Performance Report

Minnesota Department of Natural Resources

January 1999

DNR Performance Report - Outline

I. Managing for Sustainability

A. The DNR Strategic Plan

The DNR addresses its mission through a planning process called **Directions**. The **Directions** process has created a vision statement, goals, and strategies.

1. DNR Vision: The DNR vision statement is: *"To work with people to manage the state's diverse natural resources for a sustainable quality of life."*

The vision presents two important guiding concepts. One is the importance of working **with** people. Working with people includes a focus on communities of interest and communities of place. The second concept is **sustainability**. Sustainability focuses on the need for resources to serve balanced, long-term goals that support the community, economy and the environment. Sustainable management occurs when society's need for natural resources and the benefits provided by ecosystems are satisfied, without damaging the ecosystems's ability to supply these needs over the long term.

2. DNR Goals: Directions 1997, the document that expresses DNR goals for the 1997 biennium, identifies two goals:

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

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

These goals guide the work of the DNR.

3. Strategies:Directions 1997 identifies ecosystem based strategies for meeting the goals. These strategies are the foundation upon which accomplishments will be built. They are:

- expand partnerships with other agencies, organizations, and citizens to develop common resource management goals,

- provide technical assistance and information to these DNR partners,

- encourage landscape and watershed approaches to managing resources.

4. Sustainability Issue: Increasing demand on natural resources along with changes in land use and outdoor recreation threaten the sustained use of Minnesota's ecosystems. Environmental degradation, invasion of exotic species, and fragmentation caused by land use conversion are diminishing the state's natural resource base. These threats require changes in the way society views and resolves resource problems. Minnesota needs ecosystem-based approaches that focus effective cooperation on resolving these problems.

This report measures DNR effectiveness in addressing these challenges.

B. Measuring DNR Performance

The purpose of DNR's performance measurement system is to promote sustainable natural resource management and demonstrate greater accountability for results. The ultimate measure of DNR performance is the condition of the state's ecosystems and their ability to provide benefits to Minnesotans over the long term. Citizen involvement in the stewardship of the state's natural resources is a key to achieving sustainability. The DNR vision, goals, and strategies emphasize resource sustainability and working with people.

The DNR and its partners are developing a better understanding of how ecosystems satisfy the social and economic needs of Minnesotans. This understanding has led DNR to focus on sustaining entire ecosystems (e.g. forests) as well as single resources (e.g. timber). DNR's ecosystems based management effort seeks the participation of Minnesotans in managing our natural resources. It also requires a retooling of the way DNR measures performance.

The very nature of the DNR mission requires the organization to:

- **Satisfy diverse interests:** Minnesota's ecosystems meet the environmental, community, and economic interests of a diverse population. These interests often conflict.

- **Stay scientifically and technologically advanced:** DNR addresses issues at the cutting edge of science and technology, such as investigating how commonly used chemicals function as hormone inhibitors.

THE DNR ORGANIZATION

The DNR has seven divisions, (Enforcement, Fisheries and Wildlife, Forestry, Minerals, Parks and Recreation, Trails and Waterways, and Waters) *and eight support units* (Engineering, Field Services, Human Resources, Information and Education, License Bureau, Management Information Systems, Office of Management and Budget, Real Estate Management).

DNR divisions have primary responsibility for specific resources. Management approaches are cooperative, recognizing that no resource exists independent of other resources. For example, deer depend on a healthy forest for cover and food; healthy forests depend on stable water resources. DNR divisions cooperate with stakeholders to manage broad communities of resources as entire ecological systems.

DNR support units provide essential services to DNR divisions and to the public directly. By consolidating services under support units, divisions can focus on their primary resource management mission.

The DNR has a regional and field organization that works directly with resources, local communities and customers. Six regional offices (Bemidji, Grand Rapids, Brainerd, New Ulm, Rochester and Metro) *and numerous area offices provide these services throughout the state.*

- **Manage with a long-term perspective:** Many resources require long periods to mature (e.g. forests). They respond slowly to management efforts or naturally include long time lags.

- **Remain flexible:** Society reframes resource use and preservation expectations continually. Science and technology present new tools and challenges at an ever quickening pace. The DNR must retain the ability to adapt to changing stakeholder needs and incorporate new technologies.

There are different types of performance measures or indicators. Traditionally, DNR performance has been based on activity measures (i.e. the number of permits issued, the number of programs completed). Activity measures are, at best, an indirect measure of what counts most—healthy environmental conditions and sustainable resource benefits.

This report focuses on resource systems and emphasizes both activity and outcome measures. Outcome measures reflect results in terms of environmental conditions and benefits. *Taken together, activity and outcome measures highlight key sustainability issues.* In addition, this report uses targets and goals to measure performance. Targets and goals guide long-term efforts to reach certain sustainability conditions.

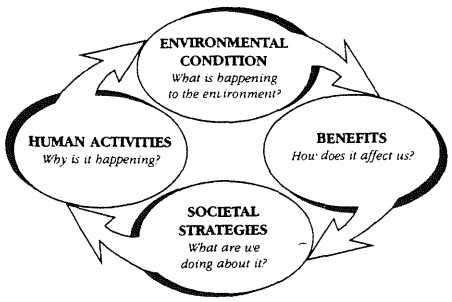
Focusing on whole resource systems, rather than on individual resources, gives a better picture of overall environmental and natural resource sustainability. DNR performance is described in six resource systems and one strategy section addressing education and enforcement approaches:

- **Water** includes rivers, lakes, wetlands, and groundwater.

- **Agriculture/Grasslands** includes grasslands, and brushlands.

- **Forests** includes the mixed conifer hardwoods of the north and hardwood forests of the south.

- **Sensitive and Threatened Habitats** include rare ecological communities.



Environmental Indicators Initiative

The Environmental Indicators Initiative is an interagency project funded through the Legislative Commission on Minnesota Resources to develop a comprehensive set of indicators that track:

- *What is happening to the environment, (environmental condition)*
- *Why it is happening (human activities),*
- *How it affects people, (benefits) and*
- *What is being done about it (societal strategies).*

Indicators inform environmental decision making at the local level and help summarize conditions of ecosystems statewide. The

- **Urban Systems** include metropolitan areas throughout the state and regional growth centers where human dominated habitat systems are interspersed among natural habitats.
- **Outdoor Recreation** includes the broad range of DNR facilities and public land and water that serve outdoor recreation demands.
- **Education and Enforcement** addresses how these activities contribute to the management or the resource systems described above.

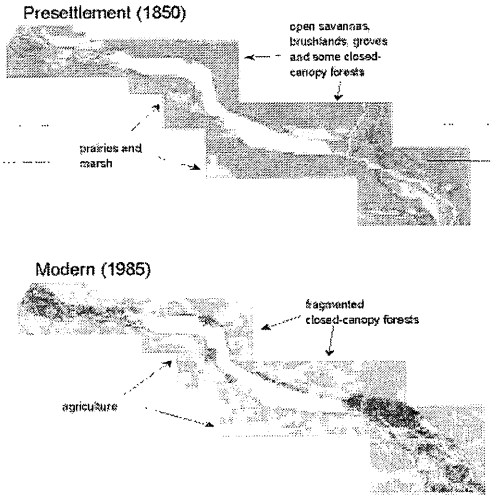
This approach to measuring performance:

- Highlights partnerships as critical to the success of DNR's work. It more accurately reflects the range of resource values that the DNR protects and manages with its partners.
- Helps clarify DNR's role and defines remaining needs to better manage resources and to more effectively measure performance.
- Better integrates information to demonstrate accountability for results.

This report is a first step toward better measurement of DNR performance in managing natural resources. It uses the best available information to reflect the broad scope of DNR environmental activities. Future performance reports will build on this effort to measure that long-term sustainability.

II. Measuring Performance

Water Resources



Mississippi River Ecosystem Decline

The once-dynamic and biologically diverse ecosystem of the lower Mississippi River in Minnesota is declining dramatically and perhaps irreversibly due to human activities on the river and in its watershed. In 1850, the Lake Pepin area was a diverse natural landscape that included tallgrass prairies, brush lands, oak savannas, maple-basswood forests and lowland forests. The river supported a rich array of fish, waterfowl and aquatic plants.

Today, much of the original habitat is gone. The river has been tamed by a system of locks and dams, and is used extensively for commercial navigation and recreation. Unwise land uses in the watershed deliver a noxious mixture of sediment, chemicals and sewage into the river.

As a result, permanently flooded backwaters have replaced seasonally flooded habitats; in some reaches 90% of the islands have been lost; waterfowl food sources [water celery, fingernail clams, etc.] have declined. Impacts on fish and wildlife have been telling. Mink populations declined drastically in the 1960s; the once countless flocks of lesser scaup and canvasbacks have declined precipitously; mussel diversity declined from about sixty species in the 1920s to only thirty today. These and other losses may be irreversible.

Background

Minnesota's aquatic resources include more than 15,000 lakes, 29,900 miles of rivers, 33,400 miles of intermittent streams 23,400 miles of drainage ditches, and nearly 10 million acres of wetlands. The aquatic heritage is a defining component of the state's varied ecosystems and is a major element in both tourism and economic development.

Lakes are what many people identify with Minnesota outdoors. They provide shoreland housing sites, recreation and economic opportunities, and serve crucial natural functions essential to many ecosystems and species of plants and animals.

Ground water is often overlooked as an element of the state's water resources. Ground water distribution is uneven around the state; in quantity it exceeds the water volume of the state's lakes, wetlands and rivers combined. Ground water use has been fairly constant in recent years, and many wells indicate stable ground water levels. 70% of Minnesotans derive their drinking water from ground water.

Critical issues threaten the sustainability of Minnesota water resource use.

- Contamination threatens some ground water supplies, e.g. in southwestern Minnesota, rising nitrate levels pose health concerns. Information gaps on important hydrological relationships make it difficult for state and local governments to develop effective ground water plans.
- Recent wet years may mask trends that could be a concern during future droughts. Some aquifers already show declining water levels suggesting that some ground water withdrawals may exceed recharge rates. As urban areas increase their withdrawal from aquifers, ground water supplies may be inadequate, especially during periods of drought.
- Some rivers, like the lower Mississippi, have been so seriously impaired by erosion and contamination, that sharp ecological declines are occurring.

- Rapid development of the state's shorelands removes essential habitat, contaminates water resources and leads to recreation use conflicts.

- Some lakes have rapidly become "hypereutrophic" resulting in severe damage to their plant and animal populations.

- Exotic species compete with native specie, and interfere with recreational activities.

WATER RESOURCE MANAGEMENT ROLES

DNR shares responsibility with other state and local environmental agencies for sustaining the quality of Minnesota lakes. For example, DNR provides technical assistance to more than 250 units of local government that manage shoreland development and more than 450 local government units that regulate construction in the flood plain.

The DNR has primary responsibility for sport and commercial fisheries and wildlife populations, and exotic species.

STRATEGIES

1) Water supply and protection

Manage water resources to ensure their equitable and sustainable use and to promote natural flows and levels.

- Apply more comprehensive and long term water resource management approaches by developing partnerships with other water management agencies, organizations, and citizens.

- Intensify cooperative efforts to protect lake resources from the impacts of shoreland development and incompatible and competing uses.

- Continue to develop cooperative watershed approaches to managing lakes and rivers.

2) Natural processes and diversity

Conserve aquatic biological diversity and foster natural processes that help sustain water quality.

- Foster adoption of Best Management Practices on all public and private shorelands.

- Limit transportation of exotics through inspections and education as called for in the Exotic Species Management Plan.

- Restore natural conditions in degraded rivers and streams through cost-share and easement programs to reduce erosion, improve water quality and enhance habitat.

Heron Lake Eutrophication

Eutrophication occurs when too many nutrients disrupt ecological processes. Too much phosphorus can cause algal blooms, deplete oxygen, kill fish, and destroy beneficial aquatic plants.

Eutrophication seriously damaged Heron Lake in southwestern Minnesota. Once heralded as the Chesapeake Bay of the Midwest, the 472 square mile lake became rapidly eutrophic and no longer suited to the thousands of waterfowl that once stopped there during fall migration. Damage to Heron Lake occurred over decades from agricultural practices and upstream waste treatment plants. Rapid decline occurred, however, since the 1980s. To save Heron Lake, DNR helped develop a coalition that includes Ducks Unlimited, PCA, U.S. Fish and Wildlife Service, Heron Lake Game Producers Association, The Nature Conservancy, and local citizens. The effort seeks to reduce erosion and sedimentation, maintain water levels, and reduce phosphorus inputs from treatment plants. Recovery may take decades.

Lake Water Quality Trends

Lakes meeting the swimmable water quality criterion

Total Acres Surveyed	Good	Fair	Threatened
2,218,269	68%	22%	9%

Fishing Satisfaction Survey

% of public satisfied or very satisfied With Fishing in Minnesota

—year—		
88	92	96
69%	72%	65%

Source: *DNR customer satisfaction surveys*

- Apply the state Wetland Management Plan and the Wetlands Conservation Act to reduce wetland loss and degradation.

3) Information Delivery

Improve understanding of the consequences of human activities on aquatic ecosystems.

- Use the Minnesota Flood Damage Reduction program to increase awareness and to reduce flood damage in Minnesota communities.

- In cooperation with the Minnesota Geological Survey, provide communities with an atlas and regional assessment of important hydrogeologic features. (e.g. County Atlases, maps, etc.) including assessments of ground water sensitivity to pollution.

Performance Measures

A. Lakes

1. Water Quality

Efforts by state agencies, local governments and citizen groups seem to be sustaining lake water quality. Lakes smaller than 200 acres, however, appear more susceptible to degradation than larger lakes.

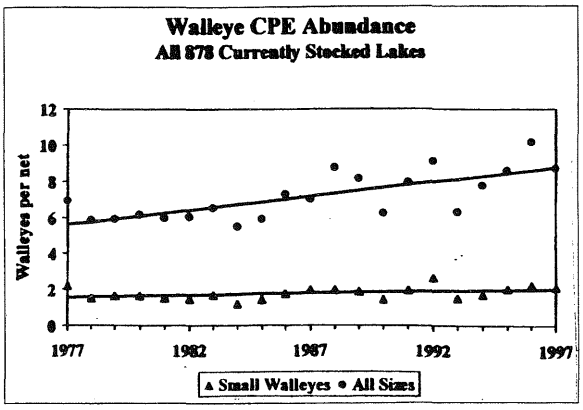
Lake eutrophication seems to be a growing problem, especially on lakes with small volumes of water. The DNR has good measures of lake eutrophication but little data to document the prevalence of the problem. The DNR will better document this concern in future performance reports.

2. Plant and Animal Populations

Sport fishing: Sport fisheries reflect both the health of a lake and potential user satisfaction with the fishing experience. Walleye populations have been increasing in stocked lakes since 1977 due to more effective stocking. The proposed accelerated walleye stocking program should result in increasing walleye populations in stocked lakes.

Loon Populations: Breeding loon populations provide another measure of lake condition. Loons fail to nest and reproduce in areas where recreation pressure during breeding season is high, lakeshore development is extensive, and water quality is poor. The DNR seeks to maintain loon populations at the level measured in 1989. As part of

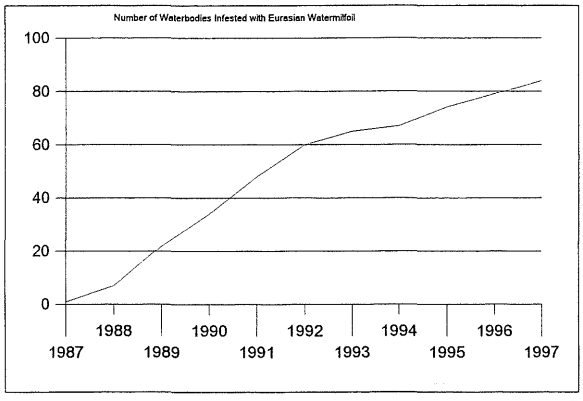
WALLEYE POPULATION TRENDS



Source: DNR Section of Fisheries

SPREAD OF EURASIAN WATER MILFOIL: 1982 - 1998

Number of Waterbodies Infested With Eurasian Water Milfoil



Source: DNR Exotic Species Program

SHORELAND DEVELOPMENT TRENDS
ITASCA COUNTY LAKESHORE HOUSING GROWTH

Type of Housing	1967-82 Percent Increase	1982-98 Percent Increase
Seasonal	65.6%	26.4%
Permanent	195.9%	32.9%
Total	103.4%	30.7%

Source DNR Office of Management and Budget

the Minnesota Loon Monitoring Program, citizen volunteers monitored 740 lakes in six areas during the 1994 - 1998 period. The proportion of lakes that support loon populations has remained constant since 1994.

Exotic Species: The DNR Exotic Species Program tracks exotic species and limits their spread. As a result of DNR efforts, more Minnesota boaters are aware of Minnesota's exotic species laws. Among boaters whose boats have been inspected, the number who are aware of exotic species laws has increased from 79% to 97% since 1993. Inspections of watercraft that spread exotic species increased from 11,261 in 1993 to 43,273 in 1997. Eurasian watermilfoil has been limited to only 96 lakes, suggesting that efforts may be slowing the spread.

3. Shoreland Development

Shorelands of Minnesota lakes (and rivers) continue to develop at a rapid rate. Between 1967 and 1982, the number of shoreland residences increased by 74%. Sampling of development in Itasca County suggests that shoreland residence totals grew by another 31% since 1982. Shoreland managers are increasingly concerned that shoreland development may lead to unsustainable conditions on many lakes. Surveys show that the public likewise is concerned. Only 45% were satisfied with DNR shoreland management in 1996. The DNR needs to better document how development patterns may lead to unsustainable conditions on lakes.

B. Rivers/Streams

1. River Water Quality

Human activities are degrading water quality and habitat in some of the state's major river systems, such as the Mississippi and Minnesota rivers. Water quality data are available for only 10% of the state's river and stream miles. Where data are available, water quality is fair to poor on more than half of the river stretches. This is a good measure of overall river quality and is a serious concern. However, since many agencies share responsibility for river and land use management, it is only an indirect measure of DNR performance.

2. Watershed approaches

Developing cooperative watershed approaches to managing lakes and rivers is integral to DNR ecosystem-based management efforts. This approach brings together stakeholders to address issues that are

PUBLIC SATISFACTION WITH DNR SHORELAND DEVELOPMENT MANAGEMENT

	% of public satisfied or very satisfied		
	---year---		
	88	92	96
DNR Management of shoreland development	53%	55%	45%

Source: DNR customer satisfaction surveys

WATER QUALITY ON MINNESOTA RIVERS

River miles meeting the swimmable water quality criterion

Total Miles Surveyed	Good	Fair	Treatened
4,264	30%	18%	52%

Source: Minnesota Pollution Control Agency

WHITEWATER RIVER RESTORATION

The Whitewater River was straightened decades ago to enhance drainage of wetlands within the river watershed. The changes improved the river's capacity to move water but damaged habitat in the process.

In the fall of 1998, the DNR Bureau of Engineering teamed up with the Division of Fish and Wildlife to restore a portion of the White Water River to its natural meandering channel. The restoration techniques used natural materials such as logs, root clamps, and boulders to create habitat and establish the new channel. The effort completely "re-engineered" the river and will yield significant improvements in river ecology.

fundamental to the way people interact with the environment. The DNR continues to improve its ability to work with communities by initiating and supporting watershed efforts statewide.

3. Habitat protection

DNR plays an active role in protecting and restoring habitat conditions on streams and rivers. Three elements of those efforts are habitat restoration, dam removal, and flood damage reduction.

Habitat restoration: Many of the state's rivers have been significantly altered. They have been channelized, straightened, riprapped, dammed and so severely modified that their value for habitat has been reduced significantly. The DNR re-engineers rivers to restore their banks and flow regimes to a more normal condition.

Because of their importance for recreation and sensitivity to modification, a special focus of habitat restoration has been trout streams. Minnesota has 2,600 miles of trout streams. To improve their sustainability, DNR conducts habitat management projects and assists private land owners to improve their land management techniques. The DNR has secured easements for habitat improvement on 200 of the 1000 trout stream miles in private ownership. DNR continues to acquire easements on high priority streams. Easement acquisition is an activity measure.

Brown trout populations require clear and cold water and are an outcome measure of habitat quality. Brown trout populations have steadily increased since 1970.

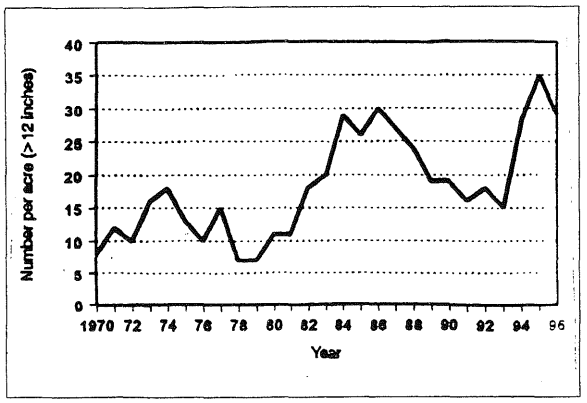
In the Twin Cities area, the DNR has established trout stream coordinators to develop cooperative approaches to manage the few remaining trout streams in the area. (See the Metro section for more detail.)

Dam removal: A major component of restoring rivers and streams to their natural conditions is dam removal. The benefits of restoring river channels include increased flow, improved water quality, expanded areas for fish spawning and migration, and reduction of injuries and fatalities of river users at dam sites.

DNR has removed dams at Hanover, New Ulm, Welch, Bening's Mill, Sandstone, Stewartville, and Stockton. Additional removals at Appleton, Frazee and Mazeppa are planned as funding becomes

available.

Brown Trout Population Above 12"



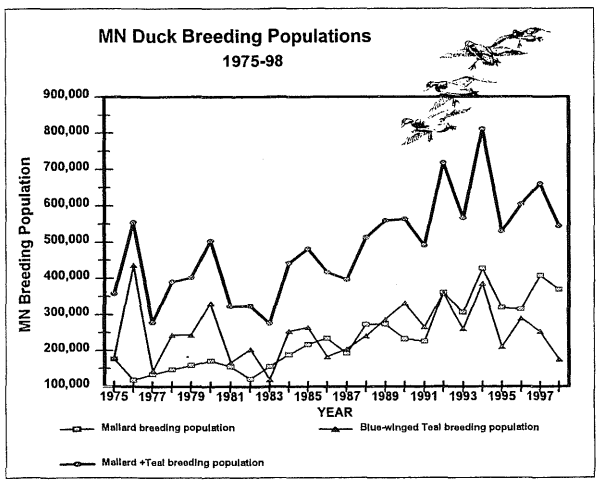
Source: DNR Section Of Fisheries

Flood Damage Reduction: The Flood Damage Reduction (FDR) program seeks structural and non-structural solutions to flooding problems including public education, comprehensive watershed management, flood storage easements, and floodplain and river restoration. Projects funded by the FDR program shield people and their communities from future disasters. For example, the flood control project in Oslo, Minnesota was built using $100,000 in local funding. This project has averted damages totaling almost $16 million in 1996 and 1997 alone. Flood damage reduction estimates for individual rivers are performance measures. The DNR does not have statewide estimates of flood damage reduction benefits.

C. Wetlands

Wetland acreage will be monitored to meet no-net-loss policies established in state legislation. While no-net-losses can be maintained, some wetlands will be drained to meet various economic and development needs. Losses are balanced by creation of new wetlands. New wetlands however do not always provide the benefits of natural wetlands.

Mallard/Teal Population Trends



Source: DNR Section of Wildlife

A larger challenge is maintaining the quality of wetland ecosystems. While wetland acreage may remain unchanged, water quality can be seriously impaired by pollution, erosion or other land use activities. The PCA has developed good indices of wetland quality. Data are available now for only a few wetlands.

One indicator of wetland health is duck breeding populations. Breeding populations show sharp annual fluctuations due to weather conditions and other factors. Long term trends are more important. The breeding populations of mallards and teal fluctuates but shows a long term increase.

D. Ground Water

Many agencies share responsibility for management and monitoring of ground water. The DNR lacks good outcome measures that would describe ground water sustainability. Funding received in FY 98 -99 is allowing development of better measures of ground water conditions and trends.

Red River Basin Coordination

DNR emphasis on early coordination with stakeholders is demonstrated in the Red River basin. The recently concluded Red River Mediation effort, cosponsored by DNR and the Red River Watershed Management Board, illustrates how divergent interests can come together on issues that have caused years of regulatory gridlock. The agreement sets up a new coordination process for flood damage reduction projects, identifies specific flood control and natural resource management goals and establishes guidelines for a new series of watershed based comprehensive plans for the basin.

DNR staff will work with watershed engineers, conservation groups and other agency personnel to develop collaborative solutions to the Basin's flooding and resource management problems.

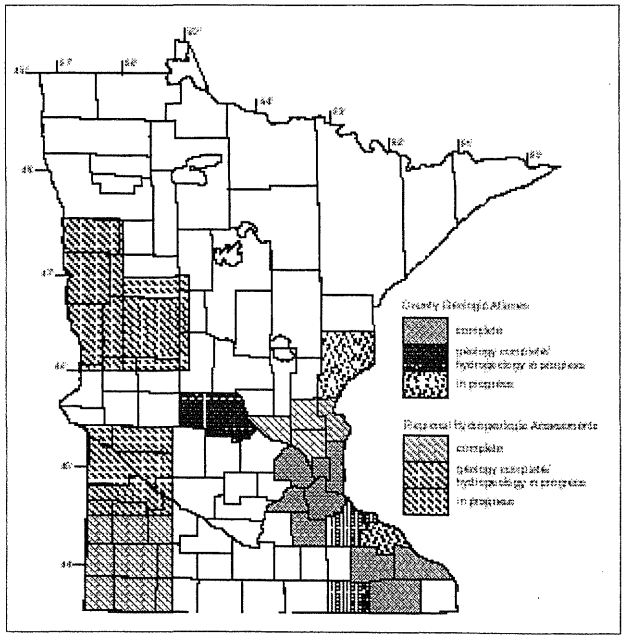
DNR assures accurate statewide water use data by annually processing about 6800 permits for water appropriations - an activity measure. These data assist in monitoring trends of statewide water use and, when paired with improved data on ground water and streamflow, will assist in defining the sustainability of specific water supplies.

Two activity measures of progress are delivery of ground water information to local government and the monitoring of ground water levels.

Sustainability Summary

Use and management of Minnesota's water resources presents a mixed picture of sustainability. Significant improvements in management based on broad, cooperative approaches have and will continue to support continued use of water resources for recreation, industry, residential uses and to safeguard natural processes. However, concerns such as shoreland development, pollution, erosion and other problems will continue to threaten the sustainability of many of the state's most valued water resources. Improved regulatory vigilance, increased monitoring, improved access to information, more educational opportunities, better defined and integrated roles for all water resource agencies, increased public and private accountability for decisions and actions and more partnerships to broaden the public's involvement in water conservation efforts are all needed to address the goal of water sustainability.

Status of County Geologic Atlases and Regional Hydrologic Assessments



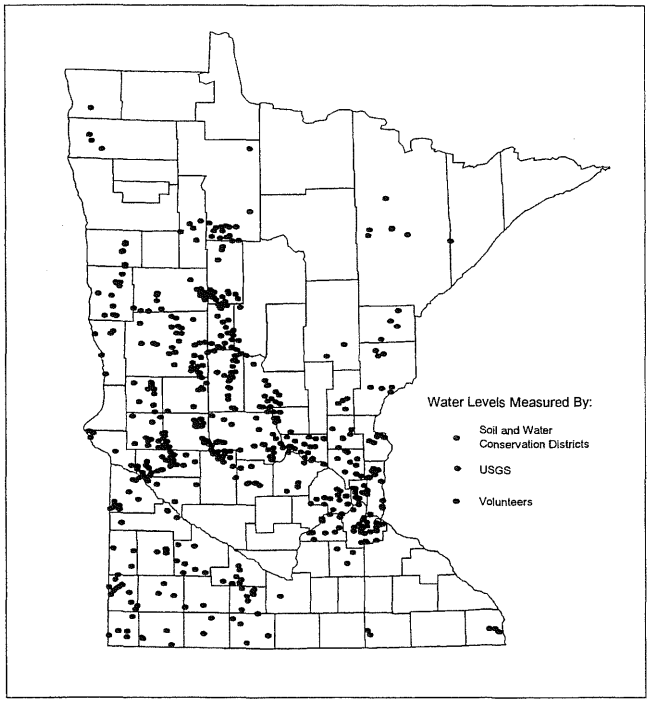
Source: DNR Division of Waters

Watersheds and Mining

Over 100 years of mining on the Mesabi Iron Range has resulted in large scale disruptions. With anticipated taconite mine expansion and emerging water management issues associated with past and current mining, there is a growing need for better resource data. Citizens, local government and industry are in need of basic information for the cooperative management of watersheds disturbed by mining to preserve and protect downstream resources.

DNR has been conducting hydrologic studies since 1996. The next step includes preparation of hydrogeologic base maps to serve as tools for community planning, and siting of overflow outlets and watershed restoration when a mine is closed. An immediate application will be to the inactive Canisteo Pit, where overtopping is anticipated in the next five years. Information is needed to resolve similar hydrologic problems at other ore pits.

Water Level Observation Well Locations



Source: *DNR Division of Waters*

AGRICULTURE/GRASSLAND RESOURCES

BACKGROUND

Prior to European settlement, native grasslands covered more than a third of Minnesota. Most of the estimated 18,000,000 acres of grassland were located in western and southern Minnesota. Almost all of the state's grasslands have been converted to agriculture. Less than 1% of native grassland remains.

Minnesota has other grassland resources, including 525,000 acres of cool season grasses in roadsides, 3 million acres of permanent pasture and native haylands, and several hundred thousand acres of grassland in government wildlife management preserves. Federal farmland retirement programs at their peak added another 1.5 million areas of primarily cool season grasses and Reinvest in Minnesota has converted about 65,000 acres of cropland to grassland.

The status of Minnesota grassland-dependent wildlife are good indicators of the quantity and quality of Minnesota grasslands. For example, 40% of Minnesota's rare plants and animals require native prairie. (Wilson's phalarope, prairie chicken, and marbled godwits are listed as species of special concern while loggerhead shrike, Henslow's sparrow, chestnut collared longspur and burrowing owls are state listed threatened or endangered species.) Other wildlife species rely heavily on undisturbed grasslands for nesting or brood rearing (e.g. ducks, pheasants, Hungarian partridge, rabbits, coyote, ground squirrels, redtailed hawks, kestrel, and bluebirds.)

STRATEGIES

DNR will promote partnerships between citizens, farmers, agencies and private groups to implement the following strategies at watershed and landscape scales.

1) Grassland protection

Protect remaining prairie from conversion to other uses.

2) Agricultural policy

Promote federal and state agricultural policies that will permanently protect existing native grasslands, and retire from production at least 1.6 million acres of highly erodible or frequently flooded crop land and convert to grasslands.

Glacial Lake Agassiz Stewardship Project

Northwest Minnesota's Glacial Lake Agassiz Interbeach Area contains 190,000 acres of pasture land, almost 40% of the state's Conservation Reserve program lands (750,000 acres) and an estimated 75,000 acres of native prairie. Statewide forage and grasslands contribute 15-20% of cash farm income, provide primary habitat for many wildlife species, are important to reducing soil erosion, and home to over 40% of Minnesota's rare and endangered species. The continuing decline of grass and forage based agriculture in the region and accelerating loss of biodiversity has brought the future of this region to a crossroads.

The Glacial Lake Agassiz project brings together a network of multi-agency projects plus individual efforts to better serve the region's interrelated environmental and economic problems. This Partnership believes that region-wide collaborative efforts can make a real and lasting improvement to stewardship to the Glacial Lake Agassiz Interbeach Area.

Activities include:

- *landowner workshops and field tours*
- *grassland demonstration projects*
- *Community education activities*
- *Cooperative resource assessments*
- *multi-agency/stakeholder training*
- *Internet information resources.*

3) Habitat improvement

Minimize roadside grassland disturbance during critical nesting periods and provide economic incentives to improve the quality and management of roadside cover on public and private roadsides.

Improve the quantity and quality of grasslands in state wildlife management areas.

Performance Measures

1) Grassland protection

Both activity and outcome measures describe performance in meeting grassland protection objectives. DNR has been deeply involved in developing cooperative forums (Glacial Lake Agassiz Ecosystem Stewardship Project and Clay County Beach Ridges Forum) for educating landowners on protection options that are economically viable to farming operations. These activities have significant potential for preserving the few remaining prairies in private ownership.

An important outcome measure is preventing addition of grassland-dependent plants or animals to the state list of threatened and endangered species. None have been added in recent years.

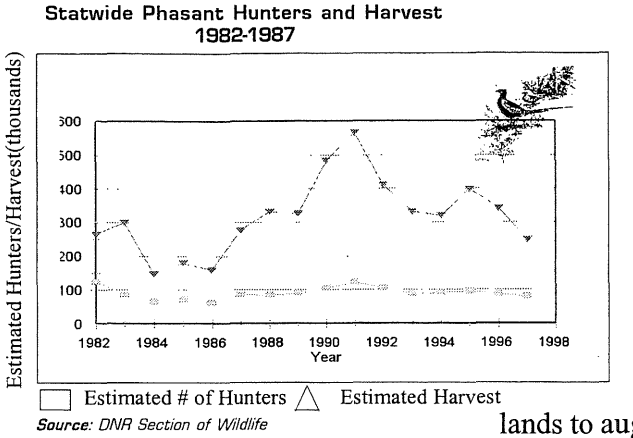
2) Agricultural policy

DNR has been actively involved at the state and federal level to influence agricultural policy that encourages stewardship of grassland resources. This activity has been highly successful judging from state (Reinvest in Minnesota) and federal programs (Conservation Reserve Program) that provide payments to set aside sensitive grasslands.

The population of ring-necked pheasants provides a good performance measure of the success in agricultural policy. Ring-necked pheasants are sensitive to loss of habitat (as well as weather and predation). Pheasant populations are closely related to acreage in set aside programs.

The DNR's target for pheasants is a fall population of 2 million birds and a harvest of 500,000 roosters. In 1997, there were an estimated 1,000,000 pheasants and 248,000 roosters were harvested. While populations are below targets, numbers have improved over years prior to the set aside programs. Land reserve programs will continue to be critical in determining sustainability of pheasants and other grassland resources.

Pheasant Population Trends



Source: DNR Section of Wildlife

3) Habitat improvement

A third element of DNR's strategy is enhancing the condition and acreage of grassland and prairie in state wildlife management areas and roadside rights-of-way.

The DNR attempts to improve 10,000 grassland acres annually. During the 1997/98 biennium, the DNR improved 21,000 acres.

The DNR establishes new prairie areas on public lands to augment remnant prairie found in private ownership. The target is to establish 6,000 acres of prairie annually. In 1998, DNR converted 3,046 acres of cool season grasses to prairie in state wildlife management areas and helped establish 2,128 acres of prairie on private lands.

Finally, DNR attempts to minimize disturbance of roadsides between April and August to less than 23%. In 1995, 35% of the roadsides were disturbed. DNR habitat improvement efforts are a crucial element in the long term sustainability of grassland resources.

Sustainability Summary

Conversion of grasslands to cropland has seriously depleted the state's grassland resources. Farmland retirement programs and land restoration efforts have helped grassland-dependent species. However, long-term success will depend on continuing farmland retirement programs, restoring native prairie, and protecting remaining native prairie tracts. Uncertainties posed by agricultural economics and federal programs raise significant concerns for the long-term sustainability of grassland resources.

Clay County Beach Ridges

Clay County's beach ridges, remnants of Glacial Lake Agassiz, are home to the largest and best examples of native prairie remaining in Minnesota. The beach ridges also are an important source of sand and gravel that supports growth of Fargo/Moorhead.

In 1995, a local forum met to discuss gravel mining and prairie protection in Clay County. The forum provided an opportunity for land owners, gravel producers, supporters of native prairie, citizens and governmental agencies to learn about the prairie and gravel resources. A final report recommended improved stewardship of natural resources to avoid future prairie and gravel conflicts.

Several cooperators formed a committee to act on key recommendations. The committee initiated several cooperative projects.

- *Gravel pits on public land are being evaluated to determine which contain aggregate reserves and which are candidates for reclamation.*
- *A major public/private collaborative project to reclaim an abandoned pit is underway in Buffalo River State Park using public pit reclamation funds.*
- *Cooperative aggregate drilling projects in the Felton Prairie area will help balance aggregate and ecological resources on public lands.*

AGRICULTURE/BRUSHLAND RESOURCES

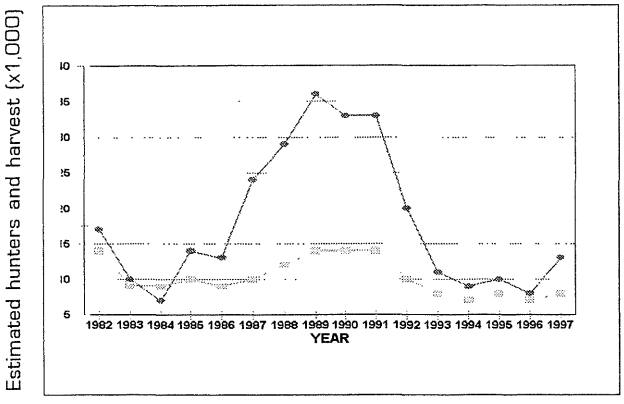
BACKGROUND

Brushlands are some of the state's most important wildlife producing habitat. They consist of a wide range of upland and lowland vegetative communities. On wetter sites, they are often called shrub swamps or shrub bogs. The drier, upland areas consist of shrub thickets, small tree groves, and wet meadows. Brushlands are maintained by natural and human disturbances including fire, grazing, flooding, and chemical treatments.

Certain wildlife species (sandhill cranes, sharptailed grouse, savanna sparrows) rely on shrublands. Other species, such as deer and moose, frequently use brushland habitats. Brushlands decrease runoff, provide flood control, reduce erosion, and recharge ground water supplies.

Sharptail Population Trends

MN Sharp-tailed grouse hunters/harvest 1982-1997



Brushland acreage is declining. In many areas fire suppression has allowed brushlands to mature into forest communities. While this benefits forest ecosystems, it represents a decline for brushlands. In other areas, brushlands have been converted to cropland. The loss of these brushlands causes a decline in wildlife species that depend on this habitat. For example, the decline in brushland acreage has resulted in an annual loss of about 15% in sharptail grouse dancing grounds. Sharptail harvest by hunters has declined steadily from 36,000 birds in 1989 to only 17,000 in 1998. These declines indicate concerns for the sustainability of brushland habitats.

MANAGEMENT STRATEGIES

1) Inventory habitat

Inventory the extent and quality of brushlands.

2) Manage for brushland habitat

Apply brushland management techniques - applied burns, mechanical and chemical treatment - to public and privately owned brushland areas.

Increase prescribed burning of brushlands, expand technical assistance, and increase coordination with other public and private land managers to preserve and enhance habitat on brushlands.

3) Research

Accelerate research on brushlands to better document their ecological and economic value to Minnesota.

Performance Measures

1) Inventory

The DNR is undertaking a long-term assessment that identifies priority landscape areas for brushland management.

2) Habitat Management

DNR management efforts seek to improve brushlands habitat throughout the state so that populations of wildlife species dependent on the habitat are either stable or growing.

One target is to improve 6,200 acres of brushlands using prescribed burns and shearing. 31,480 acres of brushlands were enhanced in 1998. This is a major accomplishment beyond the targeted goal.

Sharptail grouse populations are a good indicator of the availability of brushland habitat and harvest by hunters is a good indicator of sharptail grouse populations. The DNR target is an annual harvest of 40,000 sharptail grouse; 17,000 were harvested in 1998. While progress is being made in many efforts to preserve brushlands habitat, wildlife populations are below target.

3) Research

The DNR will continue to explore the economic potential of harvesting brush as a bio-mass for fuel. The DNR in partnership with the Natural Resources Research Institute has received Legislative Commission on Minnesota Resources funding for a two-year study. Findings will guide future management efforts.

Sustainability Summary

Continued drainage, conversion to other uses and fire suppression have reduced the extent of brushlands and reduced wildlife populations dependent on brushlands habitat. Brushland losses on private land continue at the same time that DNR and other land managing agencies seek to expand and improve brushland habitat. Large brushland ecosystems in public ownership, e.g. Thief Lake Wildlife Refuge, are islands of brushland. Lost or degraded habitat elsewhere seriously impairs the sustainability of brushlands wildlife statewide. The DNR will be unable to meet brushland targets until trends in the sustainability of private brushlands are reversed.

Parkland Ecosystems

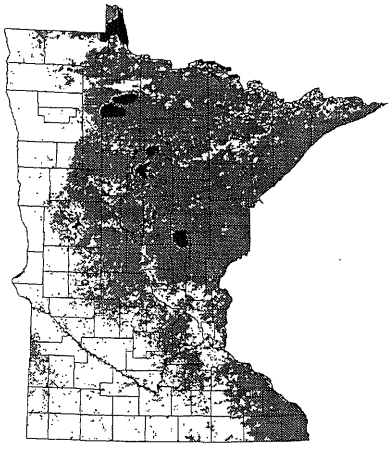
The large expanses of brushlands in northwestern Minnesota are called the aspen parklands. These brushlands provide habitat for many species and especially for some of the state's rarest plants and animals. The County Biological Survey discovered 35 new locations for the very rare yellow rail in the aspen parklands. The survey also identified 285 new locations for six other rare birds species, four locations for rare mammals, 19 for rare butterflies and nearly 200 sites for rare plant species.

Success in Preserving Brushland

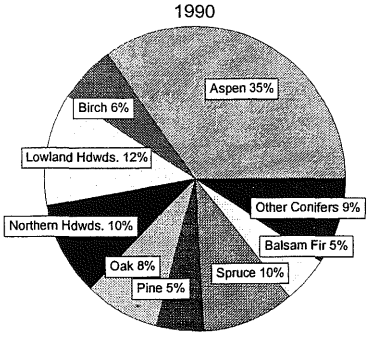
Efforts to convert brushlands to cropland in northwestern Minnesota met with many failures. The great depression left thousands of acres of such land languishing on county tax forfeit lists. Beginning in the 1960s, DNR worked closely with Kittson County to establish large brushlands habitat management areas. The Nature Conservancy purchased additional large blocks to add to the system. The result is Beaches Lake and Caribou Wildlife Management Areas. These are the two largest contiguous blocks of tallgrass aspenland in the United States.

Forest Resources

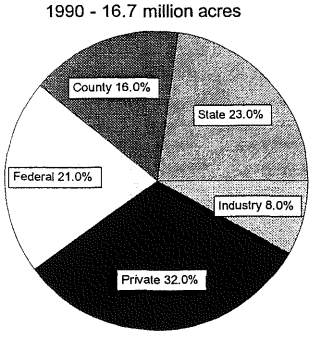
Forest Land in Minnesota: 1990



Minnesota Timber Land by Forest Type: 1990



Mn Forest Land Ownership: 1990



Background

Forests cover about 16.7 million acres or nearly one third of Minnesota. Minnesota's deciduous, coniferous and mixed forest communities contains more than 50 tree species in 14 major forest types. Forest types are based on the most common species or mix of species within a forest stand. The aspen type is the most common, occupying one third of the State's forest area. Black spruce occupies the largest area of any conifer forest type stretching over large areas of northern peat bogs.

Forest ownership is diverse with more than 147,000 individuals owning about a third of the total forest area. The State of Minnesota is the single largest landowner with about 23% of the forests. Various federal agencies own 21%; counties own 16%; and forest industry and other corporations own another 8% of the forests. Some forests exist in sizeable blocks under a single ownership. Most forest land, however, lies in areas of intermingled ownership. This ownership mix poses special management challenges since forest are best managed as entire ecosystems.

Between 1850 and 1900, much of Minnesota's original pine forests were harvested and substantial forest areas were cleared. This loss of forest land and changes in species composition and age structure decreased the diversity of Minnesota forests. Some forest types and age classes are now rare; e.g. only small, disconnected parcels remain of the once vast expanses of maple basswood forests. Tree and animal species dependent on large blocks of forest land are at greatest risk when forests are fragmented.

Minnesota forests rebounded from the initial wave of harvest at the turn of the century. Forest acreage has increased from a low of 11.9 million in 1895 to today's 16.7 million acres. Wood harvested from Minnesota forests has steadily increased over the past 15-20 years, yet growth still exceeds harvest for nearly all tree species. Some forest dependent wildlife species once declining (e.g., timber wolf and bald eagle) are successfully recovering.

Projected harvest increases will help maintain the state's healthy forest-based economy and address growing demands for forest products. However, the DNR and other forest landowners will continue to need implementation of a number of important

management strategies to ensure the long term health and productivity of the state's forest ecosystems.

Strategies

1) Management of State-owned forest land

Manage state-owned forest lands to maintain the health, productivity, and diversity of forests across landscapes. This requires coordination (See strategy #5.) and consideration of condition, capabilities and management of all forest lands within a landscape to help guide actions on state lands.

- Incorporate concerns for wildlife habitat, biodiversity, rare communities, water, wetland and aesthetic quality; soils; timber productivity; and cultural/historic resources into vegetation management on state-owned forest lands.
- Provide opportunities for motorized and non-motorized recreation consistent with user safety and satisfaction while minimizing adverse impacts on forest ecosystems.
- Maintain and improve the productivity of forest lands for timber without compromising environmental protection measures and considering other forest benefits and uses.

2) Wildlife Management

Manage wildlife habitat and populations through forest management practices and regulated harvest of game species.

3) Technical Assistance

Provide technical forest management, wildfire suppression and cost-share assistance to non-industrial private forest landowners, communities and counties.

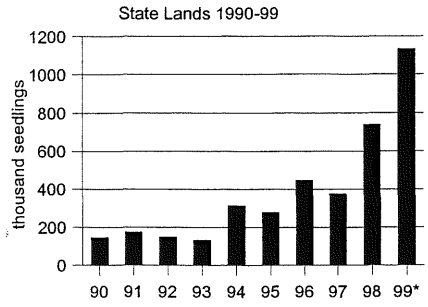
4) Monitoring

Monitor changes in forest resource conditions, wildlife populations and overall effectiveness of forest management practices and policies.

5) Coordination

Coordinate and collaborate forest management efforts with other agencies, forest land owners and stakeholders to address sustainability issues that occur across larger land areas and across ownerships boundaries.

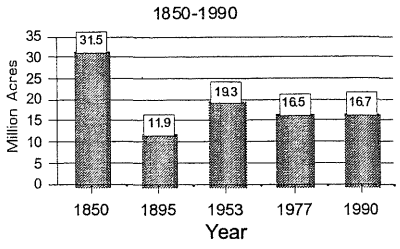
White Pine Planting



White Pine Management:

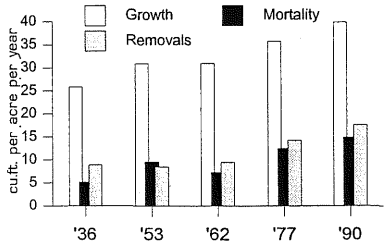
The amount of white pine in Minnesota has decreased substantially from presettlement times, due largely to extensive pine logging and post-logging "slash" fires during the 1800s and 1900s. There is strong popular support for increasing white pine stands in Minnesota's forests. However, deer browsing, blister rust, and the white pine weevil make white pine regeneration difficult. In December, 1997, the White Pine Regeneration Strategies Work Group report recommended ways to increase the presence of white pine. This report was the basis for funding initiatives in 1997 and 1998. As a result, white pine management activities have increased substantially over the past four years. These efforts need to be sustained to achieve substantial long-term increases in Minnesota white pine.

Minnesota Forest Land



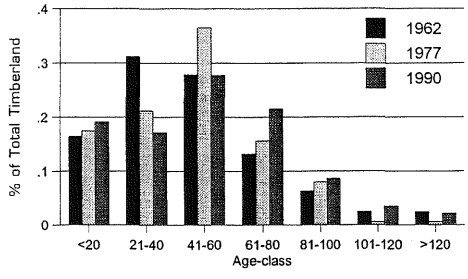
Source: DNR Division of Forestry

Growth, Mortality and Removals from Growing Stock



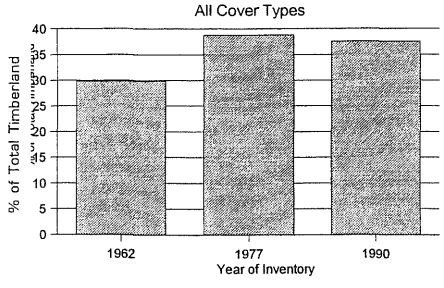
Source: DNR Division of Forestry

Age of Minnesota Forests



Source: DNR Division of Forestry

Forest Land Beyond Rotation Age



Source: DNR Division of Forestry

Performance Measures

Today's forests are the product of events (human and natural) that occurred over the past 1000 years. Forest changes occur incrementally from one year to the next. Inherent variability can also make year-to-year measures poor indicators of significant long-term trends. As a result, forest management performance is often best measured using longer-term trends.

Indicators should give insights on the sustainability of forest outputs (e.g. timber, recreation) and conditions (e.g. growth, mortality, age, species diversity). The following performance measures show progress resulting from the application of several strategies.

1) Acres of forest land

Acreage of land in forest cover is an important aspect of sustainability. While forest land acreage increased slightly since 1977, development of urban and seasonal homes will decrease the amount and quality of future forest land. This will be partially offset by tree planting on retired agricultural lands, continued reforestation of existing forest lands, and increased assistance to non-industrial private forest land owners. *(This measure relates to forest land management, technical assistance and monitoring strategies.)*

2) Tree growth and mortality

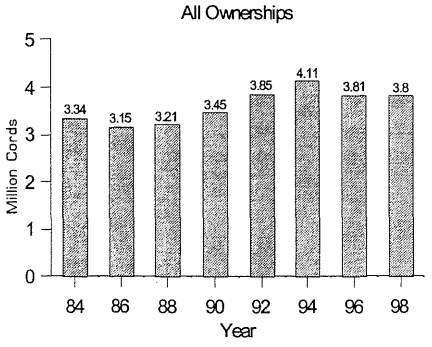
Total growth of wood fiber continues to exceed timber harvests and losses from mortality. Increased use of basic management practices provide an opportunity to reduce additional timber mortality through harvest, and will improve the overall growth of Minnesota forests. *(This measure relates to forest land management, technical assistance and monitoring strategies.)*

3) Forest Age Distribution

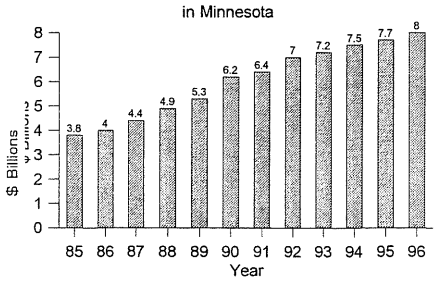
Many of Minnesota's forests currently are older than normal harvest (i.e. rotation) age. Increased harvesting has raised concerns about maintaining older-aged forests as important wildlife habitat, biodiversity, and large trees. For some forest types (e.g. aspen) there is a shortage of mid-aged forest stands. One objective of forest sustainability is a relatively equal distribution of young, middle and old aged forests.

The DNR adopted old growth forest and extended rotation guidelines and conducts planned timber harvesting and reforestation to address age class distribution on state lands. *(This measure relates to forest land management, habitat management, coordination, technical assistance and monitoring strategies.)*

TIMBER HARVESTING IN MINNESOTA



VALUE OF MANUFACTURED FOREST PRODUCTS IN MINNESOTA



Source: DNR Division of Forestry

4) Economic Benefits

Since 1980, harvest of wood from Minnesota forests increased by more than 50 percent (from 2.4 to 3.8 million cords per year). While harvesting has currently leveled off, it is expected to increase to 4.34 million cords per year by 2001. (Canadian wood imports could reduce Minnesota harvests below this level.) The Generic Environmental Impact Statement for Timber Harvesting and Forest Management in Minnesota stated that harvest levels between 4.0 and 4.9 million cords are sustainable if recommended mitigations are implemented. DNR and other forest land owners must continue to implement and evaluate these mitigation efforts to avoid potential impacts identified in the GEIS. *(This measure relates to forest land management, technical assistance and monitoring strategies.)*

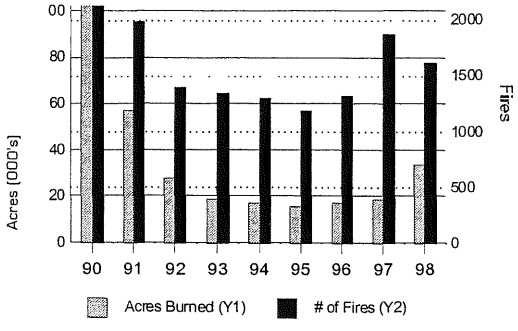
The total value of forest products manufactured in Minnesota grew to more than $8 billion annually, making it the third largest manufacturing industry in Minnesota. More than 61,000 Minnesotans are employed in the wood products industry, with nearly one half of this employment occurring in the Twin City Metropolitan Area.

5) Fire Management

Since wildfires played a major role in shaping Minnesota's pre-settlement forests, forest managers are increasing the use of "prescribed (controlled) fire" to maintain the health of many forest types.

Expanding residential and seasonal home development in forested areas highlights the importance of DNR's mandate to protect life, property, and natural resources from wildfires. The DNR exceeded its goal of maintaining the median size of wildfires at or below 5 acres (actual median size of 1 acre in FY98).

WILDFIRES SUPPRESSED



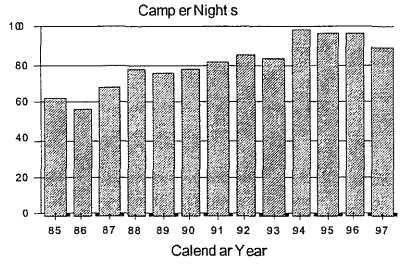
Source: DNR Division of Forestry

An aging workforce and inability to attract or hire new recruits could lead to critical shortages of trained and experienced wildland and rural structural firefighters within the next 5 - 10 years. This would directly affect the DNR's ability to effectively fight wildfires. *(This measure relates to forest land management, technical assistance and coordination strategies.)*

6) Recreation Benefits

Forest lands support a variety of other outdoor recreation activities including much of the state's upland game hunting (about half of the deer and nearly all bear and moose hunting opportunities.) Public forests also provide thousands of miles of marked recreation trails, hundreds of developed campgrounds and day-use areas, public water accesses, and miles of forest access roads and hiking trails.

STATE FOREST CAMPGROUNDS



Source: DNR Division of Forestry

Nearly 1,000 campsites within 46 state forest campgrounds represent 20% of the total campsites on DNR lands. State forest campground use will continue to increase. In a 1989 survey of state forest campers, 94% were "mostly satisfied" or better with their experience. The DNR repeated this survey following the 1998 camping seasons. Survey results are still being tabulated.

DNR State forest lands provide nearly 1200 miles of recreational trails for a variety of motorized and non-motorized uses. The DNR is conducting an Off-Highway Vehicle (OHV) trail system planning effort to identify additional opportunities for OHV use on state lands. *(This measure relates to forest land management and coordination strategies.)*

7) Wildlife game populations

Populations of game species provide an indicator of forest health, and hunter success is an indicator of customer satisfaction. Deer populations fluctuate based on harvest, predation, weather, and habitat condition. The DNR seeks to maintain a deer population that provides good rates of hunter success while maintaining populations within limits acceptable to society. The target is to maintain a hunter success rate that ranges between 15% and 50% in the forested region of the state. For the most part, harvest rates fall within that range. Deer populations will continue to be sustainable at these desired levels.

HUNTING SATISFACTION

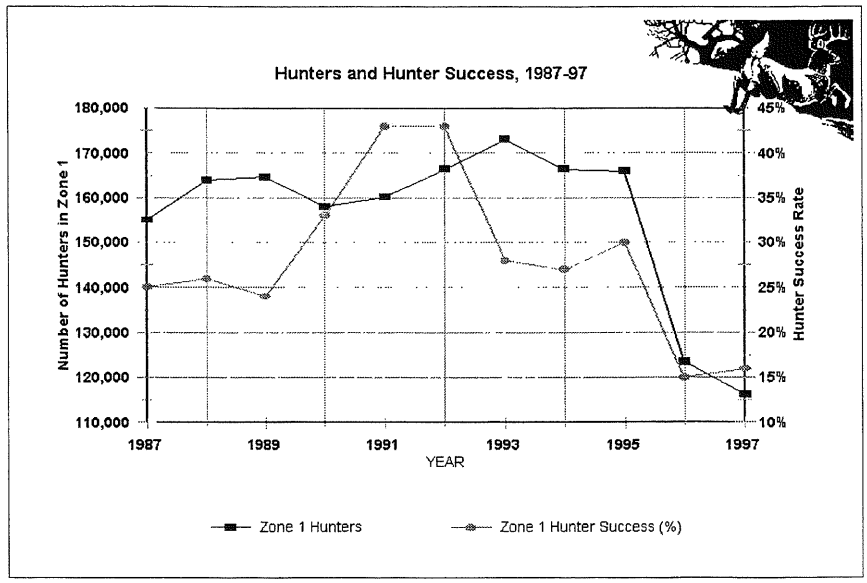
% of public satisfied or very satisfied With Hunting in Minnesota

---year---		
88	92	96
63%	68 %	66%

Source: DNR customer satisfaction surveys

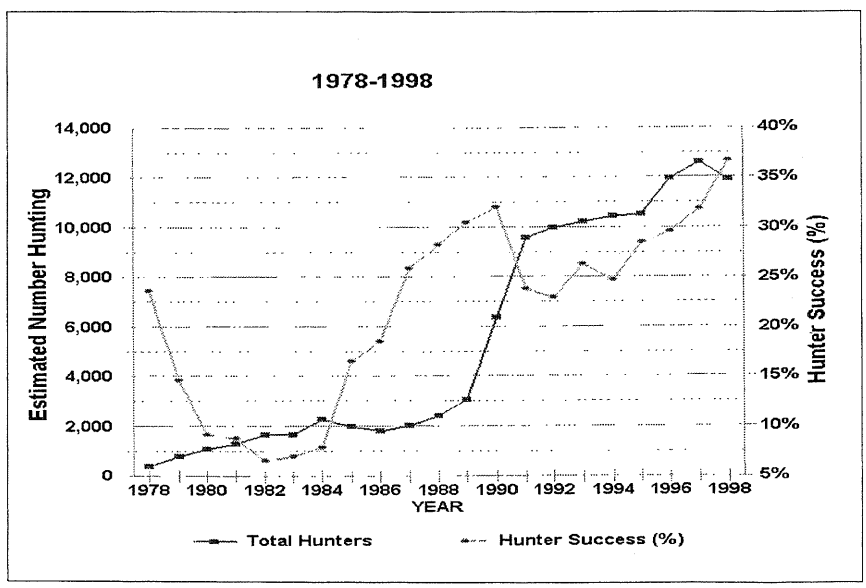
Turkey populations have been a success story since their reintroduction in Minnesota less than two decades ago. The numbers of turkeys, turkey hunters and harvest rates have all steadily increased, reflecting healthy habitat in southern Minnesota forests and effective management. Turkey populations will continue to expand into new areas and will not peak for several years. Turkey populations are sustainable at higher levels. *(This measure relates to Forest land management, habitat management, technical assistance, monitoring and coordination strategies.)*

Forest Zone Deer Management



Source: DNR Section of Wildlife

Wild Turkey Hunter Harvest and Success



Source: DNR Section of Wildlife

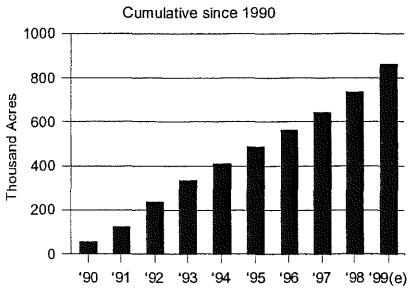
8) Forest song bird populations

The Minnesota Forest Bird Diversity Initiative is a long term research and monitoring program designed to assess forest song bird population trends and relate those trends to changes in forest landscapes. The program annually counts songbird populations at 1,266 sample points. Surveys indicate that songbird populations are relatively stable in the northern part of the state but declined in southeastern Minnesota between 1995 and 1997. Severe winters during that period may account for the decline. Longer term monitoring will be needed to better document the population patterns and their relationships to forest landscape changes before more specific conclusions can be reached. *(This measures relates to each of the strategies.)*

9) Private forest management

Private lands are critical to sustaining Minnesota's forest resources. The DNR and its partners have a goal that, by the year 2005, 50% of the non-industrial private forest land (in parcels over 20 acres) are receiving professional assistance as demonstrated by a completed Forest Stewardship plan. Over 700,000 acres of Forest Stewardship plans have been prepared since 1990. While this is an activity measure, it is an indicator of how DNR enhances the sustainability of timber resources on private lands. *(This measures relates to the technical assistance strategy.)*

PRIVATE LANDS WITH STEWARDSHIP PLANS



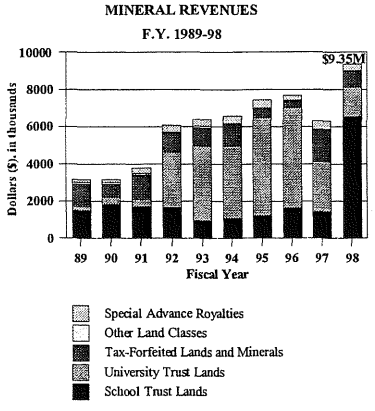
Source: DNR Division of Forestry

10) Forest inventory

DNR cooperates with the U.S. Forest Service in conducting the Forest Inventory and Analysis (FIA). FIA provides extensive data about forest cover type composition, vegetative structure, age-class structure, and shrub layer composition.

DNR and the U.S. Forest Service are working on a pilot project (Annual Forest Inventory System - AFIS) to provide more frequent updates on forest resource conditions. AFIS will provide a complete reinventory every four years with a continuously updated database maintained through annual field sampling, remote sensing and computer modeling. Field data for AFIS have been collected in the Aspen-Birch and Northern Pines survey units. Preliminary data analysis for these units is underway. The U.S. Forest Service recently incorporated AFIS into a nation-wide annual forest inventory system that will be implemented soon.

Mineral revenue: *Northeastern Minnesota's forested lands cover another natural resource of value to the state–taconite. In FY 1998, mining and exploration on state lands generated about $9.35 million in revenue, of which 97% was from iron ore and taconite leases. This income is distributed to state trust funds and local taxing districts throughout the state.*



The past biennium was one of the most active periods of state iron ore and taconite leasing since the 1950s. In FY 1998, negotiations resulted in amendments of the terms of 46 leases and nine new leases; at the close of the year, 113 taconite and iron ore leases, covering 9,637 acres, were in effect. The DNR division of minerals also negotiated an eighty-acre taconite lease on behalf of the University of Minnesota that will provide $4-5 million to the University Trust Fund for research, scholarships and an endowed chair.

Sustainability Summary

Increased demand for forest products, expanded use of forests for outdoor recreation, and expanding residential development in forest areas pose challenges to the sustainable management of Minnesota's forest ecosystems.

The DNR continues extensive work with a broad range of stakeholders to foster a balanced management approach for forest resources to help meet the needs of citizens while sustaining forest ecosystems for the future.

Off-Highway Vehicles (OHV's)

Use of OHVs [all-terrain vehicles [ATVs], off-highway motorcycles and off-road vehicles such as jeeps and trucks] increased dramatically in the past five years. With increased use comes user conflicts, environmental damage, and the need for clear, consistent guidelines for OHV use. DNR, in cooperation with other public and private groups, initiated a multi-pronged effort to manage OHV use, including:

- *Amending state forest rules, including those governing OHV use on state forest lands.*
- *Amending rules governing OHV use in grouse hunting and other small game.*
- *Updating ATV rules to include off-highway motorcycles and off-road vehicles [4x4s]. These rules include vehicle registration, display of decals, special permits, muffler requirements, and education programs.*
- *Development of OHV guidelines to provide a consistent approach to managing OHV recreation.*
- *Development of an OHV trail system to provide quality riding opportunities and minimize conflicts between motorized and non-motorized forest visitors.*

The Sustainable Forest Resources Act

A broad cross-section of the forest resource interests identified the Sustainable Forest Resources Act (SFRA) as the most effective way to implement major recommendations from the GEIS. The SFRA develops and implement, programs that promote the sustainable use and management of Minnesota forest resources. A Minnesota Forest Resources Council (MFRC), consisting of 14 individuals representing a wide range of forest resource interests, is responsible for developing and implementing these programs. Key aspects of the SFRA include:

- Addressing important state-wide forest resource issues.
- Encouraging appropriate site-based forest management practices.
- Monitoring forest resource conditions, trends, and management practices.
- Addressing forest resources research needs.
- Managing forest resources information.
- Promoting continuing education for loggers and natural resource professionals.

Details of the SFRA implementation are available in a biennial report by the MFRS.

Certification of Forest Management

The Aitkin County Land Department and the DNR in Aitkin County were certified in October, 1997 as meeting international standards for long-term forest management, biodiversity protection, economic viability, and community relations. The evaluation and certification were performed by SmartWood (a program of the Rainforest Alliance) through a third-party certification program. This certification is the first of its kind in Minnesota, and only the second on public forest lands in the United States. In December of 1998 the DNR successfully completed its first annual audit under the SmartWood certification process.

Sensitive and Threatened Habitats

Background

Glaciation, climate, fire, insect infestation and wind shaped Minnesota's natural landscapes. These forces maintained a mosaic of diverse natural communities, from the white pine forests of the northeast to the tall grass prairies of the west and the big woods forests of the southeast. The Minnesota Natural Heritage Program has identified fifty-seven ecological community types with 196 sub-types that together classify the wide range of forest, wetland and grassland communities that originally covered the state.

Sensitive and threatened habitats are the remains of once abundant natural communities, such as old-growth white pine and Big Woods forest stands. They also include habitats that were always rare, such as calcareous fens. Conservation actions are needed to protect what remains, and Minnesotans have shown support for those activities. Public survey results show that since 1988, more than two thirds of Minnesota residents are satisfied with how DNR balances use and preservation.

Minnesota remnant habitats

- *Less than 1% of native prairie remains.*
- *1/10 of 1% of big woods forest remains.*
- *Less than 1/10 of 1% of oak savanna remains.*
- *Less than 4% of old growth forest remains.*

Benefits provided by these remnant ecosystems have greatly diminished over time and continue to be lost. Sustaining these natural features into the future requires concerted conservation action.

Calcareous Fens

Calcareous fens are Minnesota's rarest wetland type and may be the rarest type in North America. Calcareous fens are peatlands formed in areas where cold, mineralized groundwater reaches the surface. Found here are many species of plants that flourish under these conditions but nowhere else.

The 1991 Minnesota Wetlands Conservation Act gives special protection to these fens and requires that management strategies be developed that will improve or maintain the status of calcareous fens.

Ecosystems at risk

Natural habitats maintain the resilience of ecosystems, provide recreational, aesthetic, and scientific benefits, and provide homes to common as well as rare and endangered species. Remaining high quality examples of habitat types serve as important benchmarks for evaluating the health of impacted sites. They are also the building blocks to begin restoration of larger ecosystems.

Strategies

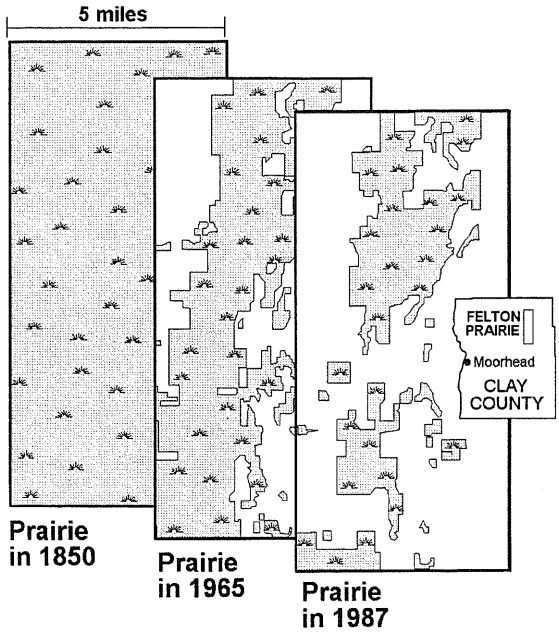
1) Data collection and research

Collect essential information on sensitive and threatened habitats through the following activities:

- Accelerate collection of information on the distribution, abundance and security of native habitats and species to develop priorities for protection.

Case Study – Prairie Ecosystems

What is the future of Minnesota Prairie?



Land use changes have fragmented the once contiguous prairie of Clay County's beach ridges landscape. Despite these changes, traditional grazing practices along with establishment of reserves maintain the area as one of the largest prairie remnants in the upper Midwest. The area harbors 25 state listed rare plant and animal species.

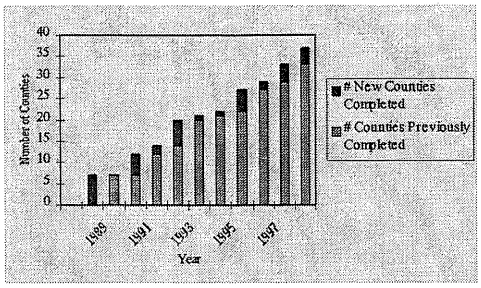
CLAY COUNTY BEACH RIDGES FORUM

Clay County's beach ridges, remnants of Glacial Lake Agassiz, support agriculture, gravel mining, and native prairie. In 1995, a local forum was organized to allow landowners, aggregate producers, supporters of native prairie, government agencies and the interested public to discuss, in a neutral setting, the future of the gravel and prairie resources. Forum goals include:

- Provide key information about the beach ridges to landowners, gravel operators, land managers and the public,
- Protect natural resources (both prairie and gravel) and avoid future conflicts,
- Recommend ways to improve reclamation.

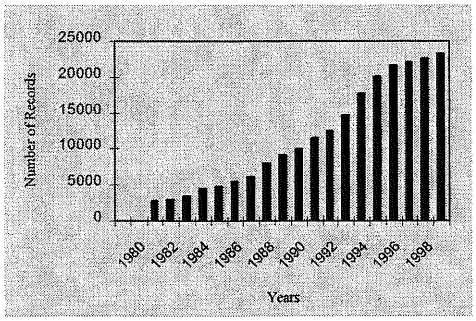
The forum will produce computer-generated maps, an information handout, and a draft plan for the beach ridges that has value and relevance to the people of Clay County.

County Biological Survey Progress



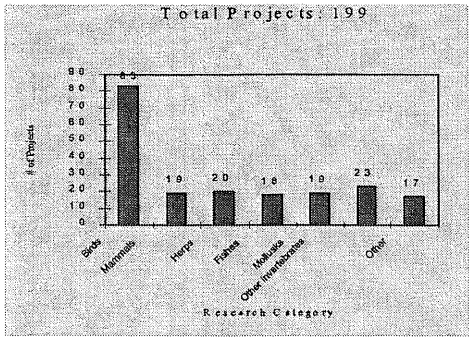
Source: Minnesota County Biological Survey Program

Rare Features Data Base



Source: DNR Ecological Services Section

Research Projects Distributed Since 1980



Source: DNR Ecological Services Section

- Focus research on ecological processes needed to maintain sensitive and threatened habitats, and on the life history requirements of rare plants and animals dependent on these habitats.

- Monitor the condition and extent of sensitive and threatened habitats and the rare plants and animals dependent on these habitats.

2) Protection

Protect natural habitats through acquisition and public-private partnership efforts.

3) Site Management

Manage sensitive and threatened habitats to restore essential ecological processes.

4) Information and education

Provide opportunities for all stakeholders to learn about Minnesota's natural habitats and to contribute to their management and protection.

Performance Measures

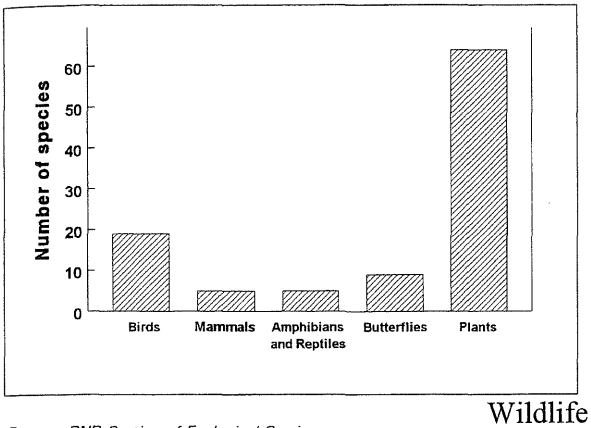
1) Data collection and research

The Minnesota County Biological Survey (MCBS) is a survey of rare biological features. The survey identifies significant natural areas and collects and interprets data on the distribution and ecology of rare plants, rare animals, and natural communities. Surveys have been completed in 35 counties, are underway in 16 and are proposed for all or portions of 13 other counties. The survey has published maps displaying survey results for 22 counties. Another outcome is publication of the book, *Minnesota's St. Croix River Valley and Anoka Sandplain: a Guide to Native Habitats*. Similar publications are now planned for northwestern and southeastern Minnesota.

Rare Features Data Base: The number of records in the Rare Features Database is a measure of DNR efforts to collect data on sensitive and threatened habitats. This information provides a basis for managing sensitive and threatened habitats and species. The database contains over 22,000 records.

Conservation Biology Research Grants: Complementing MCBS are efforts to conduct more focused survey and research work on rare plants and animals and their habitats. This work helps managers

Prairie Species Threatened in Minnesota



Source: DNR Section of Ecological Services

Public Satisfaction with DNR Protection of Endangered Species

	% of public satisfied or very satisfied		
	---year---		
	88	92	96
DNR Protection of Endangered Species in Minnesota	78%	79%	66%

Source: DNR customer satisfaction surveys

Informing Citizens about Sensitive Habitats

*The DNR helped produce two recent publications to guide protection efforts by private citizens and local units of government - **Natural Areas: Protecting a Vital Community Asset** and **Land Protection Options: A Handbook for Minnesota Landowners**. The booklets provide protection strategies to maintain the integrity of natural areas, and suggestions for financing and planning. **Land Protection Options** has been well-received and is in its second printing.*

understand the life history requirements and ecological conditions necessary to sustain local occurrences of rare species and sensitive habitats.

Since 1980 the Nongame Wildlife Research Program has funded nearly two hundred projects with universities, local colleges and independent researchers on a wide diversity of species. A small grants program begun in 1980 was expanded in 1992 and formally established as the Grants for Conservation Biology Research in Minnesota. It is cooperatively funded by the divisions of Fish and Wildlife and Parks and Recreation, and the Minnesota Chapter of The Nature Conservancy. Seventy projects have been supported during four grants cycles with $237,750.

Since 1980, 199 research projects have been conducted on birds, small mammals, reptiles and amphibians, nongame fish, and numerous invertebrates and rare plants.

2) Protection

Scientific and Natural Areas: The Minnesota Scientific and Natural Areas Program (SNA) protects about 120 sites of statewide significance that preserve examples of plant communities, geological features, landforms, and rare and endangered species habitats. SNA sites are preserved and managed for these features and for their scientific and educational value. The SNA Long Range Plan recommends protecting multiple sites in each ecological subsection.

The DNR tracks approximately 500 features to ensure their protection. A system of about 500 natural areas will be needed to adequately protect these features in a system of multiple sites.

SNA designation is the strongest protection for natural areas; about 2% of all rare features whose ownership are known are protected on State SNAs. Another 30% occur on other public lands, such as state Wildlife Management Areas, State Parks, National Forests, Federal Wildlife Refuges, County and Regional Parks. Public lands also provide some protection to these rare resources.

Prairie Bank: Prairie bank easements protect native prairie plant communities while leaving lands in private ownership. The program protects prairie and the plant and animal species on those sites where landowners are reluctant to sell their land yet are willing to see it remain as prairie. To be eligible, a tract must be covered by native

Population Monitoring--a Tool for Achieving Recovery

*Minnesota's sensitive and threatened habitats support several federally listed plants and animals, including the prairie bush clover (*Lespedeza leptostachya*). Prairie bush clover is a perennial prairie legume found only in the tall grass prairie region of Iowa, Illinois, Minnesota and Wisconsin.*

A Federal Recovery Plan for the species required protection of viable populations in a core area of southwestern Minnesota and northwestern Iowa. Prairie Bush Clover SNA in Kilen Woods State Park contains one of the most important of those populations. Intensive monitoring of this population was initiated in 1983 and has been maintained by citizen volunteers. This has provided scientists and managers with critical information regarding the species life history and how prairie burns influence recruitment and mortality. Models based on information obtained from monitoring suggest that this population is stable and healthy.

prairie vegetation, must never have been plowed, and must have less than 10% tree cover. The program protects 18 prairie tracts totalling 2,266 acres. Because 75% of the state's remaining prairie acres are in private ownership, the prairie bank program is a valuable protection tool. The long range goal of the Native Prairie Bank program is to protect 75,000 acres.

3) Site Management

Prior to European settlement, fire was a regular disturbance on the prairie. Fire reduces tree encroachment and stimulates growth of native grasses and wildflowers. Burning ensures the long-term viability of native prairies protected by the SNA Program. SNA staff burn approximately 2000 acres each biennium.

4) Information and education

Volunteering to assist with natural areas management provides learning opportunities for participants and contributes valuable hours to completing site management tasks. This fall, for example, seventh graders from Sandberg Middle School in Anoka collected 400 pounds of acorns at Boot Lake Scientific and Natural Area. Next spring they will plant 2400 oak seedlings grown from acorns they collected. Volunteers annually contribute 500 - 1500 hours to natural areas management activities.

Sustainability Summary

Minnesota has made significant progress over the last decade in inventory, research and protection of sensitive habitats. However, opportunities to protect undisturbed natural environments and their wild species are being lost as these habitats are under continuous threat from a broad range of activities, including land conversion, habitat fragmentation and pollution. Some of these fragile ecosystems, such as the tall grass prairies of western Minnesota, are only protected as scattered remnants that can no longer sustain viable populations of many of the larger animals that they once supported. Intensified efforts will be needed to maintain what remains and to work to restore ecological processes to maintain their viability.

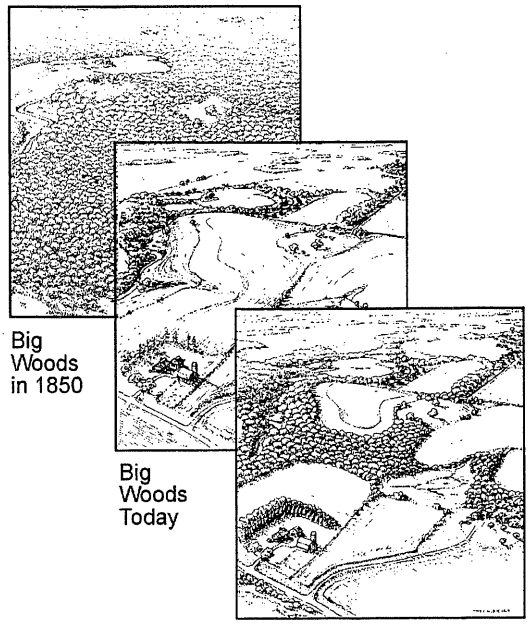
Sustainable Farming at a Big Wood Dairy

The challenges and rewards of working a grass-based dairy will come to life through the eyes of the Phil and Dawn Brossard family. They have agreed to cooperate with several state agencies in a demonstration of sustainable agriculture. The Brossards will manage more than 50 herd of dairy cattle using a system of rotational grazing on about 80 acres.

Their efforts, along with measurements of the environment surrounding the farm will be recorded for several years. The DNR, Minnesota Department of Agriculture, and The Nature Conservancy and other partners hope to gain valuable economic, social and environmental data from this demonstration. This partnership between state agencies, a private conservancy and Brossards will also be shared with the public through tours and interpretive events.

Case Study – The Big Woods

What is the future of The Big Woods?



The "Big Woods" Maple-Basswood forest once covered 3,420 square miles of south central Minnesota. Today only a few thousand acres of isolated forest tracts remain. Local groups working with agency partners have developed a vision for restoring forest connectivity and vitality to the landscape.

THE BIG WOODS PROJECT

The Big Woods Project, a model effort initiated by local groups and concerned citizens, is working to improve the Big Woods ecosystem in south-central Minnesota. The goal of the project is to "protect, maintain and restore healthy and biologically divers natural areas as part of the social and economic environment in eastern Rice County". Project activities include:

- Maintain and restore Big Woods forest remnants,
- Protect and restore connectivity to these forest patches,
- Improve the overall quality of the landscape by providing habitat for important plant and animal species, and
- Reduce erosion and improve water quality.

Partners include the Cannon River Watershed Partnership, Seven Mile Woods Association, the river Bend Nature Center, Friends of the Big Woods, the Nature Conservancy, and the regional office of the MN Department of Natural Resources.

URBAN SYSTEMS

BACKGROUND

Minnesota is one of the fastest growing states in the Midwest. The growth has been uneven within Minnesota, however. Many small communities and rural areas in the agricultural part of the state continue to decline, while urban places, especially the Twin Cities metropolitan area, continue to grow. This urban growth is concentrated in an axis from Rochester, through the Twin Cities and north through St. Cloud.

Growth of low density housing and corresponding highway and strip mall expansion is urban sprawl. Sprawl contributes to habitat loss and fragmentation, reduction in air quality, and disturbance to aquatic systems. Impacts to rivers and streams have been especially damaging as flooding, pollution, increase in water temperature, and loss of habitat have devastated some rivers and streams.

Large urban areas concentrate people and consumption of resources in a relatively small area. They concentrate pressure on natural resources, through the pollution they generate and the habitat they displace. If not managed well, urban systems can damage the natural systems they depend on.

The large number of local governments and watershed districts in the metro area plus competing interests (e.g. economic development, habitat protection, recreation needs, etc.) hinder developing a coordinated approach to natural resource management. Success in managing urban ecosystems has two requirements:

1) cooperation across ecosystems and jurisdictional boundaries, and

2) planning to build strong partnerships that emphasize community sustainability.

STRATEGIES

1) Protection and restoration

Initiate and foster community partnerships that focus on protecting, restoring and connecting sensitive lands (e.g. remnant habitats, easily damaged habitats - trout streams, etc.) and other types of open space.

METRO GREENWAYS AND NATURAL AREAS COLLABORATIVE (GNA)

In the 150 years since the metro area was settled, more than 94% of its native habitat has been converted to urban use. The prospect of losing the remaining 6% prompted Metro DNR to action. Regional staff assessed the natural resource base and mapped remaining high quality natural areas and likely wildlife corridors. In 1997, the DNR organized and facilitated the GNA Collaborative, a thirty member group of area public and private organizations and a handful of DNR resource specialists to explore the idea of a regional greenways network.

The GNA collaborative summarized their proposal in a report to the Minnesota Legislature, "Metro Greenprint: Planning for Nature in the Face of Urban Growth". DNR has distributed 1300 copies of the report and received $4.5 million from the Minnesota Legislature to acquire significant natural areas, and for grants to local communities for planning and program operation. Several high quality natural areas are protection targets in 1999. The Metro Greenways Program will go a long ways towards preserving the region's environmental health and overall quality of life. It could be the most significant natural resource initiative for the seven county metro area in decades.

- Support the Metro Greenways program.

- Support the Metro Trout Stream Watershed Protection initiative.

- Seek opportunities to implement habitat protection programs in areas outside the seven county Twin City Metropolitan Area.

2) Technical Assistance

- Launch partnerships with community schools to assist with hands-on science-based education, such as student monitoring of trout streams.

- Provide technical assistance and user-friendly information to local communities.

- Develop and offer workshops on ecosystems based management.

- Create and support development of handbooks, natural resource maps, and information sharing networks.

3) Local Planning

- Promote local planning that incorporates natural resource base line information early in the planning process.

- Promote planning grants that provide financial support for natural resource inventories and plans at the local level.

- Establish early coordination with local communities throughout the state as a standard procedure for Environmental Review efforts.

4) Funding Assistance

Leverage funds from state and regional programs to assist local government efforts to better manage urban development in ways that sustain natural resources.

Performance Measures

Metropolitan areas have more dynamic environmental systems than their natural counterparts in rural areas. Measuring improvements in such urban settings is difficult. With enough time and resources, DNR and its partners will develop measures that

Metro Trout Stream Protection

In 1996, a group of biologists, conservation interests, and anglers released a report documenting loss of urban trout streams. This spurred DNR and local partners to build a community-based process to save the remaining metro trout streams. The Metro Trout Stream Watershed Protection Initiative began to work with citizens and local officials to preserve and restore the six highest priority streams: Mill Stream, Brown's Creek, Valley Creek, Vermillion River and tributaries, Eagle Creek and Assumption Creek.

Local residents and community leaders embraced the community based approach for planning the management of a vital natural resource. An Ad-hoc Committee of residents, city officials, natural resource specialists received support of the Valley Branch Watershed District to develop a comprehensive natural resources management plan for the Valley Creek sub-watershed. The Vermillion River Watershed Management Organization formed a team from member communities to help plan the future of the Vermillion River watershed. Citizens assist in restoring native plant communities and improving stream habitat of Brown's Creek. The Old Mill Stream Association is doing monitoring, working with local government on water quality issues, and educating land owners on water quality management. Ten community schools are monitoring trout streams as a part of a hands-on, science-based environmental education. The DNR premiered, The Riffle, a newsletter providing information on local initiatives and educational pieces on trout streams and watershed protection.

accurately reflect progress in managing the urban environment. For now, the DNR will use a variety of measures. Some are quantitative outcome measures, others are qualitative descriptions of new program initiatives.

1) Protection and restoration

- Natural habitat protection: A 220 acre prairie remnant in Cottage Grove is one of the rarest ecosystems in the Metro area. It was permanently protected through a DNR partnership with MPCA, the Environmental Protection Agency and a major oil company.

- Metro DNR received $4.5 million from the Minnesota Legislature to protect high quality natural areas.

- A reduction of phosphorus from 5mg/l to 1mg/l was achieved by the Metro Pigseye Treatment Plant. The reduction, spearheaded by DNR efforts, should improve water quality in Pool 2 of the Mississippi River and downstream in Lake Pepin.

- Trout habitat improvements have been made at Eagle Creek, Brown's Creek, Valley Creek and the Vermillion River through community based restoration projects in collaboration with the DNR.

2) Technical Assistance

- DNR Metro staff conducts workshops (e.g. Keeping Nature in Your Backyard) designed to educate and assist citizens' natural resource needs.

- DNR Metro staff work closely with county boards and local communities to help them understand and use important natural resource data bases. (e.g. County Biological Survey).

3) Local Planning

- The DNR adopted ecosystems-based management and community-based approaches to promote sustainability. During the last five years, Metro DNR has forged numerous new partnerships and strengthened existing ones. An example is the Valley Creek partnership described in the sidebar below.

AGGREGATE RESOURCES

Minnesota's population growth is driving an increase in demand for aggregate. About half of this demand is for public projects (roads and airports) in urban centers. DNR efforts to identify and map new aggregate deposits include:

- *partnering with MnDOT to identify new resources needed for road construction in regional population growth corridors, where resources are needed for road construction projects and known aggregate resources are limited,*
- *identifying new deposits in Nicollet and Blue Earth counties where demand from Mankato's growth is depleting local supplies,*
- *mapping remaining aggregate deposits in the seven county metro area so future protection strategies can be developed. DNR is helping determine the quantity and quality of individual aggregate deposits throughout the state such as:*
- *appraisals to acquire privately held land in state parks,*
- *appraisals for DNR Section of Wildlife to determine the value of aggregate resources to sell to private companies,*
- *appraisals to determine the value of aggregate resources on private lands that the DNR is purchasing for Scientific and Natural Areas,*
- *evaluations to determine the quantity of aggregate available for state forest roads projects.*

4) Funding Assistance

DNR local grants program meets the growing demand for financial support to local communities to protect and restore natural habitats.

- A new planning grant program, the Greenways Program, supports communities' natural resource inventories and plans.
- More than $2.3 million in Natural and Scenic Area grants have helped protect more than 470 acres of natural areas in the St. Cloud to Rochester growth corridor since 1996.
- Almost $1 million in habitat improvement grants under the Conservation Partners Grant Program have been made in the seven county metro area since 1996.
- DNR's Flood Damage reduction program is providing $200,000 for "natural" flood mitigation efforts such as greenways, natural floodways, setback levees, and comprehensive watershed planning.
- Nearly $1 million has been provided since 1994 for ReLeaf matching grants to communities to plant and protect trees and urban forests throughout the state.

VALLEY CREEK TROUT STREAM

The Environmental Indictors Initiative and Metro DNR are working in partnership to develop indicators to help Metro DNR chart progress in protecting, restoring and connecting sensitive land and open space throughout the seven county metro area. Science-based indicators will quantify the ecological, economic and aesthetic benefits derived from protection and restoration efforts.

The Environmental Indicators-Metro partnership is helping landowners, Metro DNR, Valley Branch Watershed District and the cities of Afton and Woodbury identify natural resource management and land use plans that will sustain the ecological health of Valley Creek trout stream. Monitoring will provide valuable information on how urbanization affects cold water streams and how management and development strategies can maintain heathy streams in urban areas.

SUMMARY

Expansion of urban and suburban areas throughout Minnesota often results in a wasteful and unsustainable use of land. Urbanization threatens the natural systems upon which urban communities depend.

The DNR has made significant progress within the Twin City Metropolitan Area in providing leadership and participating as collaborators in partnerships to develop and implement innovative solutions to urban natural resource issues. These efforts are still being developed. DNR and its partners are learning which approaches will be most effective. There are few models describing urban ecosystems; DNR needs to develop urban indicators; and long-term ecosystem monitoring is needed. Future success depends on the ability of DNR and its partners to develop more comprehensive approaches to managing natural resources in urban areas.

Outdoor Recreation

Background

Minnesota's natural resources support a wide range of recreational opportunities. With more than 15,000 lakes, 65,000 miles of streams and rivers, 17 million acres of forest land, and 10,000 DNR-regulated wetlands, the state has an exceptional base from which to build a high quality recreation system.

Minnesota's Outdoor Recreation System includes State Parks, State Trails, State Forests, State Recreation Areas, Wildlife Management Areas, Scientific and Natural Areas, Historic Sites, Public Waysides and Rest Stops, State-Designated Wild and Scenic Rivers, Canoe and Boating Routes, and a kayak trail.

Outdoor recreation activities for fishing and hunting alone contribute over $2.8 billion annually to the state's economy. This provides income and employment for thousands, and is the mainstay of many local economies. The value of this resource, however, is not only measured with dollars but by the quality of the public's recreation experience and by benefits for local communities. Minnesota's state outdoor recreation system provides safe, convenient, affordable and physically accessible recreation opportunities, especially for those who would otherwise be unable to access the out-of-doors. The state has 8.3 million state park users, 1.5 million anglers, 600,000 hunters, 85,000 snowmobilers and more than 700,000 registered watercraft.

Growing and changing recreational demands often focus on Minnesota's most sensitive natural resources, such as the state's lakes and rivers, wetlands, forests, and prairies. New technologies (e.g. roller blades, jet skis, underwater cameras, and off highway vehicles) plus growth in recreation demand pose increasing risks of resource damage and depletion. Resource managers strive to balance resource use and protection, and to maintain a long-range commitment to the protection and restoration of degraded natural habitats. Many of these efforts involve partnerships with county and local governments, private landowners, conservation clubs and citizen volunteers.

Minnesota's population is aging, increasingly urbanized, and increasingly diverse ethnically. It has less leisure time and disposable income than its predecessors. Today's users of recreation facilities demand accessible, high-quality public facilities located near major

The Muskie Mystique

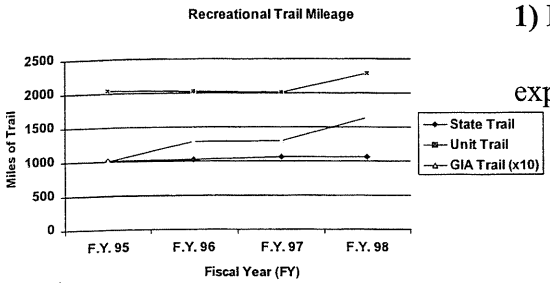
For decades, the muskie has held an air of mystique for anglers. Though an uncommon fish, its status as a trophy fish make it ranked 9th in angler preference and 8th in angler participation.

DNR manages 107 lakes and three large rivers for muskie and tiger muskie. Management relies on three basic strategies: stocking, habitat protection and harvest regulations. Muskie anglers seek trophy-sized fish (those which grow 50" or longer), which used to be available primarily in naturally-reproducing muskie waters. However, the muskie stocking program has greatly expanded trophy muskie opportunities. For example, the percentage of muskie angling trips that targeted waters stocked with the Leech Lake strain muskies increased from 29% in 1986 to 74% in 1997.

***Source:** DNR Section of Fisheries*

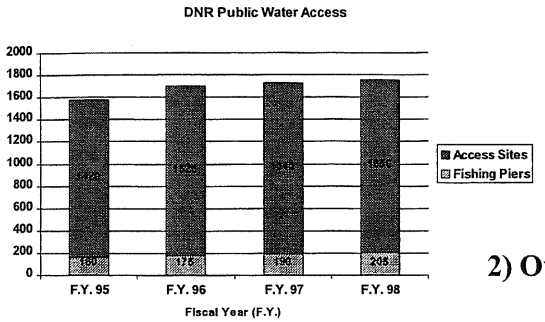
transportation routes, population centers and tourist destinations. Recreation services must be tailored to reflect these changing social, economic and demographic characteristics of Minnesotans.

Miles of State Trail in Minnesota



Source: DNR Trails and Waterways Unit

Water Recreation Facilities in Minnesota



Source: DNR Trails and Waterways Unit

Safe Harbors

Lake Superior waters are now safer for recreation boating with the construction of a breakwater and harbor of refuge at Silver Bay. Silver Bay harbor is the first of several sites designated by the North Shore Management Board. The DNR Bureau of Engineering provided technical expertise needed to design the breakwater and the additional land needed for improving the boater access facilities. The harbor will provide slips for 136 boats, 50 car trailer stall parking, and an administrative building for harbor operation. The Bureau of Engineering provides a variety of design and survey services to DNR disciplines.

Strategies

1) Facility Development

Provide high quality facilities that offer a range of opportunities to experience the state's outdoor recreation system.

- Expand trail systems to complete linkages between trails and other recreation facilities, and to meet increasing demands from diverse user groups.
- Develop additional public water access sites and related facilities on high priority water bodies.
- Develop and operate five Lake Superior safe harbors in cooperation with local governments.
- Complete acquisition of state park in-holdings.
- Maintain existing infrastructure and strive to achieve operating standards of public service.

2) Outreach

- Develop wider linkages with stakeholders and other recreation management agencies to enhance outdoor recreation opportunities (e.g. Adopt-a-River volunteers to clean up Minnesota's shorelines).
- Provide quality, accessible environmental education opportunities within state parks.
- Continue to involve stakeholders in recreation planning decisions.

3) Assessment

Provide assessment and evaluation needed to support high quality recreation experiences.

- Continue to evaluate operating standards needed to assure a viable state outdoor recreation system.
- Maintain healthy ecosystems and wildlife populations to enhance outdoor recreation experiences.

STATE PARK ATTENDANCE: 1987 - 97

Year	*Attendance*
1987	*6,737,324*
1988	*7,699,093*
1989	*7,904,153*
1990	*7,819,935*
1991	*7,980,700*
1992	*7,960,685*
1993	*7,484,445*
1994	*8,384,155*
1995	*8,356,566*
1996	*8,393,286*
1997	*8,315,286*

Source: *DNR Division of Parks and Recreation*

PUBLIC SATISFACTION WITH DNR BUILDING AND CAMPGROUND MAINTENANCE

	% of public satisfied or very satisfied		
	——year——		
	88	*92*	*96*
The way DNR Maintains buildings and campgrounds	*75%*	*76%*	*77%*

Source: *DNR customer satisfaction surveys*

PERFORMANCE MEASURES

1) Facilities

The DNR measures performance in providing recreation facilities with four approaches: number of facilities, use of facilities, quality of the user's experience, and benefits to users and communities.

To meet growing and changing demand for outdoor recreation, the DNR annually increases the state's inventory of recreation facilities. Miles of trail continues to increase to reflect demand for trail based recreation. Trail miles will continue to expand, especially as the DNR completes unit planning efforts for Off Highway Vehicles.

Participation in fishing, as measured by license sales has stabilized, while other forms of water-based recreation continue to expand. DNR is adding fishing piers and water accesses to increase opportunities for the public to reach and use lakes and rivers.

The DNR lacks comprehensive data on outdoor recreation activity. Despite weather-based fluctuations, use of state recreation facilities seems to be increasing. For example, State Parks use reached an all time high in 1998 with 8.3 million visitor-days. A growing number of State Park users are emigrants from southeast Asia. To provide better service to these park users, the DNR is creating a Southeast Asian interpretive program and is working more closely with SE Asian community leaders.

Satisfaction with the recreation experience is a key component of performance. DNR surveys indicate that 94% of State Park users are satisfied or very satisfied with their recreation experience.

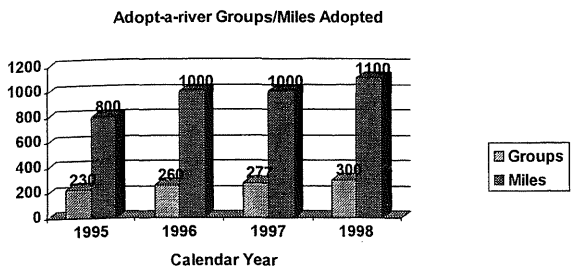
To better measure outcomes and performance, the DNR will need to invest in more comprehensive surveys of outdoor recreation activities, user experiences and benefits, and community benefits.

2) Outreach

Through its focus on community, the DNR reaches out to recreation stakeholders with a wide range of efforts. The DNR has gained considerable experience in involving stakeholders both in the decisions and management of recreation resources. A few highlights are:

- DNR has involved OHV users in more than 50 meetings throughout the state to plan use of OHVs on state lands. This process will continue in 1999.

Adopt a River Program



Source: DNR Trails and Waterways Unit

Park Interpretive Program Attendance

Year	*Program Attendance*
1995	*172,000*
1996	*161,000*
1997	*161,000*
1998 (Target)	*164,000*
1999 (Target)	*167,000*
2000 (Target)	*170,000*

Source: DNR Division of Parks and Recreation

- DNR has established the Adopt-a-River program to help keep rivers clean and free of debris. The number of river miles in this program expands each year.

- The DNR has completed a series of thirty meetings around the state to determine the direction of the state parks system. The next step will be to involve stakeholder in determining implementation steps.

- The DNR holds quarterly meetings with Off Highway Vehicle groups, snowmobilers, cross-country skiers, and other trail users to get their input on facility needs, new program initiatives, and policy development.

- The DNR uses recreation facilities to inform users both with interpretive programs as well as with passive and interactive displays. The DNR seeks to increase participation in interpretive programs by 2% annually.

- The DNR conducts research to assess how outdoor recreation opportunities contribute to the quality of life in local communities.

The DNR routinely involves citizens in management planning processes for outdoor recreation facilities. Outreach efforts will continue to expand. The DNR needs to reach a larger number of stakeholders and needs to better focus information and communication on high priority resource issues.

3) Assessment

The DNR conducts continuous assessments of its management efforts to provide high quality recreation services and to maintain healthy ecosystems within recreation management units. The planning and assessment process is not an outcome in itself but does indicate progress towards meeting outcomes. The DNR annually revises at least six state park and trail management plans and prepares at least five cultural and archaeological surveys of state park lands.

Summary

Use of Minnesota's outdoor recreational facilities is mostly sustainable at current and anticipated future use levels. The State is well positioned to meet existing demand with an excellent system of outdoor recreation facilities, a broad expanse of public lands and

plentiful access to public waters. The DNR is maintaining and expanding these facilities to meet future needs.

Concerns remain for expanded use of new recreation technologies such as personal watercraft and off highway vehicles. User conflicts and damage to sensitive land and water ecosystems are possible. Continued growth in the use of these technologies may face sustainability limits.

Helping Local Recreation Providers

Because most people recreate close to home, local government plays a key role in providing outdoor recreation facilities. DNR provides grants to help local government build those facilities. The DNR Office of Management and Budget Local Grants Section administers matching grants to local government that totaled $4.5 million for 122 projects since 1994. Examples of grants range from inner city park renovation, to suburban park land acquisition, to development of the only recreation facilities in some small communities. This service helps link recreation providers and lays the groundwork for expanded future partnerships to deliver outdoor recreation services.

In addition, DNR-Trails and Waterways has provided more than $6.4 million in matching grants for trail acquisition and development since 1995.

Education and enforcement

Background

As resource use and users increase, so do conflicts among resource users. Regulation, enforcement and education help ensure fair, safe, and sustainable use of the state's natural resources.

1) Regulation

Laws and agency rules are established to guide equitable and safe use of natural resources.

2) Enforcement

The DNR-Division of Enforcement helps ensure compliance with laws and rules. Enforcement is essential in managing competing natural resource uses and in evaluating the effectiveness of new approaches, such as compliance with experimental fishing regulations.

3) Education/Information

Wise natural resource use is best ensured by educated citizens. Environmental education gives information on natural resources and is the most sound framework for citizen cooperation in managing natural resources.

Strategies

1) Regulation

- Streamline permitting by developing general permits and by delegating permit authority to area staff.
- Work closely with stakeholders to ensure an understanding and support for regulatory efforts.

2) Enforcement

- Prioritize enforcement efforts according to resource management needs and priorities.
- Maintain close coordination with other enforcement agencies to ensure a unified approach to enforcing natural resource laws and regulations.
- Apply current technologies to ensure a modern and efficient approach to managing people and enforcing natural resource laws and regulations.

ELCOP

Minnesotans are changing. Recent immigration has added a rich diversity of new Americans to our ethnic mix. Spanning language and cultural barriers always poses a challenge, especially on enforcement concerns. To address that challenge, DNR initiated the Enforcement Liaison Community Officer Program - ELCOP for short. The program focuses enforcement officer recruitment efforts on recent immigrant communities. Currently, four new American citizens from southeast Asian countries are completing a training program to become enforcement officers. Their presence will improve cultural understanding between new immigrants and long term state residents.

Public Satisfaction with DNR License Procedures

	% of public satisfied or very satisfied		
	year		
	88	92	96
DNR Procedures for obtaining a license or permit	68%	69%	76%

Source: *DNR customer satisfaction surveys*

- Develop better communication with groups not traditionally been reached by DNR resource management efforts.

3) Education/Information

- Develop a broad overall plan for environmental education to ensure that it focuses resources on the high priority issues and needs.

- Implement communication and outreach initiatives, such as media campaigns during game and fish openers, education programs, and Enforcement Liaison Community Outreach Program (ELCOP).

- Coordinate DNR information resources to ensure a broad public understanding of critical resources issues.

- Establish training programs designed to ensure safe use of resources and cooperation needed for high compliance rates.

Performance Measures

1) Regulation

- DNR has completed efforts to streamline its public waters permitting process. DNR public water permitting reduces damages that could result from filling, drainage, or other alteration of lakes, rivers and wetlands. Streamlining increases the number of permit inspections, compliance checks and efforts to mitigate negative effects to public waters. These increases should be measurable and could be described in future performance reports.

DNR is now seeking opportunities to coordinate its permitting efforts with those of other agencies (U.S. Corps of Engineers).

2) Enforcement

- The number of enforcement hours devoted to obtaining compliance with game and fish regulations met established targets. This measures performance in meeting departmental priorities.

- Engage special focus task forces (Snowmobile and Personal Watercraft Task Forces) to address recreational user concerns and safety.

- Fund and implement the ELCOP program as one technique

Enforcement Hours by Fund Support Dedicated to Game and Fish Enforcement

Category	*Goal*	*Actual*
General Fund	*43,690*	*43,151*
Game	*66,221*	*65,772*
Fish	*80,937*	*85,382*
Water Rec. Account	*12,226*	*15,892*
Snowmobile Account	*18,110*	*19,643*
All Terrain Account	*2,830*	*4,376*
Solid Waste	*1,698*	*1,642*

Source: *DNR Division of Enforcement*

Enforcement Technology

Effectiveness of enforcement efforts will hinge on DNR cooperation with other law enforcement agencies. DNR law enforcement arm is small and relies on cooperative agreements with other agencies at critical periods. In 1999, the Minnesota state patrol will change the frequency of communications equipment to 800 Mhz in the nine county metropolitan area. Effective communication with these agencies will require DNR conversion of its communications equipment.

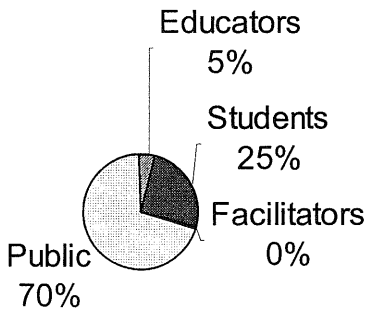
Effective management requires continuous investments in people and technology. These investments invariably have dividends that are not always measurable.

PUBLIC SATISFACTION WITH DNR ENFORCEMENT

	% of public satisfied or very satisfied		
	— year —		
	88	92	96
Effectiveness with enforcing hunting laws	69%	67%	70%

Source: DNR customer satisfaction surveys

AQUATIC EDUCATION EFFORTS



TOTAL ACCIDENTS - FATAL AND NONFATAL

Year	Snowmobile	Firearms
1994	22-531	4-24
1995	19-489	3-29
1996	26-630	1-44
1997	32-703	1-28
1998	19-295	0-41

Source: Division of Enforcement

for reaching out to new communities of resource users. (See box below.)

- Ensure coordination of emergency response through 800 MHZ radio conversion initiative.

3) Education and information

- Education will be a cornerstone to DNR efforts to develop an environmental ethic among all Minnesotans. A soon-to-be released Cornerstones report will articulate DNR education strategies. It will propose greater coordination of environmental education efforts and a sharper focus on sustainability issues. Effectiveness in implementing this strategy will be measured in future performance reports.

- Current aquatic education efforts inform Minnesotans about critical water resource issues and solutions. In 1998, nearly 50,000 Minnesotans were involved in Aquatic Education efforts.

- Project Wet (Water Education for Teachers) is providing curriculum materials to more than 1000 teachers annually

- State law requires safety training for youth firearms and snowmobile users. DNR has about 2,000 volunteer snowmobile safety instructors and almost 4,000 firearm safety instructors. Since program inception, 275,955 youths have been trained in snowmobile safety and 823,963 youths have been trained in hunting safety. These totals exceed the total number of snowmobile and hunting licenses issued respectively in 1998.

- The real performance measure of safety instruction is lives saved. Snowmobile and firearm injury and fatality records show considerable annual fluctuation based on many factors. Data cannot document lives saved from training efforts. However, in 1998 no lives were lost due to firearms accidents while hunting. Accident rates are very low due to training provided by a large cadre of volunteer instructors working closely with the DNR.

GIS Technology and Indian Treaty Rights

Getting clear information to the public was never more important than at last year's Treaty Information meetings, where hunters and anglers needed to know how the 1837 Indian Treaty Rights would affect their favorite sports. DNR used advanced Geographic Informations System technology to prepare maps showing treaty boundaries, lakes affected by the treaty, and fish harvest levels.
"Everyone wanted to see the maps." *said DNR Assistant Commissioner Gail Lewellan.* "Maps helped the public understand the complex implications of the treaty."

GIS, a computer based mapping system, is revolutionizing how the DNR views and manages natural resources. GIS combines such information as land ownership, soils, and forest cover to give a more complete picture of what is on the land and how the land should be managed. GIS is one of many new technologies that the DNR Management Information Systems Bureau develops to improve the art and science of resource management.

Mineral Education

In the past two years, more than 100 Minnesota educators have participated in the Minnesota Minerals Education Workshop. The workshops, held on-site on the Mesabi Range and in the Minnesota River Valley, teach educators about geology, mineral resources and the role of mining in meeting society's needs.

Hands-on activities about geologic concepts, mineral samples and resource materials are provided for classroom instruction. Field tours visited a range of mining operations and participants also had opportunities to search for fossils at local geologic sites.

A coalition of state and federal agencies (including the DNR), teachers and mining industry staff organized the workshops. The program is provided at no cost to teachers and parents who home school.

Minnesotans Want to Know

Demand for information about Minnesota's natural resources is growing rapidly. To respond to this demand, DNR is accelerating information dissemination to the public. The DNR established the Information Center in 1985 to meet this demand. Its purpose is to provide a one stop facility - answering questions on natural resource topics and issues, educating the public on outdoor recreation opportunities, and supplying printed materials and fact sheets. In 1998, Information Center staff responded to 150,000 telephone inquiries, replied by computer to 4,400 Internet customers, helped more than 20,000 walk-in visitors, and distributed 500,000 maps and brochures.

The DNR established a Web Site in February, 1997. It now contains more than 10,000 pages of information. Public demand for on-line information has increased in the last year. DNR's Web Site receives more than 600,000 "hits" per month. During May, 1998 alone, more than 90,000 lake survey reports were delivered to customers via the DNR Web Site. This compares to about 20,000 hard copy reports distributed annually in prior years.

III. Emerging Issues

1. Shoreland Development

Development of the state's shorelands will continue. Some shoreland areas are totally developed. Intensive shoreland development diminishes the aesthetics of lakes and rivers, damages habitat, and often contaminates surface and subsurface waters. Some shoreland areas are more densely developed or altered than many urban areas. Other, more pristine areas, are developing rapidly.

Between 1969 and 1982, the number of shoreland dwellings in Minnesota increased by 74%. A pilot in Itasca County, indicates that shoreland dwellings increased by another 31% in that county between 1982 and 1998.

The well being of Minnesota's lakes and rivers is at stake as shoreland areas continue to be more intensely managed and developed.

2. Flooding

Expansion of impervious surfaces, continued tiling of farm fields, and drainage projects will move increased volumes of water more quickly through the drainage network. The Red River Valley flood of 1997 caused damage of $1 billion in Minnesota, only 12% of which was covered by flood insurance. Public recreation facilities as well as other public infrastructure are not insured.

Extreme events such as heavy rainfall and rapid snowmelt, will have more calamitous consequences in certain areas. Flood events will challenge the state's emergency response network and cause increased devastation to farms and cities.

Floods also devastate habitat. Often the fisheries in a flooded river system requires years for full recovery. In addition, upland habitat and habitat restoration projects can be significantly damaged.

3. Exotic Species

Minnesota struggles to combat a host of exotic species. For example, Minnesota works aggressively to combat spread of the zebra mussels. Loss of natural habitat and native species from spread of exotic species can have major implications for important ecosystems. Minnesota's sport fisheries can be especially vulnerable. With global

warming or other major climatic shifts, new invasions of exotic species are likely.

4. Recreation User Conflicts

New technologies and increased affluence create novel recreation opportunities. Recreation users look to public lands and waters to provide space for these recreation activities. User conflicts result. Jetskiers and anglers compete for space at water accesses; off highway vehicle riders compete with hikers for remote trails; canoeists and personal watercraft users vie over use of waterways. They all look to the DNR to provide opportunities and to mediate conflicts. Recent history suggests that the near future will bring more of the same, with conflicts being sharper and opponents more strident.

5. Water Resources

The future will see growing demand for clean water to meet recreation, industrial, commercial and residential uses. Water supply may decline if non-point source pollution continues to impair surface water quality, aquifer contamination worsens, urbanization reduces aquifer recharge, and global warming reduces precipitation. Government, as the water regulator, may face difficult decisions allocating water resources among users.

6. Urbanization

The process of converting natural landscapes into land for homes, businesses, transportation will continue. This will reduce land available for natural processes, outdoor recreation,and other purposes essential to healthy ecosystems.

7. Habitat Fragmentation

Land conversion will continue to fragment habitat and diminish its productive capacity. Some habitats, such as the state's original prairies, have been reduced to less than 1% of their original expanse.

8. Forests in Demand

Minnesota forests will face increasing pressures for timber, recreation, and development. Investments in key environmental initiatives will need to continue if the state is to sustain forest systems. Equally important will be the need to sustain a flow of wood from Minnesota forests to maintain the viability of the state's forest products industry and to meet society's growing demand for raw materials.

9. Global Climate Change

Most scientists now concur that the earth's climate is changing. Global temperatures are warmer and patterns of precipitation may be altered significantly. Whether or not human activity is responsible, climatic change would exert rapid and significant impacts on ecosystems. Some plant and animal species populations could decline sharply and perhaps disappear. Others may thrive. In the balance, the speed of the changes could cause great disruptions in Minnesota's ecosystems.

10. Endocrine Disruptors

Synthetic chemicals may disrupt hormones in humans and animals. Even small amounts of these chemicals could be responsible for cancers, birth defects and immune problems. Major malformation in animals in the Great Lakes region traced to artificial chemicals raised the initial alarm about hormone disruptors. Subsequent investigations in Minnesota indicated similar problems in the Mississippi and St. Croix River. The Environmental Protection Agency is assessing how best to evaluate impacts of these chemicals.

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