraordinary opportunities arise and County approval is obtained. There may be opportunities for Non-Government Organizations to acquire critical shoreline parcels in this area, to either be managed by them or turned over to the DNR as AMAs or other Outdoor Recreation Units.

Aquatic Management Area Acquisition – Regional Recommendations Ecological Section 4, Northern Prairie Parklands

GENERAL DESCRIPTION: This section includes the transition zone between prairie and forest areas in the northern part of the state. This transition zone continues to the northwest through portions of Manitoba, Saskatchewan, and Alberta, and also to the southeast through the rest of Minnesota and into Wisconsin. Aspen is the primary hardwood. This section is located on the ancient bed of Glacial Lake Agassiz.



AQUATIC SYSTEMS/WATERSHEDS: Fishing lake classification is primarily Hard-water Walleye, with some Prairie Lakes on the western edge. This Ecological Section is located entirely within the Red River drainage. There are no major lakes.

LAND USES: Primarily agriculture with some forestry activities. There are large areas of varying types of public land holdings.

MAJOR POPULATION CENTERS: Small towns such as Thief River Falls, Red Lake Falls, Roseau, Karlstad, Plummer, and Greenbush provide services. No large populations centers exist.

SHORELAND CHARACTERISTICS:

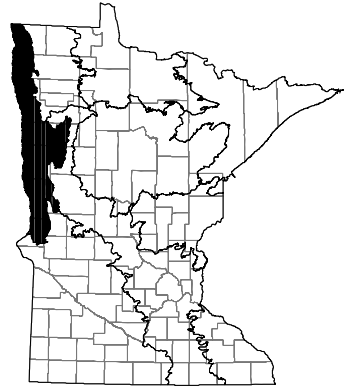
Northern Prairie Parklands 2,907,589 acres	Lake & Warmwater Streams	Trout Streams	Totals	Acquisition Index Score
Shoreline miles in section	972	0	972	
AMA protection (miles)	0	0	0	
Estimated other public protection (miles)	302	0	302	
Protected waters (acres)	NA	NA	23,392	
Percent PWI acres of section acres	NA	NA	0.008	1.0
Number of Public Accesses in section	NA	NA	17	
Number of Public Accesses per mile of shoreline	NA	NA	0.007	1.0
Population per acre	NA	NA	0.02	
Projected % Population Change (2000 – 2030)	NA	NA	+5.8	1.0
Natural Heritage Aquatic Features / Mile ²	NA	NA	0.09	2.0
Number of Fish Species Present	NA	NA	21	1.0
Acquisition Index				6.0

AMA LAND ACQUISITION NEEDS – NORTHERN PRAIRIE PARKLANDS

There is a significant amount of land already under public protection in this area and some Counties are not eager to see more publicly owned land. There are no designated trout streams. The majority of lakes in this section are relatively small, shallow lakes - most suitable for wildlife. The index for Natural Heritage features is moderate in comparison with most other sections and the index for number of fish species is low. The recreational demand on this area of the state will likely outpace the projected population change. Additional lake and warmwater stream shoreline should still be acquired when extraordinary opportunities arise and County approval is obtained. There may be opportunities for Non-Government Organizations to acquire critical shoreline parcels in this area, to either be managed by them or turned over to the DNR as AMAs or other Outdoor Recreation Units.

Aquatic Management Area Acquisition – Regional Recommendations Ecological Section 5, Red River Valley Prairie

GENERAL DESCRIPTION: This section includes the northern portion of the tall grass prairie area in Minnesota. It is separate from the southern portion due to a shorter growing season. Topography is level to gently rolling. This section is located on the southern extent of the ancient bed of Glacial Lake Agassiz.



AQUATIC SYSTEMS/WATERSHEDS: Fishing lake classification is primarily Prairie Lakes, with some Bass Panfish Lakes on the southeast edge. This system is located entirely within the Red River drainage area. There are no major lakes in this section.

LAND USES: Primarily intensive agriculture of sugar beets, potato, wheat, sunflower, and other specialty crops. Recreation is winter snowmobiling, bird watching, summer fishing, and fall hunting.

MAJOR POPULATION CENTERS: Crookston, Thief River Falls, Moorhead, and Breckenridge.

SHORELAND CHARACTERISTICS

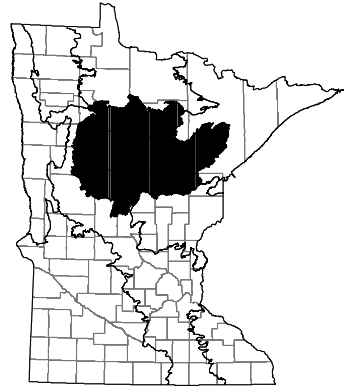
Red River Valley Prairie 3,950,521 acres	Lake & Warmwater Streams	Trout Streams	Totals	Acquisition Index Score
Shoreline miles in section	2,313	22	2,335	
AMA protection (miles)	2	0	2	
Estimated other public protection (miles)	140	3	143	
Protected waters (acres)	NA	NA	24,549	
Percent PWI acres of section acres	NA	NA	0.006	1.0
Number of Public Accesses in section	NA	NA	25	
Number of Public Accesses per mile of shoreline	NA	NA	0.005	1.0
Population per acre	NA	NA	0.03	
Projected % Population Change (2000 – 2030)	NA	NA	+2.2	1.0
Natural Heritage Aquatic Features / Mile ²	NA	NA	0.05	1.0
Number of Fish Species Present	NA	NA	32	2.0
Acquisition Index				6.0

AMA LAND ACQUISITION NEEDS – RED RIVER VALLEY PRAIRIE

There is a moderate amount of land already under public protection in this area and some of the northern Counties are not eager to see more publicly owned land. There are few designated trout streams. The majority of lakes in this section are relatively small, shallow lakes - most suitable for wildlife. The index for Natural Heritage features is low in comparison with most other sections and the index for number of fish species is moderate. The recreational demand on this area of the state will likely outpace the projected population change and additional public access to fishing lakes and streams is a priority. Permanent angling and management easements on streams, while maintaining private ownership, draw anglers to the area, bring additional dollars into the local economy, and provide the inroad to create permanent protection to shoreline habitat, which insures clean water for future generations. Additional lake and warmwater shoreline should still be acquired when extraordinary opportunities arise and County approval is obtained. There may be opportunities for Non-Government Organizations to acquire critical shoreline parcels in this area, to either be managed by them or turned over to the DNR as AMAs or other Outdoor Recreation Units.

Aquatic Management Area Acquisition – Regional Recommendations Ecological Section 6, Northern Lakes

GENERAL DESCRIPTION: This section is located in north central Minnesota. Pre-settlement vegetation was primarily forest. Predominate species are conifers (white pine, red pine, and jack pine) and hardwoods (aspen, birch, and mixed oak). Topography varies from level to rolling. Landforms include end and ground moraines, outwash plains, lake plains, and drumlin fields.



AQUATIC SYSTEMS/WATERSHEDS: Fishing lake classification is primarily Hard-water Walleye lakes, with some Bass Panfish lakes on the Southern edge. This system is located mostly in the Upper Mississippi Drainage, with a small part in the Lake Superior Drainage area. Cass, Winnibigoshish, Leech, Woman, Ten Mile, Cross, Gull, and Big Sandy Lakes are located in this Section.

LAND USES: Agriculture is the primary use to the south and west, changing to tourism and recreational uses of the forested areas to the north and east. Recreation is winter snowmobiling, bird watching, fishing, boating, and hunting. Seasonal housing on lakes is increasing dramatically.

MAJOR POPULATION CENTERS: Aitkin, Grand Rapids, Baxter, Walker, Bemidji, Detroit Lakes, Park Rapids, Wadena, and Staples.

SHORELAND CHARACTERISTICS:

Northern Lakes 8,390,291 acres	Lake & Warmwater Streams	Trout Streams	Totals	Acquisition Index Score
Shoreline miles in section	14,094	574	14,668	
AMA protection (miles)	63	107	170	
Estimated other public protection (miles)	5,383	225	5,608	
Protected waters (acres)	NA	NA	728,496	
Percent PWI acres of section acres	NA	NA	0.087	4.0
Number of Public Accesses in section	NA	NA	948	
Number of Public Accesses per mile of shoreline	NA	NA	0.060	5.0
Population per acre	NA	NA	0.03	
Projected % Population Change (2000 – 2030)	NA	NA	+44.1	3.0
Natural Heritage Aquatic Features / Mile ²	NA	NA	0.18	3.0
Number of Fish Species Present	NA	NA	88	5.0
Acquisition Index				20.0

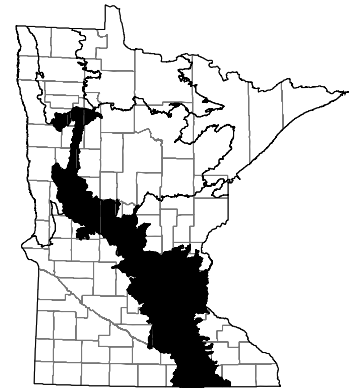
AMA LAND ACQUISITION NEEDS – NORTHERN LAKES

There is a significant amount of land already under public protection in this area, but only a moderate amount of shoreline is protected. Much of the land that is under public protection in this area is in the form of CRP and CREP easements, which do not provide public access. There are also numerous WMAs and WPAs that do provide public access. There are a moderate number of designated trout streams in this section, with approximately half being protected. The majority of lakes in this section are suitable, not only as fishing lakes, but as places to build both permanent and seasonal homes. The index for Natural Heritage features is moderate in comparison with most other sections and the index for number of fish species is high.

The population of this area is projected to increase by nearly 45% by 2030. The recreational demand on this area of the state is high. As lakeshore property is developed, public access opportunities become more restricted and clean water issues begin to emerge. Permanent angling and management easements on trout streams, while maintaining private ownership, and provide the inroad to create permanent protection to shoreline habitat, which insures clean water for future generations. Additional lake and warmwater stream shoreline needs to be acquired to insure public walk-in access to favorite angling destinations and to insure that critical cleanwater habitat is preserved. There may be additional opportunities for Non-Government Organizations to acquire critical shoreline parcels in this area, to either be managed by them or turned over to the DNR as AMAs or other Outdoor Recreation Units.

Aquatic Management Area Acquisition – Regional Recommendations Ecological Section 7, Deciduous Transition

GENERAL DESCRIPTION: This section includes the transition zone between prairie and forest areas that stretches from the northwest, through central and southeast Minnesota. It includes areas of prairie, savanna, and hardwood forest. Landforms are diverse and include end moraines, ground moraines, outwash plains, and drumlin fields.



AQUATIC SYSTEMS/WATERSHEDS: Fishing lake classification is primarily Bass Panfish lakes, with some Prairie lakes along the southern edge. This system spreads across the Upper and Lower Mississippi River drainage areas, with a small part in the Minnesota River drainage area where it enters the Mississippi River. This section includes popular fishing destinations in the Detroit Lakes, Fergus Falls, Alexandria, Little Falls, Twin Cities, and Waterville areas.

LAND USES: Predominantly agriculture. Cities along transportation corridors are rapidly expanding to accommodate commuters. A vast majority of Minnesota’s population is located in this section.

MAJOR POPULATION CENTERS: St. Paul, Minneapolis, St. Cloud, Little Falls, Detroit Lakes, Mankato, Albert Lea, Austin, and Owatonna.

SHORELAND CHARACTERISTICS:

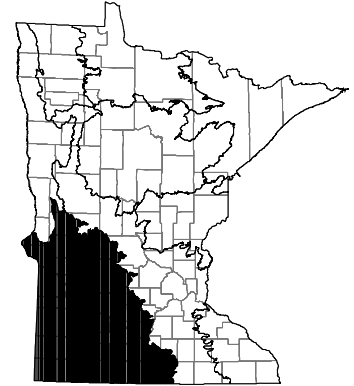
Deciduous Transition 9,191,829 acres	Lake & Warmwater Streams	Trout Streams	Totals	Acquisition Index Score
Shoreline miles in section	13,380	289	13,669	
AMA protection (miles)	84	15	99	
Estimated other public protection (miles)	1,118	27	1,145	
Protected waters (acres)	NA	NA	535,260	
Percent PWI acres of section acres	NA	NA	0.058	3.0
Number of Public Accesses in section	NA	NA	1,013	
Number of Public Accesses per mile of shoreline	NA	NA	0.050	5.0
Population per acre	NA	NA	0.37	
Projected % Population Change (2000 – 2030)	NA	NA	+30.7	4.5
Natural Heritage Aquatic Features / Mile ²	NA	NA	0.17	3.0
Number of Fish Species Present	NA	NA	107	5.0
Acquisition Index				20.5

AMA LAND ACQUISITION NEEDS – DECIDUOUS TRANSITION

There is not a significant amount of land under public protection in this area, and only 9% of the shoreline is under public protection. Most of the land that is under public protection in this area is in the form of CRP and CREP easements, which do not provide public access. There are also numerous WMAs and WPAs that do provide public access. There are a moderate number of designated trout streams in this section, with only about 12% being protected. The majority of lakes in this section are suitable, not only as fishing lakes, but as places to build both permanent and seasonal homes. The index for Natural Heritage features is moderate in comparison with most other sections and the index for number of fish species is high. The population of this area is projected to increase by over 30% by 2030. The recreational demand on this area of the state is high. As lakeshore property is developed, public access opportunities become more restricted and clean water issues begin to emerge. Permanent angling and management easements on trout streams, while maintaining private ownership, and provide the inroad to create permanent protection to shoreline habitat, which insures clean water for future generations. Additional lake and warmwater stream shoreline needs to be acquired to insure public walk-in access to favorite angling destinations and to insure that critical cleanwater habitat is preserved. There may be additional opportunities for Non-Government Organizations to acquire critical shoreline parcels in this area, to either be managed by them or turned over to the DNR as AMAs or other Outdoor Recreation Units.

Aquatic Management Area Acquisition – Regional Recommendations Ecological Section 8, Minnesota River Prairie

GENERAL DESCRIPTION: This section includes the southern portion of the tall grass prairie in Minnesota. Topography is rolling or flat. The “Prairie Coteau”, which stretches along the western part of this section, is up to 500 feet higher in elevation than the rest of the area.



AQUATIC SYSTEMS/WATERSHEDS: Fishing lake classification is split between Bass Panfish lakes to the northeast and Prairie lakes to the southwest. This section is located primarily in the Minnesota River Drainage, with the southwest corner located in the Missouri/Des Moines River drainage. This section includes popular fishing destinations in the Ortonville, Glenwood, Hutchinson, Fairmont, and Windom areas.

LAND USES: Mostly agriculture with a growing number of livestock confinement facilities. Agricultural services and small manufacturing dominate the population centers. Ethanol production is a rapidly growing industry in the area. Angling, pheasant, waterfowl, and deer hunting are major recreational activities in this section.

MAJOR POPULATION CENTERS: Willmar, Glenwood, Hutchinson, New Ulm, Fairmont, Windom, Worthington, Marshall, Ortonville, Luverne, and Pipestone.

SHORELAND CHARACTERISTICS

Minnesota River Prairie 12,146,197 acres	Lake & Warmwater Streams	Trout Streams	Totals	Acquisition Index Score
Shoreline miles in section	9,537	90	9,627	
AMA protection (miles)	24	5	29	
Estimated other public protection (miles)	1,007	13	1,020	
Protected waters (acres)	NA	NA	284,012	
Percent PWI acres of section acres	NA	NA	0.023	2.0
Number of Public Accesses in section	NA	NA	535	
Number of Public Accesses per mile of shoreline	NA	NA	0.023	2.0
Population per acre	NA	NA	0.04	
Projected % Population Change (2000 – 2030)	NA	NA	+2.2	1.0
Natural Heritage Aquatic Features / Mile ²	NA	NA	0.04	1.0
Number of Fish Species Present	NA	NA	77	4.0
Acquisition Index				10.0

AMA LAND ACQUISITION NEEDS – MINNESOTA RIVER PRAIRIE

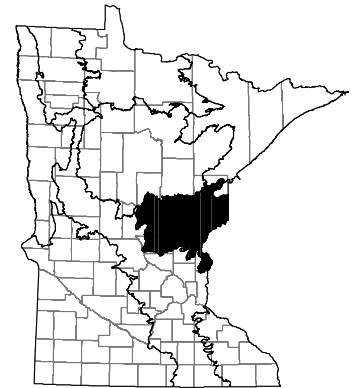
Most of the land that is under public protection in this area is in the form of CRP and CREP easements, which do not provide public access. There are also numerous WMAs and WPAs that do provide public access. Eleven percent of the shoreline in this section is under public protection. There are only a few designated trout streams in this section, however they do provide cold-water angling opportunities in a landscape predominated by shallow lakes. The majority of lakes in this section, especially south of the Minnesota River, are shallow, and experience periodic winterkills. Because of the periodic loss of fish due to low oxygen conditions that cause winterkill, there are numerous opportunities for boom and bust angling.

Because most of the lakes in this section are shallow and impacted by agricultural use, they do not have many of the qualities that are associated with “clean water”. Many of these lakes are not experiencing the heavy development that is occurring in other parts of the state. The population of this area is not projected to increase significantly by 2030.

The index for Natural Heritage aquatic features is low in comparison with most other sections and the index for number of fish species is relatively high. Most trout stream angling is put-and-take, with trout being stocked yearly. Permanent angling and management easements on the few existing designated trout streams, can provide unique angling opportunities. Trout stream easements, while maintaining private ownership, and provide the inroad to create permanent protection to shoreline habitat, which insures clean water for future generations. Additional lake and warmwater stream shoreline should be acquired to insure public walk-in access to favorite angling destinations and to insure that critical remaining clean-water habitat is preserved. There may be additional opportunities for Non-Government Organizations to acquire critical shoreline parcels in this area, to either be managed by them or turned over to the DNR as AMAs or other Outdoor Recreation Units.

Aquatic Management Area Acquisition – Regional Recommendations Ecological Section 9, Superior Uplands

GENERAL DESCRIPTION: The Superior Uplands section has landforms consisting of end and ground moraines, outwash plains, and drumlin fields. Pre-settlement vegetation was dominated by forest. Present species include white pine, red pine, jack pine, aspen, birch, red oak, basswood, and balsam fir.



AQUATIC SYSTEMS/WATERSHEDS: Fishing lake classification is mostly Hard-water Walleye Lakes, with some Trout Streams and Heritage Lake Trout to the northeast, and some Bass Panfish lakes in the western part. This section is located primarily in the St. Croix River Drainage, with the western part being in the Upper Mississippi River drainage and the northeast Corner being in the Lake Superior Drainage. Popular lakes in this section are Mille Lacs, Bay, Clearwater, Knife, Pokegama, and Center Lakes.

LAND USES: Land use is dominated by forestry and recreation. Angling; grouse, woodcock, and deer hunting are important recreational uses. Lake and wetland shore development is rapidly expanding.

MAJOR POPULATION CENTERS: Brainerd, Hinckley, and Mora.

SHORELAND CHARACTERISTICS:

Superior Uplands 3,501,513 acres	Lake & Warmwater Streams	Trout Streams	Totals	Acquisition Index Score
Shoreline miles in section	3,388	247	3,635	
AMA protection (miles)	24	12	36	
Estimated other public protection (miles)	651	62	713	
Protected waters (acres)	NA	NA	194,101	
Percent PWI acres of section acres	NA	NA	0.057	3.0
Number of Public Accesses in section	NA	NA	197	
Number of Public Accesses per mile of shoreline	NA	NA	0.036	4.0
Population per acre	NA	NA	0.04	
Projected % Population Change (2000 – 2030)	NA	NA	+49.5	3.0
Natural Heritage Aquatic Features / Mile ²	NA	NA	0.19	3.0
Number of Fish Species Present	NA	NA	73	4.0
Acquisition Index				17.0

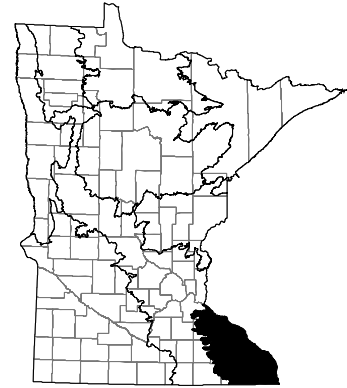
AMA LAND ACQUISITION NEEDS – SUPERIOR UPLANDS

There is a significant amount of land already under public protection in this area, but only about 20% of the shoreline is protected. There are a moderate number of designated trout streams in this section, but only about 25% are protected. The majority of lakes in this section are suitable, not only as fishing lakes, but as places to build both permanent and seasonal homes. The index for Natural Heritage features is moderate in comparison with most other sections and the index for number of fish species is fairly high. Other than the extreme northwest part of this section, most of the lakes in this section are shallow and somewhat impacted by agricultural use, especially in the southeast portion of the section.

The population of this area is projected to increase by nearly 50% by 2030. The recreational demand on this area of the state is high. As lakeshore property is developed, public access opportunities become more restricted and clean water issues begin to emerge. Permanent angling and management easements on trout streams, while maintaining private ownership, and provide the inroad to create permanent protection to shoreline habitat, which insures clean water for future generations. Additional lake and warmwater stream shoreline needs to be acquired to insure public walk-in access to favorite angling destinations and to insure that critical cleanwater habitat is preserved. There may be additional opportunities for Non-Government Organizations to acquire critical shoreline parcels in this area, to either be managed by them or turned over to the DNR as AMAs or other Outdoor Recreation Units.

Aquatic Management Area Acquisition – Regional Recommendations Ecological Section 10, Southeast Blufflands

GENERAL DESCRIPTION: This section consists of the transition zone in the southeast corner of the state. Pre-settlement vegetation consists of hardwood forest, oak savanna, and prairie. Topography is varied, with the ridge-tops leveling off to gently rolling areas. Areas adjacent to rivers and creeks are very steep. Landforms consist of ground moraines to the west and loess-covered plateaus adjacent to the unglaciated stream areas dissecting the limestone-plateau area to the east.



AQUATIC SYSTEMS/WATERSHEDS: Fishing lake and stream classifications are mostly Trout Streams with a few Prairie Lakes to the west and a few Bass Panfish Lakes to the northwest. This section is located entirely within the Lower Mississippi drainage area. This section has become one of the premier trout fishing destinations in the Upper Midwest part of the United States.

LAND USES: Agricultural on the flatter top and bottomland. The steep side hills are forested, with oak, black walnut, and cherry being the primary species. Trout fishing, turkey hunting, deer hunting, and bird watching are common recreational activities.

MAJOR POPULATION CENTERS: Rochester, Cannon Falls, Lanesboro, Caledonia, LaCrescent, Winona, Red Wing, Wabasha, and Lake City.

SHORELAND CHARACTERISTICS:

Southeast Blufflands 2,648,086 acres	Lake & Warmwater Streams	Trout Streams	Totals	Acquisition Index Score
Shoreline miles in section	2,141	997	3,138	
AMA protection (miles)	3	197	200	
Estimated other public protection (miles)	609	119	728	
Protected waters (acres)	NA	NA	24,274	
Percent PWI acres of section acres	NA	NA	0.009	1.0
Number of Public Accesses in section	NA	NA	139	
Number of Public Accesses per mile of shoreline	NA	NA		2.0
Population per acre	NA	NA	0.11	
Projected % Population Change (2000 – 2030)	NA	NA	+25.5	2.5
Natural Heritage Aquatic Features / Mile ²	NA	NA	0.34	5.0
Number of Fish Species Present	NA	NA	84	4.0
Acquisition Index				14.5

AMA LAND ACQUISITION NEEDS – SOUTHEAST BLUFFLANDS

Much of the land that is under public protection in this section is in the form of CRP and CREP easements, which do not provide public access. There are also numerous State Forest parcels and some WMA parcels that do provide public access. Twenty eight percent of the shoreline in this section is under public protection. Approximately 26% of the shoreline along designated trout streams is protected.

The population of this area is projected to increase by nearly 25% by 2030. The recreational demand on this area of the state is high. Acquisition of bluffland that includes shoreline along trout streams has become popular with groups of individuals wanting private preserves for turkey and deer hunting, as well as trout angling. When grain prices are high there becomes overwhelming incentives to put marginal cropland into crop production, which increases sediment loading during rain events.

The nationally renowned trout fishing in this section attracts anglers from all over the Midwest and beyond, making additional public access to streams a priority. Permanent angling and management easements, while maintaining private ownership, draw anglers to the area, bring additional dollars into the local economy, and provide the inroad to create permanent protection to shoreline habitat, which insures clean water for future generations. There may be opportunities for Non-Government Organizations to acquire critical shoreline parcels in this area, to either be managed by them or turned over to the DNR as AMAs or other Outdoor Recreation Units.

Individual Acquisition Criteria

Not only are potential acquisitions assigned importance based upon where they are located in the state, but acquisitions are also scored on an individual basis as they are entered into the system for potential funding. This insures that potential AMAs will protect the highest quality available habitat and that funding is being used efficiently.

Each potential acquisition is scored 1, 2, or 3 for each of the following criteria before the acquisition (with a total score) is entered onto a ranked list. The acquisition list is dynamic and is subject to change as criteria scores of individual acquisitions change. Following are criteria as listed in the current Fisheries Acquisition Spending Plan. The list of criteria may be refined in future spending plans, but will be based on similar premise.

AMA Acquisition Prioritization Criteria

1) Critical habitat criteria as defined in MS 86A.05 and MR 6270.0200

- Premise: meeting multiple habitat criteria provides a higher degree of resource protection.
 - a. Fully meets most AMA habitat criteria (3)
 - b. Meets more than one AMA habitat criteria (2)
 - c. Meets only one AMA habitat criteria (1)

2) Proximity to other protected habitat

- Premise: creating habitat corridors is beneficial to fish and wildlife species
 - a. Immediately adjacent to protected habitat (3)
 - b. Within one mile of other protected habitat (2)
 - c. Greater than one mile, but still significant habitat (1)

3) Donation of land value

- Premise: donations extend our spending capability and consequently our ability to protect additional critical habitat.
 - a. Full donation of value – willing to complete RIM donor form (3)
 - b. Partial donation of value – willing to complete RIM donor form (2)
 - c. No donation of value (1)

4) Partner involvement

- Premise: partner involvement garners public support at all levels. Fundraising fosters local “ownership” in the acquisition. Partner involvement extends spending capability and consequently our ability to protect additional critical habitat.
 - a. Partners – Multiple partners with goal of raising 50% of value (3)
 - b. Partners – Willing to initiate local fundraising activities (2)
 - c. Partners – local support but no money (1)

5) Public access

- Premise: higher levels of public access increase public support of the program.
 - a. Light use including angling, bow hunting, and firearms hunting (3)
 - b. Light use including angling and/or bow hunting (2)
 - c. Water access only or no public access (1)

6) Willingness of potential seller

-- Premise: higher degree of willingness increases the likelihood of a successful acquisition

- a. Willing seller motivated by resource protection at some personal cost (3)
- b. Willing seller motivated by resource protection, but needs our best offer (2)
- c. Seller looking for highest bidder, and possible free appraisal (1)

7) Professional judgment

-- Premise: sometimes decisions should be based on more than data alone.

7A. 'Window of opportunity' rating (e.g., if a project is within reach but is likely to become a missed opportunity if not done quickly)

- a. Now or never (3)
- b. Timing is semi-important (2)
- c. Project is not time critical (1)

7B. Likelihood of project coming to fruition

- a. Probability is near 100% (3)
- b. Probability is at least 50% (2)
- c. Probability is below 50% and may not be good risk (1)

8) Available Dollars

-- Premise: potential funding needs to be available

- a. Funding is readily available (3)
- b. Funding not immediately available but will likely be available by closing (2)
- c. Funding is questionable, but may come together by closing (1)

Other Insights and Advice

Realizing that this report can't address all of the efforts that are needed to adequately protect critical shoreland habitat and preserve Minnesota's clean water legacy, the Committee wanted to at least provide insights and advice concerning additional efforts that can compliment the fundamental recommendations provided in this plan.

Urgency

1. Increased funding for the AMA system will reduce missed opportunities.
2. Identify economic benefits of AMAs for Legislature and LGUs.
3. Redirect vegetation management efforts with private landowners to focus more on acquisition.
4. Acquisition is an important tool in the northeast before development progresses further.
5. Watershed management in upland forests has a critical impact on trout streams.
6. Target areas of acquisition need; use a geographic approach.

Partnerships

1. Explore partnerships with watershed districts.
2. Consider flexible fee title with partners.
3. Consider having partner NGOs (e.g., Trout Unlimited, The Nature Conservancy, Trust for Public Land, etc.) take lead in acquisitions depending on specific area of state.
4. Partner with local sportsmen's clubs to meet with potential sellers.
5. Agricultural partnerships will have a great influence (e.g. Farm Bill conservation provisions, loss of CRP lands, Farm Service Agency/USDA waterfowl scoring of wetlands through USFWS, etc.) on trout habitat in the southeast.

Coordination

1. Agencies and local government units need to coordinate efforts for effective management of shoreland habitat through zoning, best management practices, etc.
2. Coordinate acquisition of RIM matched easements resulting in public and private ownership.
3. Creative ideas such as a "lake loan act", "working lands", or other approaches in targeted areas to combine acquisition and easements with grants and tools to enhance private land management.

Funding Needs and Sources

1. Explore new funding sources, initiatives (e.g. increased lottery proceeds, new RIM-like funding, new LCCMR projects through NGOs, Working Lands Initiative), and partnerships.
2. Consider need for increasing "on the ground" and local resources (i.e. field staff) to identify and assist with acquisition opportunities. This approach is being used by USFWS for the Niemkl project area.

Donations

1. Investigate options for “marketing” to landowners interested in selling or donating land to AMA system – creating a legacy.
2. Explore ways to make “gift giving easy” for donors.
3. Identify tax advantages for donations.
4. Publicly recognize landowner donors in local NGO events, etc.
5. Develop brochure to promote acquisition partnership with individuals.

Forest Areas

1. Develop tools for protecting aquatic habitat in forested areas.
2. Create task force to implement this plan.
3. Expand or model Sustainable Forest Incentive Program to lakes, rivers, and streams.
4. SFI creates tax credits for landowners that practice long-term sustainable forest management.

Other

1. Seek simplification in entire acquisition process including the appraisal process.
2. Fee title or easement acquisitions are just one tool to protect trout habitat.
3. Stream nursery habitat for trout can be seriously impacted by warm temperatures. Quality nursery habitat available adjacent to Lake Superior in Ontario, is not readily available along MN shorelines. Can this be improved?

Appendix A. Aquatic Management Area Statutes & Rules

MS 86A.05 Classification and purposes.

Subd. 14. **Aquatic management areas.** (a) Aquatic management areas may be established to protect, develop, and manage lakes, rivers, streams, and adjacent wetlands and lands that are critical for fish and other aquatic life, for water quality, and for their intrinsic biological value, public fishing, or other compatible outdoor recreational uses.

(b) Aquatic management areas may be established to protect wetland areas under ten acres that are donated to the Department of Natural Resources.

(c) No unit may be authorized unless it meets one or more of the following criteria:

- (1) provides angler or management access;
- (2) protects fish spawning, rearing, or other unique habitat;
- (3) protects aquatic wildlife feeding and nesting areas;
- (4) protects critical shoreline habitat; or
- (5) provides a site for research on natural history.

(d) Aquatic management areas must be administered by the commissioner of natural resources in a manner consistent with the purposes of this subdivision to perpetuate and, if necessary, reestablish high quality aquatic habitat for production of fish, wildlife, and other aquatic species. Public fishing and other uses shall be consistent with the limitations of the resource, including the need to preserve adequate populations and prevent long-term habitat injury or excessive fish population reduction or increase. Public access to aquatic management areas may be closed during certain time periods.

(e) State-owned lands or waters, or any state-owned interests in lands or waters, acquired before August 1, 2000, that meet the criteria of this subdivision and that have been administered by the commissioner of natural resources as fish management areas or other areas of fishery interest are authorized as units of the outdoor recreation system upon designation by the commissioner of natural resources as aquatic management areas.

HIST: 1975 c 353 s 5; 1976 c 166 s 7; 1984 c 599 s 5; 1986 c 444; 1990 c 391 art 8 s 17; 1992 c 462 s 3; 1992 c 566 s 16; 1993 c 172 s 39,40; 1993 c 285 s 5; 2004 c 221 s 22; 2004 c 262 art 2 s 4

Copyright 2004 by the Office of Revisor of Statutes, State of Minnesota.

MS 97C.02 Acquisition of critical aquatic habitat.

The commissioner shall acquire lands that are critical for fish and other aquatic life and that meet criteria described for aquatic management areas in section 86A.05, subdivision 14. The lands that are acquired may be developed to manage lakes, rivers, streams, and adjacent wetlands and lands for aquatic life, water quality, intrinsic biological value, public fishing, and other compatible outdoor recreational uses. The land may be acquired by gift, lease, easement, or purchase. The commissioner shall designate land acquired under this subdivision as aquatic management areas for the purposes of the outdoor recreation system.

HIST: 2000 c 495 s 40

Copyright 2004 by the Office of Revisor of Statutes, State of Minnesota.

MS 84.0272 Procedure in acquiring lands.

Subd. 1. **Acquisition procedure.** When the commissioner of natural resources is authorized to acquire lands or interests in lands the procedure set forth in this section shall apply. The commissioner of natural resources shall first prepare a fact sheet showing the lands to be acquired, the legal authority for their acquisition, and the qualities of the land that make it a desirable acquisition. The commissioner of natural resources shall cause the lands to be appraised. An appraiser shall before entering upon the duties of office take and subscribe an oath to faithfully and impartially discharge the duties as appraiser according to the best of the appraiser's ability and that the appraiser is not interested directly or indirectly in any of the lands to be appraised or the timber or improvements thereon or in the sale thereof and has entered into no agreement or combination to purchase the same or any part thereof, which oath shall be attached to the report of the appraisal. The commissioner of natural resources may pay less than the appraised value, but shall not agree to pay more than ten percent above the appraised value, except that if the commissioner pays less than the appraised value for a parcel of land, the difference between the purchase price and the appraised value may be used to apply to purchases at more than the appraised value. The sum of accumulated differences between appraised amounts and purchases for more than the appraised amount may not exceed the sum of accumulated differences between appraised amounts and purchases for less than the appraised amount. New appraisals may be made at the discretion of the commissioner of natural resources.

Subd. 2. **Stream easements.** (a) Notwithstanding subdivision 1, the commissioner may acquire permanent stream easements for angler access, fish management, and habitat work for a onetime payment based on a value attributed to both the stream and the easement corridor. The payment shall equal:

- (1) the per linear foot of stream within the easement corridor times \$5; plus
 - (2) the easement corridor acres times the estimated market value.
- (b) The estimated market value is equal to:

(1) the total farm market value plus the timberlands value; divided by

(2) the acres of deeded farmland plus the acres of timber.

(c) The total farm market value, timberlands value, acres of deeded farmland, and acres of timber are determined from data collected by the Department of Revenue during its annual spring mini abstract survey. The commissioner must use the most recent available data for the city or township within which the easement corridor is located.

(d) The commissioner shall periodically review the easement payment rates under this subdivision to determine whether the stream easement payments reflect current shoreland market values. If the commissioner determines that the easements do not reflect current shoreland market values, the commissioner shall report to the senate and house of representatives natural resources policy committees with recommendations for changes to this subdivision that are necessary for the stream easement payment rates to reflect current shoreland market values. The recommendations may include an adjustment to the dollar amount in paragraph (a), clause (1).

MR 6270.0100 DEFINITIONS.

Subpart 1. **Applicability.** For purposes of this chapter, the terms defined in this part have the meanings given them.

Subp. 2. **Aquatic management area.** "Aquatic management area" means a unit of the outdoor recreation system established in accordance with Minnesota Statutes, section 86A.05, subdivision 14.

Subp. 3. **Commissioner.** "Commissioner" means the commissioner of natural resources.

Subp. 4. **Easement aquatic management area.** "Easement aquatic management area" means an aquatic management area for which the commissioner acquires easement rights for angler and management access.

Subp. 5. **General use aquatic management area.** "General use aquatic management area" is a designation for identifying permitted and prohibited activities as described in part 6270.0200 on an aquatic management area acquired in fee simple by the commissioner.

Subp. 6. **Restricted use aquatic management area.** "Restricted use aquatic management area" is a designation for identifying permitted and prohibited activities as described in part 6270.0200 on an aquatic management area acquired in fee simple by the commissioner.

STAT AUTH: MS s 86A.06

HIST: 22 SR 292
Current as of 08/29/97

MR 6270.0200 GENERAL PROVISIONS FOR USE OF AQUATIC MANAGEMENT AREAS.

Subpart 1. **Posting of aquatic management areas.** The commissioner shall designate restricted use and general use aquatic management areas by posting signs at access points.

Subp. 2. **Permitted activities for restricted use and general use aquatic management areas.** The following activities are permitted in restricted use and general use aquatic management areas:

- A. angling;
- B. nonmotorized travel;
- C. wildlife observation; and

D. other uses that are consistent with Minnesota Statutes, section 86A.05, subdivision 14, unless prohibited by posting signs or by subpart 5.

Subp. 3. **Permitted activities for general use aquatic management areas.** In addition to the permitted activities specified in subpart 2, hunting and trapping are permitted on general use aquatic management areas. The commissioner shall determine if an aquatic management area can be designated as general use based on the location and size of the area, the proximity of residences or livestock, and any other factors that relate to the compatibility of hunting and trapping in the area.

Subp. 4. **Easement aquatic management areas.** Angler access is permitted on easement aquatic management areas. Other prohibited and permitted activities are described in easement rights purchased from the landowner. Activities other than angling are permitted only when identified on signs posted at access points.

Subp. 5. **Prohibited activities on restricted and general use aquatic management areas.** The activities in items A to J are prohibited on restricted and general use aquatic management areas except as noted.

A. A person may not operate a motorized vehicle except on roads, trails, and parking areas that are designated by sign.

B. A person may not leave a vehicle, trailer, boat, or tent overnight except by permit or in areas designated by signs for overnight use. A vehicle, trailer, or tent lawfully left overnight must be occupied.

C. A person may not build a fire except in a designated area.

D. A person may not destroy, disturb, or remove plants, trees, or other vegetative material, or signs, posts, fences, gates, buildings, or other property, except that edible fruits, seeds, and mushrooms may be removed for personal use.

E. A person may not engage in target, trap, skeet, or indiscriminate shooting except under permit by the commissioner.

F. A person may not construct or maintain a building, dock, fence, billboard, sign, or other structure within an aquatic management area.

G. A person may not construct, occupy, or use an elevated scaffold or stand to watch for or take wild animals, except that portable stands may be used on general use aquatic management areas if they do no permanent damage to vegetation. Portable stands must be removed each day at the close of legal shooting hours.

H. A person may not allow livestock, horses, or other domestic animals to enter a restricted or general use aquatic management area except:

(1) under permit by the commissioner; or

(2) dogs accompanied by or under control of the owner. Dogs must be on a leash from April 16 through July 14.

I. A person may not dispose of garbage, trash, spoil, sludge, rocks, vehicles, carcasses, or other debris, or abandon or store property.

J. A person may not engage in any other activity that is prohibited by the commissioner when notice of the prohibition is posted by the commissioner at access points. The commissioner may prohibit activities that are inconsistent with Minnesota Statutes, section 86A.05, subdivision 14.

Subp. 6. Department operations excluded. This part does not apply to persons lawfully engaged in the performance of their duties in the management and administration of aquatic management areas, including agents of the commissioner, persons operating under permit or contract with the department of natural resources, and law enforcement officers.

STAT AUTH: MS s 86A.06

HIST: 22 SR 292

Current as of 08/29/97

MR 6136.0700 PRIORITIES FOR ACQUISITION AND IMPROVEMENT OF CRITICAL NATURAL HABITAT.

Subpart 1. **Specific criteria for selecting critical natural habitat.** As provided by Minnesota Statutes, section 84.944, the commissioner must consider the following specific criteria in assessing the value of a proposed critical natural habitat project:

A. the occurrence of one or more of the state's various rare natural resources including plants, animals, and undisturbed natural ecological communities as identified by the department's Natural Heritage Program;

B. the existing and potential value of the project to provide vital habitat for fish and wildlife, especially for species identified for special management consideration;

C. the threat of habitat destruction if the project is not carried out;

D. the surrounding land uses in terms of the amount and type of similar habitat and the projected loss of habitat in the area;

E. the location of the project within or adjacent to an existing management unit, including accessibility and relationship to other existing state lands or waters;

F. the integrity of the land or water parcel and the long-term viability of the project;

G. the recreational potential of the parcel including present and future demand and the opportunities to meet this demand in the surrounding area; and

H. the projected acquisition or management costs and potential future management problems.

Subp. 2. Prioritization of proposed projects. Proposed projects that meet one or more of the specific criteria in this part will be ranked by the commissioner in accordance with the following priorities, listed in order of decreasing importance:

A. the potential contribution to the maintenance or enhancement of populations of native plant, fish, and wildlife species listed as endangered or threatened in chapter 6134;

B. the potential contribution to the protection or enhancement of native ecological communities that are now uncommon or diminishing;

C. the benefits provided to existing or potential habitat for fish and wildlife populations; or

D. the enhancement of fish and wildlife oriented recreation.

STAT AUTH: MS s 84.944

HIST: 18 SR 83

Current as of 01/21/00

Literature

Anderson, K.A., T.J. Kelly, R.M. Sushak, C.A. Hagley, D.A. Jensen, and G.M. Kreag. 1999. Summary report with tables of survey responses on public perceptions of the impacts, use, and future of Minnesota lakes: results of the 1998 Minnesota lakes survey. University of Minnesota Sea Grant and Minnesota Department of Natural Resources, St. Paul.

Bernthal, T.W. 1997. Effectiveness of shoreland zoning standards to meet statutory objectives: a literature review with policy implications. Wisconsin Department of Natural Resources, Publication PUBL-WT-505-97, Madison.

Castelle, A.J., C. Conolly, M. Emers, E.D. Metz, S. Meyer, M. Witter, S. Mauerman, T. Erickson, and S. Cooke. 1992. Wetland Buffers: Use and Effectiveness. Washington State Department of Ecology, Olympia, Washington.

Cohen, P., and J. Stinchfield. 1984. Shoreland development trends, Minnesota DNR, Shoreland Update Project Report 4. St. Paul.

Dennis, J. 1986. Phosphorus export from a low-density residential watershed and an adjacent forest watershed. *In* Fifth Annual Conference and international Symposium on Applied lake and Watershed Management, 1986; Proceedings of the North American Lake Management Society, Lake Geneva, Wisconsin. *Lakes and reservoir Management*2: 401-407.

Dennison, D., and D. Tilton. 1993. Rouge River national wet weather demonstration program; technical memorandum literature review – wetlands as a nonpoint source of pollution control measure. Wayne County, Michigan.

Dzuik, H. 2005. The economic value of protecting Minnesota's lakes. Minnesota Lakes Association Reporter.

Graczyk, D.J., R.J. Hunt, S.R. Greb, C.A. Buchwald, and J.T. Krohelski. 2003. Hydrology, nutrient concentrations, and nutrient yields in nearshore areas of four lakes in northern Wisconsin. U.S. Geological Survey, Water-Resources Investigations report 03-4144.

Krysel, C., E. Marsh Boyer, C. Parson, and P. Welle. 2003. Lakeshore property values and water quality: evidence from property sales in the Mississippi Headwaters Region. Mississippi Headwater Board.

Michael, H.J., K.J. Boyle, and R. Bouchard. 1996. Water quality affects property prices: as case study of selected Maine lakes (Miscellaneous Report 398). Maine Agricultural and Forest Experimentation Station, University of Maine.

Minnesota DNR (Department of Natural Resources). 1989. Shoreland management standards: statement of need and reasonableness. MN DNR, St. Paul.

Minnesota PCA (Pollution Control Agency). 2007. Why impaired waters are a priority for Minnesota. MN PCA, St. Paul.

Payton, M.A., and D.C. Fulton. 2004. A study of landowner perceptions and opinions of aquatic plant management in Minnesota lakes. U.S. Geological Survey, Minnesota Cooperative Fish and Wildlife Research Unit. University of Minnesota, Department of Fisheries, Wildlife, and Conservation Biology, St. Paul.

Radomski, P., and T. Goeman. 2001. Consequences of human lakeshore development on emergent and floating-leaf vegetation abundance. *North American Journal of Fisheries Management* 21: 46-61.

Schnaiberg, J. R., M.G. Turner, and P.R. Voss. 2002. Explaining human settlement patterns in a recreational lake district: Vilas County, Wisconsin, USA. *Environmental Management* 30:1432.

Todd, H. 1990. Importance of lakes to Minnesota's economy. *Lakeline* 10: 4 – 6. North American Lake Management Society.

Wang, L., J. Lyons, and P. Kanehl. 2001. Impacts of urbanization on stream habitat and fish across multiple spatial scales. *Environmental Management* 28(2): 255-266.

Wang, L., J. Lyons, and P. Kanehl. 2003. Impacts of urban land cover on trout streams in Wisconsin and Minnesota. *Transactions of the American Fisheries Society* 132:825-839.