Minnesota Department of Natural Resources
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Division of Fisheries

Strategic Plan for Coldwater Resources Management in Southeast Minnesota

2004-2015

August 8, 2003

Division of Fisheries Mission Statement:

To protect and manage Minnesota's aquatic resources and associated fish communities for their intrinsic values and long-term ecological, commercial, and recreational benefits to the people of Minnesota.

Broad Goals:

1. To make recreational fishing as good as it can be in the state of Minnesota for the present and future.

2. To maintain, enhance, or restore the health of Minnesota ecosystems so that they can continue to serve environmental, social, and economic purposes.

3. To foster an ethic of natural resource stewardship among all Minnesotans.

Executive Summary

The purpose of this strategic plan is to set the direction for the long-term management of coldwater resources and trout fisheries in southeast Minnesota. This plan identifies important issues and strategies that will enable the Minnesota Department of Natural Resources (MNDNR), Division of Fisheries, to maintain and improve the short and long-term values of this unique resource and provide its angling clientele with diverse angling opportunities including good catch rates, multiple species of trout, and a chance of catching a large trout. This plan will provide long-term continuity to management efforts and function as a guide for securing the knowledge, input, staff, and funding to attain the stated management goals.

This strategic plan will encompass the 12-year period from 2004 through 2015. Long-range plans will be developed and reviewed every 6 years to define the specific management actions required to achieve the goals in this strategic plan. Operational plans will be developed annually to implement and provide funding for these management actions.

Plan development resulted from a need for consistency and prioritization of management efforts surrounding the trout resources in southeast Minnesota. This strategic plan calls for an increased emphasis on promoting sound land use management, water quality monitoring, habitat enhancement and protection, increased angling opportunities, and improved communication with stakeholders. This direction is consistent with the Department's Mission Statement and the Division's Core Functions and Desired Outcomes.

The goals and strategies presented in this plan have been developed around three themes that were identified and developed through internal and external input meetings, focus groups, and the accumulated knowledge from investigations, surveys, and information gained from years of coldwater resource management. The three themes with their associated goals and strategies are outlined below:

Theme 1: Provide for the protection, improvement, and restoration of coldwater aquatic habitat and fish communities so that this unique resource is available for future generations.

Goal 1.1: Improve our ability to protect, improve, and restore riparian and in-stream habitat so that fish populations are healthy.

Goal 1.2: Increase and improve scientific investigations, monitoring, and evaluations so that management decisions are based on good biological and social information.

Goal 1.3: Support and use a watershed approach for trout management so that all coldwater resources are protected and improved, and basin-wide impacts to coldwater streams can be addressed.

Theme 2: Provide diverse angling opportunities so that a broad range of experiences are available to anglers.

Goal 2.1: Provide, maintain, and enhance diverse trout angling opportunities throughout southeast Minnesota so that trout management programs can meet the needs of as many anglers as possible.

Goal 2.2: Provide for angling access on as many streams in southeast Minnesota as possible so that anglers have a variety of locations and maximum opportunities to fish.

Goal 2.3: Establish guidelines for the utilization of hatchery-reared trout in order to provide additional angling opportunities.

Theme 3: Increase communication efforts so that information is readily available to both constituents and fisheries professionals.

Goal 3.1: Provide information to anglers and other stakeholders so that they are well informed about fisheries management and other cold-water resources in these streams.

Goal 3.2: Increase efforts at standardizing and sharing information among fisheries professionals so that decisions on trout management are based on sound biological and social information.

Goal 3.3: Provide for efficient and healthy methods of communication and dialog among trout anglers, with other stakeholders, and with Fisheries staff.

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Purpose

The purpose of this Strategic Plan is to identify key issues and concerns relative to coldwater resources and trout fisheries and to develop goals and strategies that will address these issues over the next 12 years. The intended audience for this plan includes internal and external clientele with an interest in southeast Minnesota's coldwater ecosystems and trout fisheries. The plan will enable fisheries' managers to meet public trust responsibilities of protecting and maintaining aquatic resources; promote the use of sound ecosystem management principles; provide diverse angling opportunities; and increase the general public's appreciation and awareness of trout, trout habitat, and the influences of the watershed on aquatic resources. It will consider resource management strategies for meeting the challenges brought on by an increasing human population in the region, changing agricultural practices, and changing attitudes about recreational fisheries. Finally, the plan will identify educational opportunities that encourage the appreciation of coldwater resources among a broad spectrum of the population. There will be numerous challenges over the next 12 years, and the plan will help us be more effective in meeting those challenges.

This plan represents the first phase of a cyclical process that includes developing goals and strategies, planning and implementing actions, and monitoring and evaluating results. Strategic planning is the initial phase that determines program direction and philosophy. This plan is intended to provide direction to the Division of Fisheries in managing coldwater resources and trout populations in southeast Minnesota.

Subsequent planning that is more specific to the implementation of the strategies and goals will be guided by this overall direction. Whether we are explaining fisheries management actions to interested clientele, prioritizing our current activities, or justifying the need for additional personnel and funding, this plan will be the basis for defining program goals and direction.

Background

The southeast region of Minnesota was surrounded, but untouched, by the last glacial period (Waters, 1977). The resulting landform is a loess (windblown silt) plateau characterized by highly dissected landscapes associated with major rivers in southeast Minnesota. Limestone and other sedimentary rock are exposed in deeply incised river valleys, often 400-600 feet deep. Agriculture dominates the "blufflands" landscape with forested bluffs and associated streams dissecting the land in highly branched patterns (Hargrave 1993). Major rivers of the region include the Mississippi (which forms the eastern boundary), Root, Whitewater, Zumbro, and Cannon. Coldwater streams arise from groundwater springs, common in this karst geologic region, and are tributaries to one of these major rivers.

Southeast Minnesota coldwater streams, riparian zones, and associated flora and fauna were degraded by changes in land use and hydrologic conditions that occurred with European settlement, which began in the mid 1800s (Thorn, et al., 1997). Settlers developed the land for agriculture, removed much of the native vegetation, and allowed livestock to graze valley slopes. By the early 1900s, runoff and erosion had increased, flooding was frequent, and the physical characteristics of streams had deteriorated. Formerly clear, coldwater streams became sediment laden and warmer. Southeast Minnesota's once abundant native brook trout were reduced in abundance or extirpated.

During the 1920's and 1930's, poor land use and associated water quality problems were widely recognized as a major environmental concern. Consequently, the 1930's saw the creation of the Soil Conservation Service, Civilian Conservation Corps, and more emphasis on fisheries management. Improved farming and soil conservation practices that included crop rotation, contouring, water and sediment retention structures, tree planting, etc., had the desired effect of reducing runoff, flooding and erosion (Thorn, et al., 1997). Base flow, water quality, and stream physical characteristics improved as a result of the land use improvements (Trimble and Lund, 1982). Acquisition of land for state parks, state forests, and wildlife management areas also accelerated improvements in many areas.

Point source pollution in the form of poorly or untreated sewage, high organic loads from creameries and canneries, and feedlots remained a problem through the 60's and 70's. The 1972 Clean Water Act provided a means for correcting many of these problems.

Southeast Minnesota streams have been managed for recreational fisheries since harvest was restricted in 1874 and trout were stocked in 1878. During the 1970's, most streams in southeast Minnesota were stocked with brown trout fry, catchable-size brown, or catchable size rainbow trout. By 1983, improving stream conditions and a desire to reduce rearing costs prompted the MNDNR to stock fewer streams, and to use fingerling trout more often than catchable-size trout to supplement natural reproduction. Brown trout are found in 124 of the 140 streams in the region, and wild brook trout are present in 85 of the streams (Thorn and Ebbers, 1997). Rainbow trout are stocked where relatively high angling pressure occurs and in ponds and lakes where special fishing events are frequently held. In-stream habitat improvement has been conducted on about 10 percent of the streams managed for trout since the late 1940's. Today, southeast Minnesota has 788 miles of cold water in 181 streams (MNDNR 2003). Compared to the 280 miles of coldwater in 76 streams, documented in 1970, this is a substantial increase.

Coldwater resources in southeast Minnesota currently support a trout population that is at or near all time highs (MNDNR 1997). This resource also provides a popular fishery, where an estimated 520,879 angler-days were recorded on these streams in 2001 (Vlaming and Fulton 2002). The economic value

statewide of trout fishing in Minnesota streams, of which a major portion occurs in the southeast, accounts for over $30 million in sales, with another $18 million in income (Gartner, et al., 2002)

Agriculture remains the dominant land use in southeast Minnesota. Recent trends toward fewer and larger farms, resulting in increased field size, more soybean acreage, and decreasing acreage of forage, small grain, and pasture are being witnessed throughout the region and are a concern to people of southeast Minnesota (Randall, 2003). Rural residential development and development in and around municipalities is projected to continue at or faster than the rates of the previous 20 years (Curry, 2002). Potential impacts to water quality from these trends include: increased runoff; reduced base flow; thermal pulses; and increased sedimentation, nutrient, and chemical inputs. Climate change is expected to make the region warmer and drier and would likely exacerbate these impacts to coldwater streams (Kling, et al. 2003). It is imperative that natural resource managers, all levels of government, anglers, private organizations, and the public work together to face these threats to the coldwater resources of southeast Minnesota.

Current Programs and Funding

Fisheries management programs in southeast Minnesota have evolved from predominantly put-and-take trout stocking in the early to mid-1900's to a multifaceted program beginning around 1970 to the present. Management of southeast Minnesota coldwater resources includes the following programs: fisheries surveys, habitat protection and improvement, acquisition, stocking, regulations, communication, and watershed management. Each program is summarized below and is based on a staff report recently written for this planning effort (MNDNR 2003, in progress).

Fishery Surveys

Effective and successful fisheries management requires information on the three primary components of a fishery: the biota (primarily fish), their habitat, and the benefits they provide to society (Krueger and Decker, 1999). Assessment of these components provides the information necessary to make informed decisions to achieve the goals and objectives specified in management plans. Specifically, information is gathered to: 1) define baseline conditions (i.e., provide a reference point), 2) identify limiting factors to guide selection of appropriate management techniques, 3) monitor changes and long-term trends, and 4) evaluate management actions and document them for future reference and planning. From 1970 to 2001, Fisheries has conducted 275 stream surveys (habitat and fish) and 1,050 stream fish population assessments (game fish status only). Thirty-eight creel (angler) surveys on 23 streams have been conducted from 1955-2001. From 1998-2002, the survey program averaged 19 percent of the southeast coldwater fisheries budget (Figure 1).

Habitat Protection and Improvement

Around 1950, the Minnesota Department of Conservation (now the Minnesota Department of Natural Resources) began a program of trout stream habitat improvement in southeast Minnesota. From 1950-2001, 151 in-stream habitat projects on 126 miles of coldwater streams have been completed. About 87 percent of these projects were newly constructed while 13 percent were maintenance on existing projects. Early efforts were aimed at stabilizing eroded banks, narrowing the stream to increase velocity, adding cover for fish, and planting trees to shade and cool the water. This program has continued to the present time. Various improvement techniques have evolved, but the basic concepts of stream improvement (stabilizing eroding banks, adding fish cover and narrowing the stream to increase velocities to improve substrates and increase depth) remain similar. Cooperative projects with local chapters of Trout Unlimited have also been completed on numerous streams since 1986. In addition to improvement work, and of greater importance, is habitat protection. Currently, the Division of Fisheries has important environmental review responsibilities associated with proposed changes to protected waters of the State, which include: dam repair or removal, bridge and culvert replacement, water appropriation, and stream channelization. Habitat improvement and protection was about 30 percent of the southeast coldwater fisheries budget from 1998-2002 (Figure 1).

Acquisition

The Division of Fisheries purchases land adjacent to trout streams through fee and easement acquisition to protect sensitive areas such as springs, provide access for angling, and improve riparian and in-stream habitat.

Beginning in 1956, trout stream easements were acquired to provide access for angling and habitat improvement. Some of the earliest acquired easements were obtained through donations, were of limited term (25 years or less), and contained variable covenants. In 1976, efforts to acquire trout stream corridors were accelerated with the initiation of the Resource 2000 program, a state legislated program intended to provide outdoor recreational opportunities into the next century. Only perpetual easements were acquired, and appraisals of the easements were done to establish fair market value. In 2002, the Legislature approved a new way of determining the value of an easement that eliminates the need for an appraisal and makes the process of purchasing easements much simpler and straightforward.

Since 1976, 329 parcels have been acquired on 59 coldwater streams, totaling 170 stream miles and 2,835 acres of stream corridor. From 1998-2002, acquisition has averaged 16 percent of the southeast coldwater fisheries budget (Figure 1).

Stocking

Trout were first stocked in southeastern Minnesota streams in the late 1800's to re-establish extirpated brook trout fisheries brought about by severe habitat degradation and exploitation. Initial stocking began using primarily yearling rainbow trout, brown trout, and brook trout. Since that time, many different strategies have been used to increase stocking success including the size of stocked fish, genetics, and timing of stocking. Many of these changes in stocking strategies were instituted to correspond with increasingly better stream conditions.

During the five-year period from 1996 to 2000, DNR Fisheries stocked an average of 1,031,742 trout weighing 33,494 pounds in 46 streams each year. Yearling and adult stocking averaged 65,707 trout weighing 29,122 pounds each year; fingerling stocking averaged 966,035 fish weighing 4,372 pounds annually. Nearly all catchable trout stocked were yearlings (99 percent by numbers). Catchable trout were comprised of 53 percent brown trout, 46 percent rainbow trout, and 1 percent brook trout. Stocked fingerling trout were primarily brown trout (95 percent), with the remaining 5 percent comprised of brook trout and rainbow trout.

Stocking brown trout fingerlings in spring is the most common stocking strategy at this time. Brown trout yearling stocking has been discontinued, and yearling stocking of rainbow trout now provides put-and-take fishing in select southeast streams. Fingerling brook trout are being stocked into streams where water temperature and stream conditions have improved enough to reintroduce brook trout. The production and distribution of trout during the period 1998-2002 has averaged 22 percent of the southeast coldwater budget (Figure 1).

Regulations

Regulations designed to conserve and/or enhance trout populations were first established in southeast Minnesota during the late 1800's. A multitude and variety of regulations have been used since then, including daily and seasonal restrictions and closures, daily bag and possession limits, size limits, and gear restrictions. Since 1984, regulations have been used experimentally on individual streams to try to increase the abundance and size of trout. These regulations have included minimum and maximum length limits, protected slot limits, and total catch and release. Of the thirteen experimentally regulated streams, two were considered successful in increasing abundance, five were considered unsuccessful and six are still under evaluation. Currently, eight streams totaling 53 miles are under special or

experimental regulations during the summer season, and 32 streams totaling 155 miles are under special regulations during the winter season. Other recent regulation changes include a catch-and-release only fishing season on all southeast streams for the first two weeks of the season, and for the last two weeks of the season. Budget expenditures for the period 1998-2002, primarily staff time, have averaged six percent of the southeast coldwater fisheries budget (Figure 1).

Communication

Since the 1950's, anglers have become more mobile and have more discretionary time and money. Consequently, angler interest in fisheries management and a desire to participate in management decisions has increased. At the same time, information availability and the ability to communicate both internally and externally have improved. Numerous programs and media have been developed and are available to fisheries managers to improve external communications. An example of this is the fisheries MinnAqua Program. MinnAqua is a statewide education program designed to teach angling recreation and stewardship, as well as, ecology and conservation of aquatic habitats. Since its inception in 1990, MinnAqua has reached thousands of anglers throughout Minnesota. Program topics include aquatic habitats and ecosystems, Minnesota fish, water stewardship, managing our resources, fishing techniques and equipment, and fishing safety. Special fishing clinics are also offered.

The Division of Fisheries periodically holds public input meetings on a variety of topics. Five public input meetings (Winona, Frontenac, Rochester, Lanesboro, and St. Paul) were held in the spring of 2003 to gather input on the development of this strategic plan (Appendix B). Another forum used to receive angler input was the Southeast Minnesota Trout Advisory Group (SEMTAG), which consisted of representatives from trout angling groups, bait shop owners, sportsman's club representatives, and individuals. SEMTAG typically met once a month from October through May to discuss trout resource issues. Additionally, the Trout and Salmon Stamp Oversight Committee has been established to provide broad oversight of trout and salmon stamp expenditures.

From 1998-2002, about four percent of the southeast Minnesota fisheries budget was spent directly on public information related efforts (Figure 1). However, public information is an important part of other fisheries programs and is included in their costs as well.

Watershed Management

Water quality and its influence on southeast Minnesota trout streams is of critical importance but has often been difficult to address by fisheries managers due to the magnitude of landscape effects on these parameters. Habitat and water quality problems are often a result of land use practices within a watershed. Fisheries staff participation in watershed projects and water quality monitoring can influence changes in land-use patterns to help provide healthy, sustainable fisheries, and improved water quality. Providing good technical information to other organizations and agencies with a direct responsibility for watershed management is needed to improve water quality and increase base flows. Southeast Minnesota fisheries annual budget expenditures for watershed management during the period 1998-2002 was three percent (Figure 1). While staff and budget resources dedicated to watershed management have been relatively limited, partnerships with other state, local, and federal agencies, and with the public offer the opportunity to leverage important resources in land and water management. Examples of watershed partnerships currently at work include the Wells Creek Watershed Partnership and the Whitewater River Watershed Project.

Southeast Fisheries Organization and Coldwater Budget

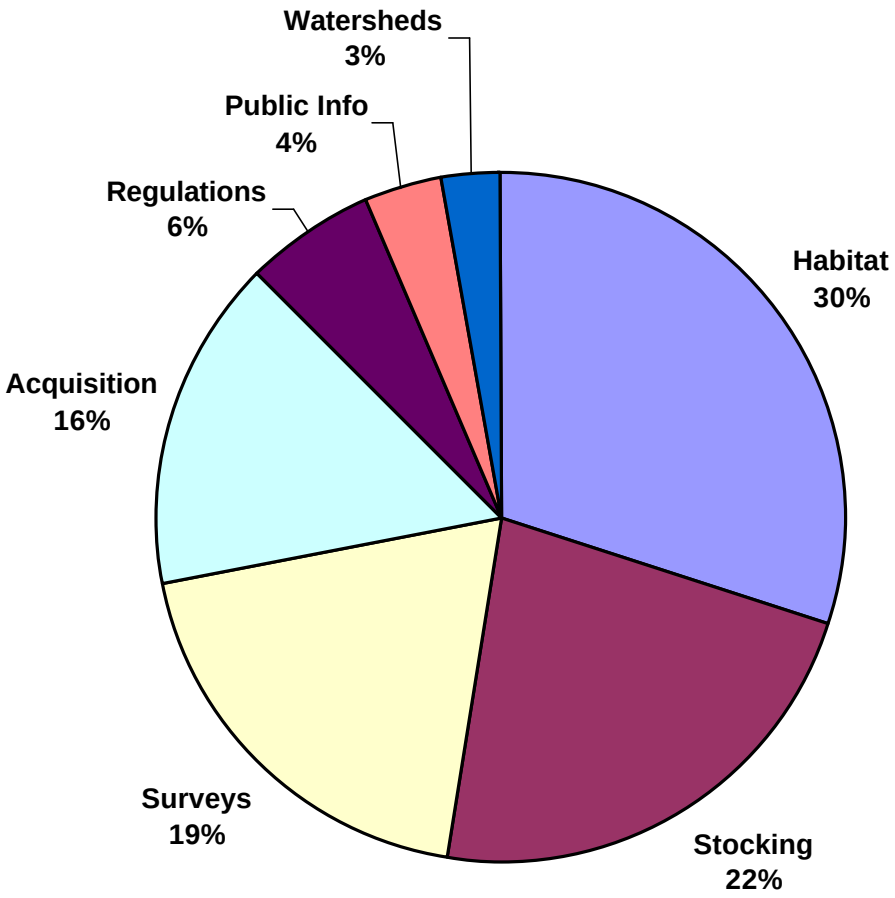
The Lake City Area Fisheries Station manages trout streams located north of Interstate Highway 90 (I-90), and the Lanesboro Area Fisheries Station manages streams south of I-90. Two fisheries research biologists are also stationed at Lake City. Administrative reorganization in 2002 resulted in the former regional office in Rochester becoming an area office serving primarily coordination and administration functions for the southeast, while the New Ulm Regional Headquarters provides Regional supervision and business functions. Three MNDNR Fisheries coldwater hatcheries are also found in the southeast – Lanesboro, Crystal Springs, and Peterson. They are supervised by the Coldwater Production Supervisor out of MNDNR Division of Fisheries Central Office. Currently, southeast Minnesota trout production needs are met by Lanesboro and Crystal Springs. All three hatcheries also contribute to trout production needs outside of southeast Minnesota.

During the five-year period from 1998 to 2002, annual expenditures for fisheries programs in southeast Minnesota averaged $1,965,000. The portion of funding dedicated to coldwater programs was estimated at $1,469,000 (Figure 1) or about 75 percent. The remaining 25 percent of the budget was dedicated to warm-water lakes, warm-water streams, and Mississippi River management. These figures include all costs at the regional and area levels, Lake City fisheries research, coldwater hatchery production, and distribution costs dedicated to southeast stocking. It does not include Central Office administrative costs or capital costs other than land acquisition and stream habitat improvement.

About 65 percent of the expenditures were for employee salaries, 9 percent for land acquisition (trout stream easements), 8 percent for in-stream habitat improvement, 8 percent for equipment and fleet, 5 percent for supplies and materials, and the remaining 5 percent for other administrative costs.

Funding during the 1998-2002 period for the southeast Minnesota coldwater program came primarily from fishing license sales (Game and Fish Fund, 69 percent), trout and salmon stamp sales (13 percent), special legislative appropriations including LCMR and RIM, and lottery sales tax proceeds (4 percent). Only 2 percent of funding came from general revenue sources.

Figure 1. Percent of average annual expenditures for the southeast Minnesota coldwater fisheries budget, 1998-2002. Annual expenditures averaged $1,469,173 for the five-year period.



Goals and Strategies

The goals and strategies presented in this plan have been developed around three themes that reflect the mission, long-range plan, and core functions of the Division of Fisheries. These themes are:

1) Protection, improvement, and restoration of coldwater aquatic habitat
2) Availability of diverse angling opportunities, and
3) Communication efforts

The goals and strategies associated with each theme are not prioritized; but clearly, protection, improvement, and restoration of coldwater aquatic habitat is most important. The State of California's draft "Strategic Plan for Trout Management, A plan for 2002 and beyond" (Hopelain, 2002) has been used as a template in the development of this section.

Theme 1: Provide for the protection, improvement, and restoration of coldwater aquatic habitat and fish communities so that this unique resource is available for future generations.

Habitat related issues are generally considered key factors causing species declines throughout the United States. Coldwater aquatic habitat in southeast Minnesota has been adversely affected since the mid to late 1800's by human population growth and land-use practices (Thorn, et al., 1997). Improvement and restoration of degraded habitat are important issues that will likely become even more important as pressure from an ever-increasing population places more demands on the State's natural resources.

In many cases, problems have been identified and corrective measures taken. The 30-year trend of increasing trout populations in southeast Minnesota is a good example of what can be achieved through cooperation and adaptive management. In spite of this, some problems continue to persist and new ones arise. Even though Minnesota is considered to be relatively rich in water resources, water quality problems and the long-term health of aquatic communities are still a concern. Maintaining and improving coldwater aquatic habitat will require protection, improvement, and restoration of in-stream and ground water resources.

Preserving habitat is more effective than trying to restore or rehabilitate it after damage has occurred. Integral to habitat protection is the knowledge of physical and biological interactions within watersheds of a given ecosystem and how manipulation of natural resources from domestic, agricultural, and recreational activities affect that physical and biological relationship. Landowners and land managers need to know what impacts their activities have on water quality and aquatic habitat as well as the range of options available to reduce or eliminate any adverse impacts. Much of this work can be achieved by providing technical information to agencies with a direct responsibility for watershed management and supporting initiatives that reduce or eliminate adverse impacts to coldwater resources.

Watershed groups, made up of people living, working, and recreating within a watershed are an effective forum for communication, education, and application of principles that allow resource use and enjoyment while improving and maintaining a functional ecosystem. A role of MNDNR, when

participating with watershed groups, is to provide encouragement, technical support, and scientific information in the pursuit of healthy ecosystems. Promoting and fostering natural resource stewardship principles among public and private landowners and land managers is an important role for the MNDNR.

The MNDNR also plays an important role in aquatic habitat protection by reviewing development plans and permit applications that may impact protected waters, enforcement of regulations designed to prevent habitat degradation, and legally required mitigation or habitat restoration for unavoidable impacts or violations. The regulatory role is the final means available to persuade entities or individuals to minimize, mitigate, or eliminate adverse impacts to water quality and/or aquatic habitat.

GOAL 1.1 Improve our ability to protect, improve, and restore riparian and in-stream habitat so that fish populations are healthy.

Strategy 1.1.1 Coordinate with other DNR divisions, state agencies, local governments, and non-governmental organizations to strengthen environmental laws that protect and improve coldwater stream resources.

Strategy 1.1.2 Continue environmental review responsibilities and encourage enforcement of existing regulations.

Strategy 1.1.3 Work to increase the amount of critical habitat that is protected through fee title acquisition or other land protection options (e.g., conservation easements, land trusts).

Strategy 1.1.4 Develop position statements regarding activities and projects that adversely impact coldwater stream resources

Strategy 1.1.5 Improve the ability of southeast Fisheries staff to assist landowners in decisions and activities concerning riparian management and fish populations.

Strategy 1.1.6 Formalize Habitat Improvement (HI) guidelines to be followed on all DNR in-stream and riparian related projects, and in reviewing similar non-DNR projects.

Strategy 1.1.7 Provide a balance between development of new projects and maintenance of old projects in the HI program.

Goal 1.2 Increase and improve scientific investigations, monitoring, and evaluations so that management decisions are based on good biological and social information.

Strategy 1.2.1 Support a program to delineate the surface and subsurface spring catchment areas as a major step in protecting and

managing the sources of cold water for southeast Minnesota trout streams.

Strategy 1.2.2 Actively participate in efforts to develop a revised Stream Survey Manual that places more emphasis on measuring and monitoring stream geomorphology and key biotic indicators, e.g., Index of Biotic Integrity (IBI).

Strategy 1.2.3 Establish continuous water monitoring stations, in partnership with other agencies and interested citizens, to increase our understanding of watershed impacts on water quality, fish populations, and other stream biota.

Strategy 1.2.4 Conduct research designed to better understand coldwater fishes, primarily trout and their habitat requirements, and increase efforts to better understand the social and abiotic factors affecting southeast Minnesota coldwater resources.

Strategy 1.2.5 Improve evaluations of stream management activities and fish populations.

Goal 1.3 Support and use a watershed approach for trout management so that all coldwater resources are protected and improved and basin wide impacts to coldwater streams can be addressed.

Strategy 1.3.1 Integrate coldwater resource management by establishing partnerships and sharing information with other natural resource and land management agencies having administrative responsibility in southeast Minnesota including Natural Resource Conservation Service (NRCS), Board of Water and Soil Resources (BWSR), County Water Planning, Department of Agriculture, local units of government, and non-governmental organizations.

Strategy 1.3.2 Coordinate and develop partnerships with other interested parties listed in Strategy 1.1.1 to develop a central stream and watershed database/Geographical Information System (GIS) that incorporates water quality, land use, and biological information.

Strategy 1.3.3 Continue to provide staff time to maintain a Fisheries presence in watershed issues, track State and Federal Farm Bill Legislation, provide private lands management assistance, and advocate for management at the watershed scale to improve trout populations and aquatic habitat.

Theme 2: Provide diverse angling opportunities so that a broad range of experiences are available to anglers.

Recent angler surveys, primarily Vlaming and Fulton, 2002, illustrate that southeast Minnesota trout anglers vary in their preferred angling methods, their preferences for different management techniques, and their perceptions of what makes trout angling an enjoyable experience. The challenge for fisheries managers lies in balancing the biological aspects of protection, improvement, restoration, and management of wild trout populations while at the same time addressing a broad diversity of angler expectations and concerns.

Managers can use a variety of traditional management tools to meet a diversity of angler expectations. These include wild trout management, stocking, habitat improvement, acquisition, and angling regulations. However, recent angler surveys clearly illustrate the importance of economic, social and aesthetic considerations to trout stream management. This now requires fisheries managers to look beyond the stream to meet the broad array of southeast Minnesota trout angler expectations. By forming partnerships with anglers, landowners, local units of government, and other state and federal agencies, fisheries managers can help to ensure that a diversity of angling opportunities are available.

Goal 2.1 **Provide, maintain, and enhance diverse trout angling opportunities throughout southeast Minnesota so that trout management programs can meet the needs of as many anglers as possible.**

Strategy 2.1.1 Use a defined set of regulations (e.g., tiered regulations or "tool box" approach) on selected streams where data shows the best potential to increase numbers of medium (12-16 inch) brown trout and large (16 inch and greater) brown trout and where there is public support.

Strategy 2.1.2 Continue to explore the expansion of winter trout angling opportunities to meet demand.

Strategy 2.1.3 Develop management strategies for non-designated trout waters.

Strategy 2.1.4 Restore wild brook trout populations in streams with aquatic habitat capable of supporting brook trout and evaluate the success of current experimental regulations.

Strategy 2.1.5 Identify, acquire, and develop easy access fishing areas designed for families and individuals with limited mobility and improve information on the availability of these areas

Strategy 2.1.6 Conduct standardized angler preference, attitude, and satisfaction surveys regarding trout fishing in southeast Minnesota.

Goal 2.2 **Provide for angling access on as many streams in southeast Minnesota as possible so that anglers have a variety of locations and maximum opportunities to fish**

Strategy 2.2.1 Purchase as many angling easements as possible, and work with constituent groups to advocate for additional dollars.

Strategy 2.2.2 Develop an angler walk-in program with landowners who are not interested in selling easements but are willing to allow angling.

Goal 2.3 **Establish guidelines for the utilization of hatchery-reared trout so that additional angling opportunities are continued**

Strategy 2.3.1 Continue to evaluate catchable trout stocking, and revise stocking guidelines so that stocking does not jeopardize wild trout management but, at the same time, provides flexibility in stocking decisions.

Strategy 2.3.2 Continue to evaluate guidelines for brown trout fingerling maintenance stocking, and revise if necessary.

Strategy 2.3.3 Maintain a source of hatchery produced trout to provide put-and-take angling opportunities in appropriate waters.

Strategy 2.3.4 Improve our knowledge of trout genetics, and use that information in reestablishing trout fisheries.

Theme 3: Increase communication efforts so that information is readily available to both constituents and fisheries professionals.

Southeast Minnesota fisheries staff identified communications as a major issue affecting resource management in southeast Minnesota. The need for continued and improved communication was supported at the public meetings and by various reports including Vlaming and Fulton, 2002. Although communications are important strategies for all of the trout issues in southeast Minnesota, fisheries staff felt strongly enough about communications to make it a separate issue within the strategic plan. Without good communications at all levels, fisheries management struggles to gain public support for management actions. The strategies outlined below are a proactive effort to continue to improve the quality of communications and hence the effectiveness of trout management programs.

Goal 3.1 Provide information to anglers and other stakeholders so that they are well informed about fisheries management and other coldwater resources in these streams.

Strategy 3.1.1 Periodically revise and update the southeast Minnesota trout stream map and easement brochure to include new information such as stream management reaches, easy access areas, and access roads.

Strategy 3.1.2 Provide continual updates of stream management issues and stream survey reports to constituents, and develop new methods of providing this information.

Strategy 3.1.3 Increase the use of trout hatcheries, local State parks, County fairs, and MinnAqua for disseminating coldwater stream information.

Strategy 3.1.4 Encourage programs that introduce youth to trout angling, and use trout angling as an opportunity to educate them about southeast Minnesota coldwater resources**.**

Strategy 3.1.5 Explore new ways of promoting or marketing the work that the Division does on trout streams in the southeast**.**

Strategy 3.1.6 Improve the quality and location of signs as a means of communication.

Goal 3.2 Increase efforts at standardizing and sharing information among fisheries professionals so that trout management decisions are based on sound biological and social information

Strategy 3.2.1 Increase efforts in developing data management systems and GIS applications that improve networking and information availability.

Strategy 3.2.2 Explore opportunities to reorganize and improve the efficiency and effectiveness of managing southeast Minnesota coldwater resources.

Strategy 3.2.3 Continuously improve a skilled, knowledgeable, and productive workforce in the Division of Fisheries.

Goal 3.3 **Provide for efficient and healthy methods of communication and dialog among trout anglers, with other stakeholders, and with Fisheries staff so that issues can be discussed and resolved.**

Strategy 3.3.1 Develop additional methods for getting input from anglers.

Strategy 3.3.2 Continue to work with anglers and angler groups to help resolve conflicts among anglers and other stakeholders.

Next Steps

This strategic plan sets the general direction for the Division of Fisheries coldwater stream management program in southeast Minnesota for the next 12 years (2004-2015). Long-range plans will be developed every six years to define specific management actions needed to reach the goals in the strategic plan. The long-range plan will be used to develop annual operational plans that list specific activities for the coming year, including habitat work, survey proposals, stocking, special projects, and their cost (staff time, equipment, fleet, and supplies).

The next step is to develop a long-range plan that identifies actions for the period 2004-2009. Work groups that include DNR Fisheries, and where needed, outside experts from other DNR Divisions, state and federal agencies, local governments, and constituents will help develop the long-range plan.

These work groups will develop specific components of the long-range plan during the summer of 2003. A final plan will be completed by October 31, 2003, with implementation on January 1, 2004.

The process for developing the long-range plan will include discussions pertinent to the priorities established by the Division of Fisheries in this strategic plan. Over time, the Division of Fisheries would like to see greater emphasis on water quality and habitat through watershed partnerships; more efficient collection, analysis and sharing of data; increased partnerships and cost sharing; and more and better communication. These strategies are outlined in the strategic plan and could influence or require changes in staffing, funding, and organizational structure.

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Appendix A

Trout Angling in Southeastern Minnesota: A Study of Trout Anglers

Interim Report Prepared for

Minnesota Department of Natural Resources
Division of Fisheries

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Executive Summary

Characteristics of Trout Anglers

- Trout anglers tend be white, middle-aged men who have higher than average education and income levels as compared to the general population of Minnesota residents.
- The average number of years since they began fishing in general is 33.7 years, and the average number of years since they began fishing for trout in southeastern Minnesota is about half of that (16.5 years).
- Eighty-one percent of all anglers are not a member of an angling organization.
- Thirty-four percent of all anglers are primarily bait-fishers. Another 25 percent are primarily fly-fishers. Fourteen percent are primarily lure-fishers, and the remainder (27 percent) are mixed-method fishers (those who do not use any one method at least 75 percent of the time).
- Two-thirds of all anglers keep some and release some of the trout they catch. Thirty-one percent release all of the trout they catch, and two percent keep all of the trout they catch. Fly-fishers are much more likely than all of the other groups to release all fish, with 70 percent indicating that they release all fish. Thirty percent of lure-fishers, 20 percent of mixed-method fishers, and 12 percent of bait-fishers release all fish.

Fishing Pressure on Southeastern Minnesota Streams

- The total number of anglers fishing southeast Minnesota streams in 2001 is estimated to be 28,531– of which just over half are non-local anglers.
- Angler-days are defined as one angler accessing one stream for a portion of one day. An angler could fish four streams in a day and would then have 4 angler-days. Another angler could fish one stream for four days on one trip. This would also count as 4 angler-days.
- There were an estimated 31,757 angler-days of fishing on southeast Minnesota streams in the winter season of 2001.

- There were an estimated 489,121 angler-days of fishing on southeast Minnesota streams in the summer season of 2001, for a total annual estimate of 520,879 angler-days.
- The Whitewater River complex (South, Middle, North and Main branches) when combined is the most often fished stream system with a total of 109,411 angler-days (22 percent of all summer angler-days). The Root River complex is the second most often fished stream system with a total of 75,473 angler-days (15 percent of all summer angler-days). The top 15 streams account for 296,809 angler-days, or 61 percent of all summer angler days.
- Bait-fishers and mixed-method fishers are responsible for approximately 60 percent of all summer angling days (30 percent each), followed by fly-fishers (22 percent) and lure fishers (18 percent).
- None of the most heavily fished streams experiences a majority of angling days from a specific-method group of anglers. To the contrary, these streams see a broad mix of different fishing methods used.
- Nearly half of all anglers indicated that their favorite stream was part of two stream systems. The Whitewater stream complex is the favorite for 25 percent of all anglers, and the Root River stream complex is the favorite of another 22 percent of all anglers. However, the remaining 53 percent of anglers are very diversified in their favorite streams.

Characteristics of the stream visit

- On the most recent trip to their favorite stream, 26 percent of anglers used fly tackle only. Another 15 percent used artificial lure tackle only. Nearly 29 percent of anglers used bait tackle only, and the remainder (30 percent) used a variety of two or more types of tackle.
- The overall success rate–defined as catching at least one trout–was around 90 percent for all angler groups.
- On average, anglers caught 9.2 trout on their most recent visit to their favorite stream. The majority of trout were between 6 and 12 inches (average catch rate of 5.45). Anglers had an average catch rate of 1.61 trout over 12 inches. Anglers kept an average of 2.5 trout.
- Mixed-method anglers had both the highest average catch rate (11.7 trout) and the highest average keep rate (3.3 trout). Bait-only anglers and fly-fishing-only anglers had the lowest average catch rates (7.3 to 7.5 trout), though there was a large difference on the keep rates for those two groups (0.6 trout for fly-only anglers and 3.2 trout for bait-only anglers).
- Catch rates are not correlated to ranking of favorite streams. This finding implies that there are other factors besides the number of trout caught that influence the angler's choice of a favorite stream.
- Bridge crossings are the most commonly used type of access (39 percent used this type of access). Private lands with easements play a significant role in providing access to 28 percent of all anglers.
- A majority of anglers fish within one-quarter mile and within one-half mile of their access point. Forty-seven percent of anglers fish within ½ mile to 1 mile from their access point. Twenty-five percent of anglers fish within 1 to 3 miles. About 10 percent of all anglers fish beyond three miles.
- Forty-seven percent of anglers felt that the access point was at least "somewhat crowded." This percentage decreases steadily as the angler moves away from the access point, with 12 percent of anglers fishing beyond three miles feeling that the area was at least "somewhat crowded."
- Ninety percent of all anglers participated in non-angling recreation activities while on their most recent trip to their favorite stream.

Opinions on trout management in southeast Minnesota

- Promoting agricultural practices to reduce erosion is thought to be the most effective strategy for improving stream health. Fencing out livestock, planting streamside vegetation to reduce erosion, and rip-rapping stream banks to reduce erosion were also thought to be at least "very effective" by a majority of anglers.
- The data indicates that there is strong support among current winter anglers for opening additional streams to winter fishing.
- Anglers enjoy having the opportunity for catch-and-release fishing in the early season (first half of April) even though they may not regularly fish that season. About 30 percent of all anglers fish in the early season. Three-fourths of all anglers indicate that the opportunity keep some fish in the early season would not increase how often they fish during that season.
- Anglers like the opportunity to fish the late season (second half of September), though only about one-third actually do so on a regular basis. Being allowed to keep some fish would get about one-quarter of all anglers to fish more often in the late season. Thirteen percent of all anglers indicated that they used to fish the late season but no longer do so because of the catch-and-release regulation.
- Two-thirds of all anglers feel that catch-and-release regulations improve trout abundance, that the regulations result in larger trout being caught, and that the use of barbless hooks results in lower fish mortality.
- A slight majority of anglers feel that slot limits are an effective way to increase the catch rate of large trout and that slot limits improve overall trout abundance. Seventeen percent of all anglers indicate that the slot limits keep them from fishing certain streams as often as they would like.
- There is not a strong consensus among anglers that special regulations should be based solely on biological information, or that regulations should not be based on social reasons. Two of every five anglers are neutral on these issues.
- All anglers would prefer to catch at least one trout. They would prefer to catch an average of about 12 trout per day
- The average bag limit suggested by anglers (rounded to integers) was 3 brook trout, 3 brown trout and 3 rainbow trout. Anglers suggested an average total bag limit of 5 trout per day per angler. Fly-fishers suggested the lowest average bag limits and bait-fishers suggested the highest average bag limits.
- The DNR has three primary information sources used by southeast Minnesota anglers. The trout map, access guide, and/or web-site are used by four of five southeast Minnesota anglers. This speaks well for the quality of these information products–they are heavily used, and it indicates that the DNR has excellent communication modes for education and information dissemination.

Satisfaction and benefits of trout angling in southeast Minnesota

- Anglers define a "large" trout as being at least 16 inches for brown trout, 12 inches for brook trout, and 15 inches for rainbow trout.
- One-quarter to one-third of all anglers feel that catching a "large" trout is not at all important to their satisfaction with their fishing experience. On average, anglers feel that it is slightly to moderately important to catch a "large" trout.

- Eighty-seven percent of all anglers indicated that they were either satisfied or very satisfied with the overall fishing experience on their most recent trip to their favorite stream. Approximately three out of every five anglers are satisfied with the number and size of trout caught, while one out of five are dissatisfied.
- On average, anglers indicate that their overall experience of fishing in southeast Minnesota has slightly increased since they first began fishing the area. Forty-four percent of anglers indicated that their satisfaction has increased; 35 percent indicated that their satisfaction has stayed the same; and the remaining 21 percent indicated that their satisfaction has decreased. The number of years anglers have been fishing southeast Minnesota does not affect their satisfaction scores.
- On average, the abundance of large brown, brook, and rainbow trout are perceived to have decreased slightly over time. Additionally, the abundance of brook trout (all sizes) is perceived to have decreased over time. Abundance of brown trout (all sizes) and rainbow trout (all sizes) are perceived to have increased. The numbers of other anglers who are fly-fishing, lure-fishing and bait-fishing are all perceived to have increased over time. Special rules and regulations, access to streams, and the number of stream improvement projects also are perceived to have increased over time.
- The are strong positive relationships ($r > 0.72$) between satisfaction and the perceived abundance of large trout (all species) and also with the abundance of all sizes of trout (all species). There is a weak negative relationship ($r = -0.36$) correlation between satisfaction and the number of lure-fishers on stream and also with the number of fly-fishers on stream ($r = -0.21$). There is a weak positive relationship ($r = 0.19$) between satisfaction and the change in the bag limits. There is a strong positive relationship between satisfaction and the change in the amount of access to streams ($r = 0.72$) and also with the number of stream improvement projects ($r = 0.70$).
- The most important general benefits of angling in southeast Minnesota include "enjoying nature and the outdoors," "being in a quiet and peaceful place," "enjoying natural scenery," "relaxing," "getting away from crowds of people," and "giving your mind a rest."
- The most important fishing-specific experiences and benefits include "fishing in a wilderness setting," "catching at least one trout," "fishing in a rural setting," "catching at least one trout over 6 inches," and "catching at least one trout over 12 inches."

Desired stream and setting characteristics

- Anglers indicated how desirable 27 different setting components were to their satisfaction when fishing in southeast Minnesota. The items are grouped into four categories: water, bank vegetation, visual/ viewshed, and management.
- On average, anglers prefer medium streams that are 10-25 feet wide with a mix of both fast and slow water that is usually clear, even in times of high water.
- Partial canopy cover is preferred over complete cover and over no canopy cover. Low brush or grass is preferred over tall brush on banks.
- The most desirable viewshed is a view of hills or bluffs followed by a view of forest with open understory, a view of dense forest, a view of open unplowed fields, and then individual farms/houses spaced far apart. Pasture with animals is neutral, views of roads have a slight negative rating, and a view of housing subdivisions has a strong negative rating.

- On average, the most popular management characteristic is signs telling rules at access points, followed by special regulations for the stream, signs telling about the area at access points, and lastly, obvious stream improvements.
- Stream setting data will be merged with physical stream data and benefit data to help develop a potential stream classification system. That classification effort will be reported in a subsequent report.

Appendix B

Executive Summary of Public Input Meetings, March 2003

Five public input meetings were held in the spring of 2003 to gather input to assist in the development of a MNDNR Division of Fisheries strategic plan for coldwater resource management in southeast Minnesota. One hundred and sixty-nine individuals participated in the meetings and provided 210 comments. Participants also were given three dot stickers to place by their highest priority issue(s) on flip chart displays. Fishing regulations and watershed management were the number 1 and 2 issues respectively for all meetings combined and were either ranked 1 or 2 for all individual meetings. Together they combined for over 60 percent of the comment preference point totals. Habitat, acquisition, and stocking followed, totaling about 25 percent of comment preference sums.

The five public meetings were held from March 24 to April 1, 2003. Attendance was moderate based on expectations. Despite an extensive notification campaign which included mailings and postings to 51 sportsmen's clubs, 156 local businesses, 32 metro area businesses, 15 legislators, and members of the Wells Creek Watershed group (46), turnout was similar to other trout management input meetings held in the area in recent years. Although no demographic information was collected from participants, based on cursory observation, the clientele was largely male, predominantly ages 30 to 60, and composed primarily of trout anglers.

Participants in the five public meetings had diverse and complex comments relating to management of southeast Minnesota coldwater resources (Nelson 2003). Comments relating to the pros and cons of managing for large trout using three-tiered regulations, slot limits, and catch-and-release only regulations ranked number one among issues of interest. Concern of this approach to trout management was voiced by a minority of participants, including fair resource allocation, impacts on kids and family fishing, and loss of fishing opportunities.

Watershed management and associated activities was a close second in importance to meeting participants. Favorable comments focused on the need for government agencies, including DNR Fisheries, to form partnerships with each other and with private individuals and groups including landowners, agriculture interests, and conservation groups. Comments on improving water quality, riparian corridor management, reducing flooding and stream degradation, and the need for private land programs were also made. Some trout anglers were concerned about DNR Fisheries moving from traditional areas to watershed work, although, it appeared most comments recognized the need to manage coldwater resources on a watershed-scale.

The importance of habitat and habitat management to participants was evident by many comments over a broad range of topics, including habitat management in the context of a watershed approach; making habitat improvement areas more fishable; concern over the deterioration of older in-stream habitat work; and habitat improvement methods to enhance multiple life stages of trout, forage, invertebrates, and the entire coldwater community.

Acquisition and stocking, though ranked numbers four and five in relative priority, did not receive comments anywhere near their proportion of staff and financial resources currently devoted to them. Comments on acquisition focused on continued pursuit of fisheries easements, purchasing fee title parcels, finding alternative funding sources, concern over loss of angling access to private posting, and landowner assistance and recognition programs to improve the environment for the easement program.

Stocking comments focused on the need to minimize stocking and manage for wild trout, reintroduction of brook trout, reducing catchable stocking in habitat improvement areas and on top of wild trout populations, and the need for healthy genetic strains of trout.

Results of these meetings must also be viewed in the context that they represent a non-random sample. While providing useful information on issues, they must be viewed as only part of the public input process. Encouraging and recruiting broad-based participation at public meeting forums continues to prove difficult for MNDNR Fisheries. Issues and attitudes evaluated through random-based surveys such as the recent study of trout anglers in Southeast Minnesota (Vlaming and Fulton 2003), or the economic impact study of coldwater angling in Minnesota (Fulton et al. 2002) will give less biased results. However, direct participation by concerned citizens and anglers in a face-to-face forum benefits both agency staff and citizens alike and provides valuable input on future planning efforts.

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Appendix C

Division of Fisheries Long-Range Plan
Core Functions and Desired Outcomes

FY 2004-2010 Division of Fisheries Plan Overview

Core Function 1. Conduct Fisheries Monitoring and Research.

Outcome 1. Expand knowledge about fish populations, ecosystems, and management techniques among resource professionals.
Outcome 2. Improve individual lake and stream management and statewide trend information for decision-makers.
Outcome 3. Expand knowledge about angler attitudes, actions, and satisfaction levels among resource professionals.

Core Function 2. Protect, Improve, and Restore Fish Populations and Aquatic Habitat.

Outcome 1. Improve habitats so that they sustain healthy and fishable populations for recreational and commercial users.
Outcome 2. Expand access to aquatic resources for clientele and staff.
Outcome 3. Improve regulatory compliance of permitted or licensed activities.
Outcome 4. Expand quality and diversity of fishing opportunities for anglers.

Core Function 3. Propagate Fish for Stocking in Publicly Accessible Waters.

Outcome 1. Maintain appropriate genetic fish strains and healthy fish stocks that can be used to meet management strategies.
Outcome 2. Restore, enhance, or maintain fish communities where needed through stocking for anglers.

Core Function 4. Provide Opportunities for Partnerships, Public Information, and Aquatic Education.

Outcome 1. Expand participation and partnering in fish management activities with public, commercial, and other governmental bodies.
Outcome 2. Increase awareness of natural systems and their management among the public.
Outcome 3. Improve public support for the Division and its programs.
Outcome 4. Increase compliance of regulations by our clientele.
Outcome 5. Increase access to resource information for clientele and staff.
Outcome 6. Maintain or expand public participation in fishing.

Core Function 5. Maintain a Healthy, Productive Workforce and Appropriate Level of Program and Fiscal Accountability to Meet Work Needs.

Outcome 1. Maintain a skilled, knowledgeable, and diverse work force.
Outcome 2. Maintain healthy, safe, and productive working environments for staff.
Outcome 3. Maintain effective use of agency resources.

Appendix D

GLOSSARY OF TERMS

(for the purpose of this document)

Base Flow – Portion of water quantity derived from such natural storage sources as groundwater, large lakes, and swamps but does not include direct runoff or flow from stream regulation, water diversion, or other human activities (Williams, et at., 1997).

Diversity, Angling – variety of methods of angling and places to fish (access).

Diversity, Bio – Biological Diversity. Noss (1997) defines Biodiversity as a hierarchy of biological components comprising genetic, population-species, community-ecosystem, and landscape levels. Each level includes compositional (e.g., identity and relative abundances of species or habitat types), structural (e.g., size structure of a population, sequence of habitat types), and functional components (e.g., demographic processes such as birth rates or mortality, evolutionary processes, or geologic processes). Within the context of the southeast Minnesota coldwater plan, biodiversity is that diversity which would occur naturally in an undisturbed system. The key words are "natural" and "undisturbed."

Diversity, Species – The number and relative abundance of different fish species, primarily trout, present for angling.

Easy Access – A non-developed location where handicapped individuals can access a stream recognizing that some minor difficulties may be encountered.

Ecosystem – A broad-scale landscape that includes all biological, chemical, and physical elements and their dynamic interactions with one another. Smaller-scale ecosystems can be nested within larger-scale ecosystems. An example of a large-scale ecosystem is an entire watershed; and smaller scale ecosystems, such as forest, riparian, and stream can be nested within it. Larger and smaller-scale ecosystems are interconnected, typically with larger-scale ecosystems influencing smaller-scale (e.g., downslope) ecosystems.

Ethical – Action that follows environmental laws or regulations. For the purpose of this document, it does not include personal ethics that go beyond the law. Example: Throwing back all fish in a catch and release area would be ethical. Keeping a fish in an area that allows take is also ethical. If you throw garbage on the stream bank, it is unethical because it is illegal. Not picking up someone else's garbage is not unethical as there is no law requiring it.

Field Stations (southeast Minnesota) – Crystal Springs Hatchery, Lake City Area, Lanesboro Area, Lanesboro Hatchery, Peterson Hatchery, and Rochester Area.

Habitat Improvement (HI) – Removing, adding or changing physical features of a stream for the purpose of increasing the habitat for fish. Does not include work done outside of the streambed and bank unless directly affected, such as removing box elder trees from a stream bank to encourage grasses.

Native Trout – Present in Minnesota prior to European settlement.

Natural Trout – A product of natural reproduction

Self-Sustaining – A fish population not requiring stocking on a regular basis.

Water Quality – Physical, biological, and chemical properties of water.

Water Quantity – The volume of water passing through a stream cross-section per unit of time (Gordon, et al., 1992).

Wild Trout – Includes any trout (native or non-native) that is a product of parents that spawned naturally and has spent its entire life in a natural stream environment. Wild trout may include the offspring of hatchery raised trout that reproduced in a natural environment.

Watershed – All land enclosed by a continuous hydrologic drainage divide and lying upslope from a specified point on a stream.

Watershed Management – The management of the natural resources of a drainage basin primarily for the *production and protection of water supplies and water-based resources and recreation*, including the control of erosion and floods and the protection of esthetic values associated with water (Society of American Foresters (1944) as cited in Wesche and Isaak, 1999). Within the context of this plan, watershed management includes several components:

1) Collecting hydrologic, water quality, and land use information
2) Educating, informing, and lobbying landowners; lawmakers; agencies; local government; etc.; to help them make wise land-use decisions and motivate them to change behavior
3) Developing partnerships with agencies and user groups for the purpose of planning and coordination of efforts to improve land use practices in the watershed. This includes using these partnerships to leverage funding from private and public sources and changing policy. Examples: Local Water Planning, Blufflands Team, Whole Farm Planning, etc.
4) Participation within watershed groups to provide encouragement, technical support, and scientific information in the pursuit of healthy eco-systems. Fostering natural resource stewardship principles among public and private landowners and land managers is an important role for southeast Minnesota field stations, but the landowner plays the key role in being responsible for maintaining and perpetuating resources under his/her care.
5) Developing relationships with individual landowners. (NRCS modeling data shows that most watershed land use problems come from a relatively small number of landowners (10 percent). Typically, these individuals do not participate in government cost/share programs and generally do not trust government.)

Watershed Approach – Using watershed management to accomplish a goal.

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