Sustainable Forest Resources Act Implementation in 2001

Minnesota Forest Resources Council Annual Report to the Governor and Legislature

Respectfully submitted
by the Minnesota Forest Resources Council

Gene Merriam, *Chair*

Wayne Brandt
Steven Daley Laursen
Betsy Daub
Greg Damlo
Janet Green
Wayne Hammer
Richard Holm
Norm Moody
Brad Moore
Ronald Nargang
Robert Oswold
David Parent
Shawn Perich
James Sanders
Roger Scherer
David Sterr

A Vision for Minnesota's Forest Resources

The Minnesota Forest Resources Council (MFRC) developed the following vision for our state's forest resources:

❒ Minnesota's forests are managed with primary consideration given to long-term ecosystem integrity and sustaining healthy economies and human communities.

❒ Forest resource policy and management decisions are based on credible science, community values, and broad-based citizen involvement.

❒ The public understands and appreciates Minnesota's forest resources and is involved in and supports decisions regarding their use, management, and protection.

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Message from the Chair

Our continuing efforts to promote long-term sustainable management of Minnesota's forests in 2001 have focused on 13 significant areas of accomplishment.

This has been a landmark year for the Minnesota Forest Resources Council.

We are pleased to submit the annual report of the Minnesota Forest Resources Council (MFRC) for 2001. This has been a landmark year for the MFRC.

Our continuing efforts to promote long-term sustainable management of Minnesota's forests in 2001 have focused on 13 significant areas of accomplishment:

1. We completed assessments for the six forested landscapes in Minnesota.

2. We merged forest road data for 15 northern counties and provided it to land managers for use in forest planning.

3. We completed an analysis of current economic conditions and trends in northern Minnesota.

4 We mapped current ecological conditions in the North Central Landscape. (See Figure 1, page 7.)

5. We initiated a forest spatial analysis project to improve understanding of past, present, and possible future forest spatial patterns that are important for wildlife, forest productivity, recreation, and other forest values.

Spatial patterns refer to the size, shape, and arrangement of landscape elements, such as forest types, habitats, and natural and management disturbances.

This project will develop tools, conduct analyses, and assess the value and limitations of using spatial pattern data in forest management in northeastern and north central Minnesota.

For example, two different models are being used to examine potential changes in forest spatial patterns given different management scenarios. One of the models examines ecological and management interactions at a large scale, and the other model attempts to find optimal timber harvest schedules given different spatial and economic objectives.

This research will allow forest managers to better assess:

- The effects of changing the size and type of harvest
- How natural disturbances interact with management practices
- How coordination across ownerships affects spatial patterns

6. We approved a timber harvesting and forest management guideline review process.

7. We convened a guideline review technical committee to develop potential guideline revision language.

8. We requested and received public comment on prospective guideline changes.

In 2002, the MFRC will decide which guideline recommendations will undergo peer review. Then an economic analysis of the guidelines will be conducted, and the guidelines will undergo a final public review.

If guideline revisions are approved by the MFRC, the intent is to have the MFRC approve the new guidelines by May 2003.

9. We completed three research projects on site-level harvesting impacts that were initiated in 1996.

The three research projects completed in 2001 include:

❒ Evaluating Riparian Area Dynamics, Management Alternatives, and Impacts of Harvesting Practices

❒ Wildlife Species: Response to Forest Harvesting and Management in Riparian Stands and Landscapes

❒ Impacts of Harvesting on Regeneration, Productivity, and Floristic Diversity of Quaking Aspen and Northern Hardwood Ecosystems

10. We began using the study results in reviewing and considering revisions to the timber harvesting and forest management guidelines, and we successfully sought funding for additional related research.

A proposal was submitted to the Legislative Commission on Minnesota Resources on behalf of the MFRC to evaluate how well the timber harvesting and forest management guidelines protect forest resources, especially in forested riparian areas.

This study, titled *Evaluating the Sustainability of Minnesota's Forest Management Practices*, was approved for funding by the 2001 Legislature. The study will begin in July 2002.

11. With the MFRC providing oversight and program direction, the Minnesota Department of Natural Resources (DNR) published results for the 2000 monitoring field reviews for 108 timber harvest sites on public and private forest land.

Additional monitoring field reviews were conducted for 117 timber harvest sites in 2001. The results from these monitoring field reviews will be published in spring 2002. Another round of field reviews will be conducted in 2002.

12. With the MFRC providing program advice, the DNR undertook an initial evaluation of riparian areas in Minnesota and published the results in the report *Riparian Forests in Minnesota: A Report to the State Legislature.*

The DNR, working with the MFRC, has improved the methodology for identifying riparian areas. Results from an updated analysis will be provided to the Legislature in March 2002.

For the past six years, the MFRC has provided a unique forum for collaborative problem-solving among diverse groups interested in sustainable management of Minnesota's forest resources and committed to cooperation in addressing the state's forest resource issues.

13. We completed a draft report assessing the accuracy and availability of information about Minnesota's forests.

Minnesota's ability to manage its forests sustainably depends directly on access to accurate information on the state's forest resources. A three-year study of the availability and accuracy of forest resource information shows significant and widespread gaps in knowledge about Minnesota's forests.

In 2002 the MFRC will publish a final report describing its findings and recommending actions to strengthen the state's forest resource information base and information-gathering capacity.

The coming year will be another critical one for the MFRC and its efforts to implement the Sustainable Forest Resources Act (SFRA):

❒ The current recession, intensified by the terrorist attacks of September 2001, has resulted in a state budget shortfall of almost $2 billion.

❒ Consequently, the Governor has recommended that Fiscal Year 2003 funding for implementing the SFRA be reduced from $900,000 to $200,000.

❒ The Legislature will need to decide the appropriate level of support for the policies and programs established under the SFRA—including the MFRC.

For the past six years, the MFRC has provided a unique forum for collaborative problem-solving among diverse groups interested in sustainable management of Minnesota's forest resources and committed to cooperation in addressing the state's forest resource issues.

The 2001 Minnesota Legislature reauthorized the MFRC for six years, until June 30, 2007. **The MFRC intends to build on its many accomplishments and continue to promote sustainable forest management policies and practices on all forest ownerships in Minnesota.**

Sincerely,

Gene Merriam
Chair

The Minnesota Forest Resources Council

The MFRC is a 17-member organization working to promote long-term sustainable management of Minnesota's forests.

The Minnesota Forest Resources Council (MFRC) is a 17-member organization working to promote long-term sustainable management of Minnesota's forests. It does so by coordinating implementation of the Sustainable Forest Resources Act (SFRA) of 1995 and advising the Governor and federal, state, county, and local governments on sustainable forest resource policies and practices.

Created in 1995, the MFRC operates within the policy framework for sustainable forestry set forth in the SFRA, which is to:

❒ **Pursue the sustainable management, use, and protection** of the state's forest resources to achieve the state's economic, environmental, and social goals.

❒ **Encourage cooperation and collaboration** between public and private sectors in the management of the state's forest resources.

❒ **Recognize and consider forest resource issues,** concerns, and impacts at the site and landscape levels.

❒ **Recognize the broad array of perspectives** regarding the management, use, and protection of the state's forest resources, and establish processes and mechanisms that seek these perspectives and incorporate them into the planning and management of the state's forest resources.

The Governor appoints a chair and 15 other members to the MFRC. The Indian Affairs Council appoints one additional member. Council membership includes a chair plus individuals representing the following categories:

- ❒ Commercial logging contractors
- ❒ Conservation organizations
- ❒ County land departments
- ❒ Environmental organizations (two representatives)
- ❒ Forest products industry
- ❒ Game species management organizations
- ❒ Labor organizations
- ❒ Minnesota Department of Natural Resources
- ❒ Minnesota Indian Affairs Council
- ❒ Nonindustrial private forest landowners (two representatives)
- ❒ Research and higher education
- ❒ Resort and tourism industry
- ❒ Secondary wood products manufacturers
- ❒ U.S. Department of Agriculture Forest Service

Landscape-Level Forest Resource Planning and Coordination

The MFRC's landscape program provides a forum where forest landowners and stakeholders can collaboratively address forest resource issues over broad regions.

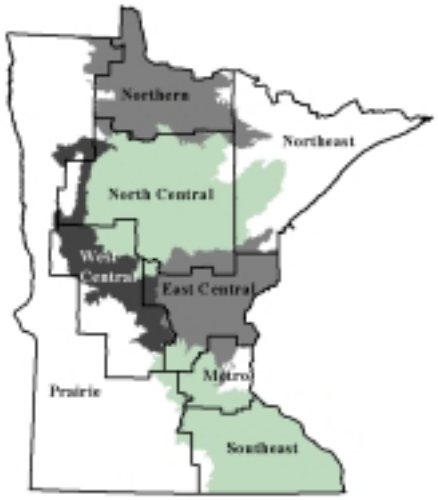

Figure 1. Landscape regions. Solid lines represent administrative boundaries; shaded areas represent ecological boundaries.

Landscape-level forest resource planning and coordination is a way of assessing and promoting forest sustainability across large areas. The MFRC's landscape program provides a forum where forest landowners and stakeholders can collaboratively address forest resource issues over broad regions.

The MFRC divided the state into six forested landscape regions plus two non-forested (Metro and Prairie) regions (Figure 1). In each region, committees of citizens and representatives of various organizations have been or will be developed to:

❒ **Gather and assess information** on the region's ecological, economic, and social characteristics.

❒ **Identify key issues and plan ways to address those issues** to promote sustainable forest management.

❒ **Agree on desired future forest conditions that promote sustainable forests,** and on goals and strategies to achieve those conditions.

❒ **Coordinate agreed-upon strategies, activities, and plans** among forest landowners and managers to achieve desired future forest conditions.

Progress To Meet SFRA Revisions

In 1999 and 2001, the Legislature made two revisions to Section 89A.06 of the SFRA. The MFRC response to mandates in those revisions has resulted in the following accomplishments to date:

Revision

Landscape assessments to be completed by June 30, 2001

Accomplishments

❒ Six forested landscape assessments completed

❒ Two non-forested landscape assessments (Metro and Prairie) currently being compiled

Revision

Regional landscape committees to complete desired future conditions, goals, and strategies for each landscape by June 30, 2003

Accomplishments

❒ The Northeast and North Central landscape committees have developed draft desired future forest conditions, goals, and strategies.

❒ Council staff, in cooperation with the University of Minnesota Southeast Regional Sustainable Development Partnership, is defining issues, desired future conditions, goals, and strategies for the Southeast Landscape.

❒ Council staff is currently developing a key participant list to form a regional landscape committee in the West Central Landscape.

Additional Accomplishments

Road Coordination

In 1999, the Northeast Landscape began working with UPM-Blandin, the Minnesota Department of Natural Resources (DNR), county land departments, Potlatch, and the U.S. Department of Agriculture Forest Service (USFS) to collect forest road geographic information system (GIS) data to be used in coordinated forest management projects. This group collected data covering Carlton, Cook, Lake, and Saint Louis counties.

In 2000, the North Central Committee expanded this project by adding data for all of the counties represented by the Minnesota Association of Land Commissioners. All of this forest road GIS data has been merged for land managers to use in forest planning.

Economic Analysis

The economic report *Northern Minnesota Forestry Analysis Project* was completed in July 2001 under contract with the University of Minnesota-Duluth (UMD) Bureau of Business and Economic Research.

The study used 1998 data with the IMPLAN model (IMpact Analysis for PLANning) to provide a current picture of economic conditions and trends in northern Minnesota as a baseline for further economic analysis.

The report can be accessed online at the MFRC's website (www.frc.state.mn.us) or at UMD website (http://sbe.d.umn.edu/ced/BBER/projects/projects.htm).

Ecological Analysis

The MFRC contracted with the University of Minnesota-Duluth Natural Resources Research Institute (NRRI) to map current ecological conditions in the North Central Landscape.

The map will be used to help measure existing ecological conditions to compare these conditions with desired future conditions for the landscape.

NRRI is providing continued support to the Northeast Landscape Committee by analyzing ecological conditions with ownership data and by analyzing future effects of implementing landscape goals.

Other Accomplishments

The Minnesota SFRA is unique nationally in establishing legislative authorization, funding, and a framework for citizens and interested groups to work together to define forest sustainability on a landscape level.

Interest remains high in both established landscape committees, with a total of 110 citizens and interested groups on the mailing list and about half actively participating in regular meetings.

The Minnesota SFRA is unique nationally in establishing legislative authorization, funding, and a framework for citizens and interested groups to work together to define forest sustainability on a landscape level.

In addition, landscape information and staff expertise is shared and is influencing USFS, DNR, and county planning over the landscape. The impacts of working together, sharing information, and coordinating planning across land management agencies are not easy to measure, but they are major contributors to implementing sustainable forest management in Minnesota.

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Future Direction

Future direction will focus on meeting the intent of the SFRA by implementing the landscape program in all landscape regions of the state by July 2003. This effort will include:

❒ Continuing work with the University of Minnesota Southeast Regional Sustainable Development Partnership and other partners in the Southeast Landscape to define issues, desired future conditions, goals, and strategies by summer 2002.

❒ Establishing regional landscape committees in the West Central, East Central, and Northern landscapes, with the planning process beginning by fall 2002.

The Northeast and North Central regional landscape committees will continue to analyze economic and social impacts of proposed ecological goals. A shift from planning to a focus on landowner coordination of strategies will accomplish landscape goals and desired conditions across all ownerships in each of these landscape regions.

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Forest Spatial Analysis and Modeling Project

Forest spatial patterns are important for numerous forest values, including wildlife, forest productivity, and recreation.

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❒ Some species require large patches of forest, while others require smaller patches of several forest types in close proximity.

❒ Forest productivity depends on spatial patterns of soils and landforms, and costs associated with logging vary according to harvest size and arrangement on the landscape.

❒ Spatial patterns affect a whole range of recreational opportunities, such as hunting, birdwatching, hiking, and off-trail vehicle use.

Despite the importance of spatial patterns, they have not been assessed comprehensively in Minnesota, and the degree to which spatial patterns should be considered in management is controversial.

The MFRC's forest spatial analysis project was initiated in 2000 to improve understanding of past, present, and possible future forest spatial patterns.

The project will develop tools, conduct analyses, and assess the value and limitations of using spatial pattern data in forest management. The study area includes the Drift and Lake Plains and Northern Superior Uplands ecological sections in Minnesota (Figure 2).

Figure 2. Study area. Forest spatial analysis project study area indicated by light shading.

Spatial Patterns

Spatial patterns refer to the size, shape, and arrangement of landscape elements, which include:

❒ Forest types, habitats, and vegetation communities

❒ Landforms, soils, and aquatic systems

❒ Disturbances (including wind, fire, forest management, and development)

Figure 3 (facing page) provides examples of four different forest spatial patterns.

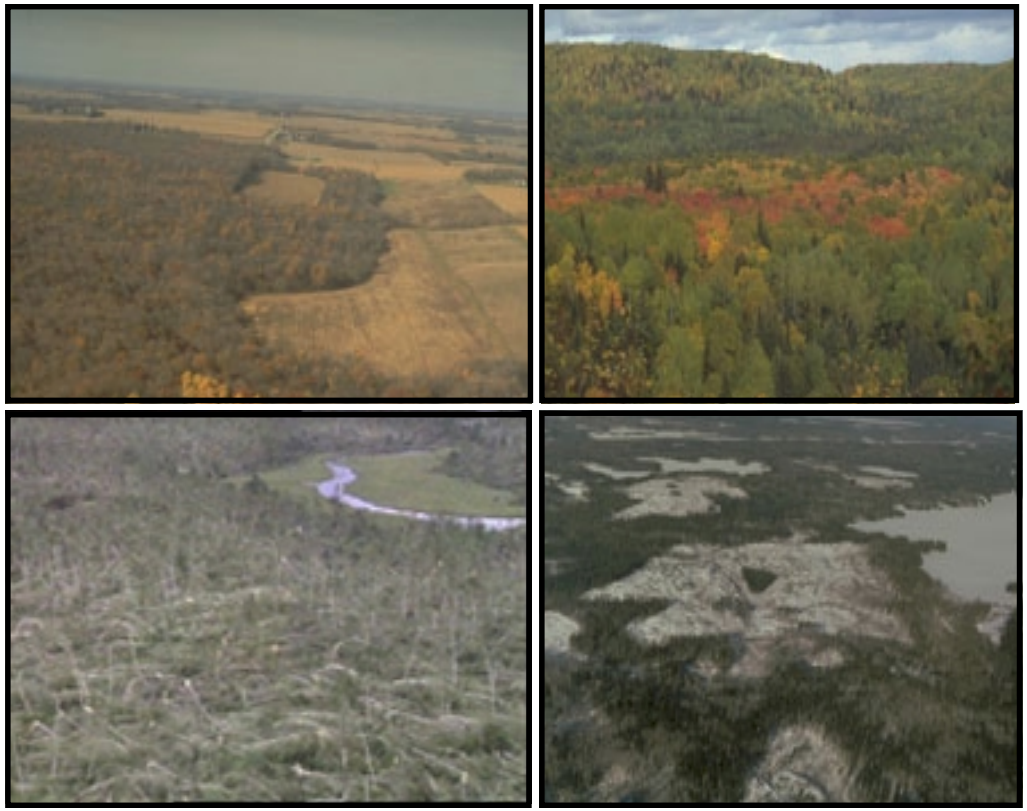
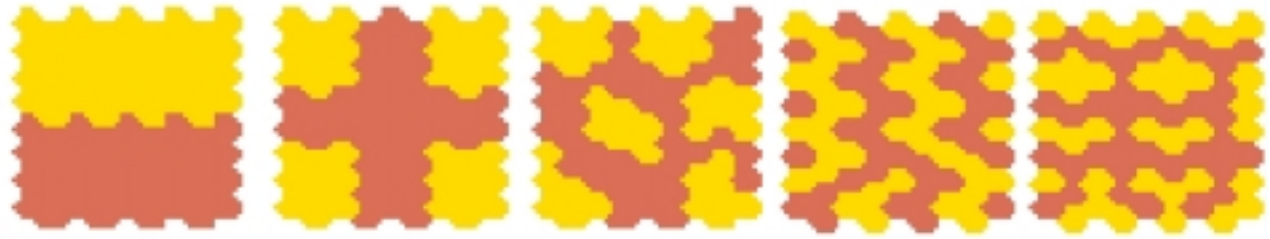


Figure 3. Examples of different forest spatial patterns: forest in agricultural landscape (upper left); continuous forest (upper right); blowdown area near Boundary Waters Canoe Area Wilderness (lower left); and forest harvests (lower right).

Spatial Analysis

Spatial analysis is simply mapping and measuring spatial patterns. Figure 4 depicts two habitats (320 acres each) arranged in five different ways. The number of patches, average patch size, and amount of edge vary dramatically from left to right, while habitat acreage of each type is constant.

Figure 4. Variation in the spatial patterns of two hypothetical habitats.



Habitat A (light shading)					
Habitat B (dark shading)					
Number of patches (Habitat A)	**1**	**4**	**6**	**6**	**12**
Average patch size (Habitat A, in acres)	**320**	**80**	**53**	**53**	**27**
Total edge (in miles)	**3.6**	**6.4**	**8.0**	**9.6**	**11.6**

Components of the Spatial Analysis Project

The spatial analysis project has numerous components, including:

❒ Making maps of past and current spatial patterns.

❒ Measuring spatial patterns on these maps and assessing changes.

❒ Modeling future scenarios.

❒ Assessing implications of past and potential future changes.

❒ Evaluating methods and analyses.

Making Maps

Geographic Information System (GIS) data sets

Aerial photo interpretation

Forty-two randomly located study sites (nine square miles each) have been identified for aerial photo interpretation (Figure 5). Forest cover types and four age-classes are being delineated over three time periods (1930s, 1970s and 1990s). All interpreted photos are being converted to computer (GIS) format.

Public Land Survey line-note interpretation

When surveyors conducted the original Public Land Survey (PLS) from 1847-1908, they noted vegetation and disturbance (including burns and blowdowns) as they walked and marked section lines. These line-notes are being converted to computer format and will be analyzed to gain an understanding of pre-European settlement vegetation and disturbance patterns. Line-note study areas are four township blocks surrounding the aerial photo block locations (Figure 6).

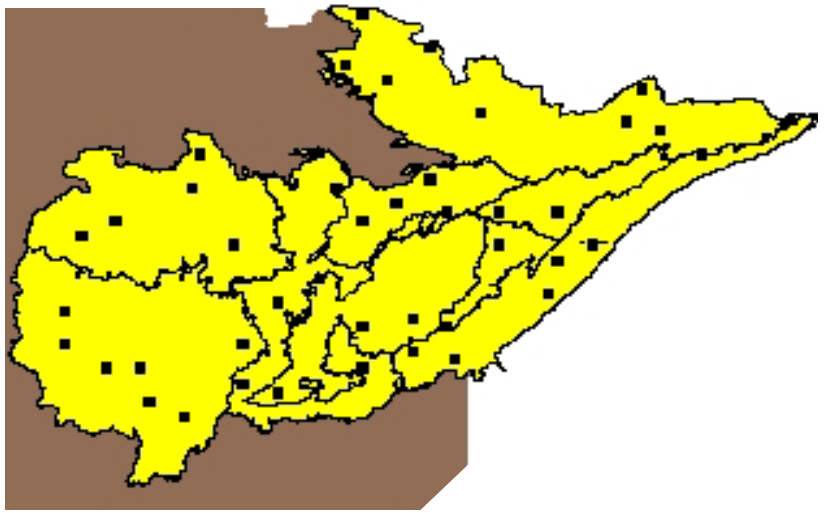


Figure 5. Aerial photo block locations.

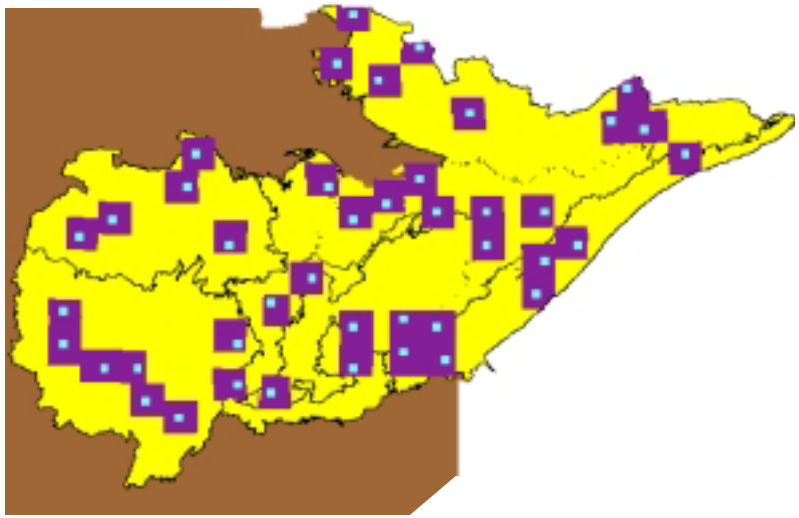


Figure 6. PLS line-note block locations.

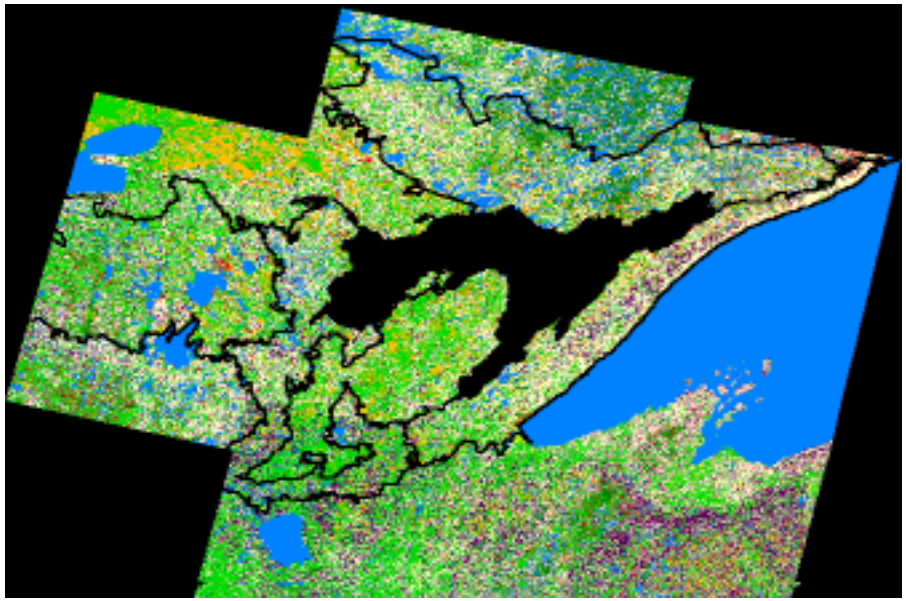


Figure 7. 1990s classified satellite image.

1990s satellite data

Spatial patterns will also be measured over the whole study area using satellite data from the 1990s (Figure 7). Although satellite data has less information on forest age than aerial photos, it is less expensive to interpret over large areas. Strengths and weaknesses of aerial photo and satellite data will be evaluated.

Measuring Spatial Patterns and Assessing Changes

In this project component, scientists will measure spatial patterns using GIS data sets developed from the aerial photos, satellite images, and PLS line-notes. They will assess how spatial patterns have changed over time. For example, has average patch size increased, decreased, or remained constant? This information will give historical context to the future modeling and wildlife effects analysis components.

Future Modeling

This project component is using two different models to examine potential changes in forest spatial patterns given different management scenarios (Figure 8). For example:

❒ What are the effects of changing the size and type of harvest?

❒ How do natural disturbances interact with management practices?

❒ How does coordination across ownerships affect spatial patterns?

One of the models is designed to examine ecological and management interactions at a large scale, and the other model attempts to find optimal harvest schedules given different spatial and economic objectives.

Wildlife Effects Analysis

This project component will examine the implications of changes in spatial patterns for plant and animal species. Methods of analysis will be determined in spring 2002. They will likely include a combination of literature synthesis, modeling, and expert consultation.

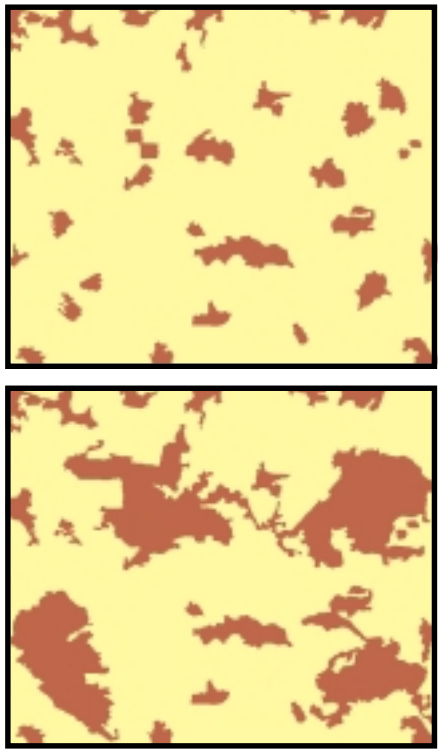


Figure 8. Hypothetical example of current (above) and modeled future (below) landscapes.

Project Sponsors and Participants

Financial and Inkind Sponsors

Financial sponsors of the project are the MFRC, DNR, Minnesota Forest Industries and its members, The Nature Conservancy, and Minnesota Audubon.

In addition to financial sponsors, several institutions are contributing staff time. These cooperators include the USFS, Natural Resources Research Institute, University of Minnesota College of Natural Resources, Minnesota Association of County Land Commissioners, and others.

Strategic and Technical Leadership Teams

The MFRC formed two inter-disciplinary, multi-stakeholder teams to design and carry out the spatial analysis project:

❒ **The Project Strategy Team (PST) provides strategic leadership** and developed the initial vision and questions for the project.

The PST is composed of 11 members from a variety of organizations, including public land management agencies, environmental groups, forest industry, conservation groups, and research organizations.

❒ **The Project Technical Team (PTT) provides technical leadership** and develops the methods to answer questions posed by the PST.

Members are scientists from a wide range of organizations, each with expertise in at least one of the following fields: remote sensing, landscape ecology, wildlife management, forest biometrics and modeling, and GIS.

The collective expertise of all team members will ensure that project deliverables are relevant and credible. The two teams met extensively throughout 2000 and 2001, and they will continue to guide the project through 2002.

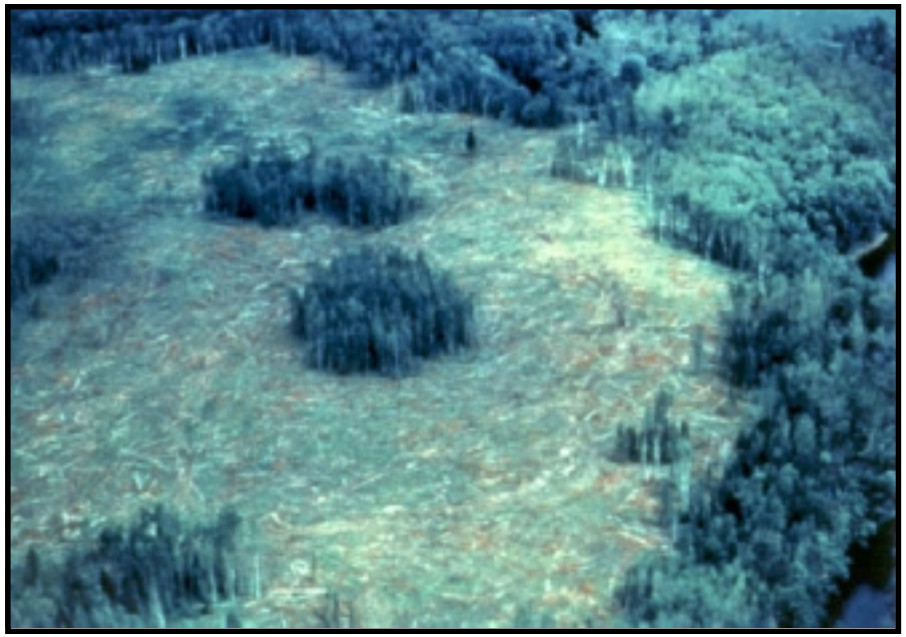
Timeline

With data development and analysis well under way, the overall project will be completed in early 2003.

Guideline Review and Revision

The SFRA required the MFRC to coordinate the development of comprehensive timber harvesting and forest management guidelines. These guidelines were published in March 1999 in the guidebook titled *Sustaining Minnesota Forest Resources: Voluntary Site-Level Forest Management Guidelines.*

The SFRA also states that "By June 30, 2003, the council shall review and, if deemed necessary, update the guidelines."



The MFRC approved a guideline review process in September 2001. A guideline review technical committee was convened to develop potential revision language for approved revisions to guideline recommendations.

The first phase of this review process was a request for public comment on needed guideline changes. The public review, conducted between mid-October and mid-December 2001, produced 14 sets of comments from individuals and organizations.

At this phase in the review process, the site-level program coordinator identified potential modifications to the guidelines based on the experience of the MFRC's guideline compliance monitoring technical committee, results from MFRC-sponsored guideline effectiveness research, and recommendations from the riparian management zone guideline peer reviews completed in December 1999.

The public review comments and recommendations from the site-level program coordinator's review are being presented to the MFRC in 2002 at its January, March, and April meetings. By the April meeting, the MFRC is expected to determine which of the guideline recommendations will be moved forward to undergo a peer review.

At that time, an economic analysis of the guidelines will be conducted, followed by a final public review of the revised guidelines. If guideline revisions are approved by the MFRC, the intent is to have the MFRC approve the new guidelines by May 2003.

Final reports for three research projects were submitted to the MFRC in 2001 for studies that were initiated in 1996.

MFRC-Sponsored Forest Resources Research

The research projects funded by the MFRC meet the research goals laid out in the SFRA. In selecting projects for funding, the MFRC strives to:

❒ Support collaboration among organizations that conduct forest resources research.

❒ Link forest resources researchers in various disciplines.

❒ Maintain interaction and communication between researchers and practitioners in the development and use of forest resources research.

Projects Completed in 2001

Final reports for three research projects were submitted to the MFRC in 2001 for studies that were initiated in 1996. Results from these studies and from an additional study completed previously are being used in reviewing and revising the voluntary site-level timber harvesting and forest management guidelines.

Effects of Timber Harvest on Archaeological Sites

This study, completed in 1998, was an investigation of the effects of timber harvest activities on subsurface archaeological deposits.

Research efforts involved construction of artificial archaeological deposits in timber stands scheduled for harvest, using materials that closely replicate those typical of authentic archaeological sites in northern Minnesota.

After harvest, data recovery was conducted to retrieve replica artifacts and document the extent to which they had been displaced or damaged by harvest activities.

Although the data indicates that the disturbance pattern during harvesting was not consistent, there was some commonality in the localized nature of observed effects.

Study Findings

❒ Within treated plots, some areas were not impacted, while other areas suffered moderate to significant impact.

❒ When the three types of effects (physical damage, horizontal displacement, and vertical displacement) were evaluated and combined, it was found that 17% of replica items in harvested plots suffered a significant effect.

❒ Equipment traffic pattern was the most important factor in explaining the variation in artifact damage and displacement.

Evaluating Riparian Area Dynamics, Management Alternatives, and Impacts of Harvesting Practices

This study considered both pre- and post-harvest conditions of various components of forest environments, including:

❒ Aquatic insects and their habitats

❒ Fish populations and their habitats

❒ Riparian vegetation composition and development

❒ Blowdown of residual trees

❒ Soil in riparian and upland areas

❒ Model archaeological artifacts

❒ Leaf litter input to streams

❒ The amount and size of coarse woody debris in and around the streams

Study Findings

❒ **Harvesting to 44 square feet basal area per acre** within the 100-foot-wide riparian management zone will not prevent the regeneration of intolerant species, such as aspen and paper birch, but biomass and density of those species could be reduced as much as 50% compared to the clearcut areas.

❒ **Coarse particulate organic matter (leaf litter) input to streams was reduced** in all harvesting treatments. Three years after harvest, leaf litter input to the streams was reduced 33-47% within the 100-foot partially harvested riparian zone.

❒ **Blowdown of riparian trees significantly increased** as a response to harvest. There was also a related temporary increase in woody debris for these treatments.

❒ **Stream temperature was not significantly affected** by harvesting. Temperatures remained within the acceptable range for brook trout.

❒ **No significant effects on water chemistry were found** for any treatments.

❒ **Increased sediment inputs to streams** appeared to be related to the total presence of road crossings in the watershed and the total extent of harvesting within the watershed.

❒ **Reduced biotic integrity was observed** for all sites, including the controls. This effect was attributed to the overall disturbance in the watershed rather than the effects at the site level.

❒ **Effects of harvesting on fish populations** were negligible.

❒ **Current riparian guidelines for trout streams (200 feet) appear adequate** to maintain stream temperatures within the normal range, provide for minor changes in leaf litter input to streams, maintain riparian species diversity, and maintain in-stream organic matter. No significant impacts are anticipated on fish and invertebrate communities.

❒ **Current riparian guidelines for non-trout streams (100 feet) provide adequate protection** against large temperature increases, but they may affect other important riparian resources (including reductions in leaf litter and large woody debris input, or changes in biotic communities). Because the streams that were studied are fed by groundwater, that source of cool water could have had some impact on any moderation of stream temperature that may have resulted from the harvests.

Wildlife Species: Response to Forest Harvesting and Management in Riparian Stands and Landscapes

This study examined the relationship between harvest levels and harvest systems in riparian areas and breeding bird populations.

Study Findings

❒ **Prescribing riparian management zones** at the recommended width around all water bodies will increase the amount of edge on the landscape.

❒ **Changes in bird communities** relative to the control sites were greater where basal area was reduced to 25 to 35 square feet per acre than on sites where the riparian forest was left uncut.

❒ **Only two riparian-dependent bird species,** a Northern Waterthrush and a Common Merganser, were observed in the study sites. This result was likely due to two factors:

- The streams studied were not wide enough to support the foraging activities of larger-bodied species.

- The second-growth forest (less than 70 years old) lacked tall, super-canopy trees, large snags, and older trees with heartrot suitable for cavity excavation.

❒ **The numbers of individual birds and numbers of species increased** in response to all harvest treatments. As the amount of time since harvest increased, bird community response to treatment regime became increasingly different from control treatments.

❒ **The Ovenbird was the only species that decreased significantly** in response to harvesting in the riparian area (see photo below).

❒ **The Black-throated Green Warbler and Hermit Thrush, forest-dependent species, responded negatively** to all harvest regimes. A 100-foot uncut riparian management zone was sufficient to maintain the Black-throated Green Warbler, but not the Hermit Thrush.

❒ **The Red-eyed Vireo, another forest-dependent species, was not adversely impacted** by any riparian treatments.

Impacts of Harvesting on Regeneration, Productivity, and Floristic Diversity of Quaking Aspen and Northern Hardwood Ecosystems

This study examined the impacts of harvest on:

❒ Soil properties

❒ The ability of trees to regenerate

❒ Productivity of harvested sites

❒ The diversity of vegetation in quaking aspen and northern hardwood ecosystems

Study Findings

❒ **Soil compaction on sites harvested in winter was less** than on sites harvested in summer.

❒ **Regeneration stem densities and height growth were higher** for sites harvested in winter than in summer, even when adjusted for differences in soil compaction.

❒ **Relative tree regeneration stem densities and height growth decreased** with increasing soil compaction and increasing residual basal area.

❒ **Equipment trafficking should be confined** and focused on as few skid trails as possible to minimize effects of compaction on soil productivity. The initial machinery passes are responsible for the majority of the disturbance.

❒ **Higher numbers of residual trees left during harvesting** were associated with lower soil compaction and resulted in those areas of the regenerating stand consisting of a higher proportion of shade-intolerant species. Alternately, lack of heavy disturbance was associated with successional, shade-tolerant species.

❒ **The practice of leaving residuals on the site during harvesting** negatively impacts future growth and productivity of the regeneration due to the effects of competition from the overstory.

Proposed Research

Evaluating the Sustainability of Forest Management Practices

The SFRA charged the MFRC with coordinating development of voluntary site-level timber harvesting and forest management guidelines.

These guidelines recommend practices to address impacts of timber harvesting and forest management on riparian areas, wildlife habitat, soil, water quality, wetlands, visual quality, and historic and cultural resources.

Application of the guidelines is now beginning throughout the state on many of the approximately 200,000 acres harvested annually. Potential guideline users include approximately 1,500 timber harvesters, 130,000 private forest landowners, DNR, county land departments, USFS, American Indian bands, and major forest products companies.

A proposal was submitted on behalf of the MFRC to evaluate how well the guidelines protect forest resources, especially in forested riparian areas. The proposal has been recommended for funding by the Legislative Commission on Minnesota Resources and the 2001 Legislature.

Monitoring

The SFRA mandated the development of a compliance monitoring program to evaluate the application of the MFRC's timber harvesting and forest management guidelines on public and private forest land in Minnesota (M.S. 89.07 Subd 4). The SFRA also specifically targets riparian forests for monitoring.

The statute (M.S. 89.04 Subd 4) states: "*Monitoring riparian forests.* The commissioner, with program advice from the council, shall accelerate monitoring the extent and condition of riparian forests, the extent to which harvesting occurs within riparian management zones and seasonal ponds, and the use and effectiveness of timber harvesting and forest management guidelines applied in riparian management zones and seasonal ponds."

Effectiveness monitoring is another requirement of the SFRA that provides information on whether the guidelines are providing the desired level of protection to forest resources. The DNR is required to conduct a program to evaluate the "effectiveness of practices to mitigate impacts of timber harvesting and forest management activities on the state's forest resources" (M.S. 89.07 Subd 3).

Compliance Monitoring

Implementation of the guideline monitoring program is the responsibility of the DNR, with oversight and program direction provided by the MFRC. Compliance monitoring is designed to evaluate application of timber harvesting and forest management guidelines contained in the guidebook *Sustaining Minnesota's Forest Resources: Voluntary Site-Level Forest Management Guidelines.*

In 2000, 108 sites were monitored, and 117 sites were monitored in 2001. The results of the 2000 monitoring field reviews are contained in the report *Monitoring the Implementation of the Timber Harvesting and Forest Management Guidelines on Public and Private Forest Land in Minnesota: Report 2000.*

The methodology for site selection for the 2001 field reviews was the same as for 2000:

❒ Blocks of land one-half township in size were randomly selected throughout the forested area of Minnesota.

❒ Complete aerial photography of these one-half townships was used to identify recently harvested forest land.

❒ Where sites were identified, permission was requested of landowners to conduct the field reviews.

❒ Field evaluations were conducted by independent contractors, who were provided with forms to collect data on the application of measurable (quantifiable) timber harvesting and forest management guidelines.

❒ For all sites monitored in 2001, harvesting and/or stumpage sales occurred prior to publication of the timber harvesting and forest management guidebook.

The results from the 2001 field reviews are considered as baseline data, except for water quality and wetland protection practices guidelines, which have been standard forestry practice for more than a decade.

The number of sites monitored in each landowner category for 2001 is shown in Table 1. The results from the 2001 field reviews are currently being evaluated and will be published in spring 2002, when they will be presented to the MFRC.

Table 1. Number of Sites Monitored by Landowner Category

State	45
County	31
USFS	12
Private industry	7
Nonindustrial private forest	22
TOTAL	**117**

For the 2002 field reviews, the site selection methodology has been modified to test the effectiveness of using satellite imagery in combination with aerial photography to improve the capabilities of the DNR in identifying potential timber harvesting sites.

Effectiveness Monitoring

Effectiveness monitoring (research) provides information on whether the timber harvesting and forest management guidelines are achieving the desired objective of protecting specified forest resources. Important issues that are addressed, in part, by this type of monitoring include:

❒ An assessment of the effectiveness of specific guidelines in maintaining or enhancing long-term site productivity

❒ Types of timber harvesting strategies appropriate for protecting specified riparian functions and values

The focus of much of the public and professional debate on guideline adequacy has been the riparian recommendations. The Legislative Commission on Minnesota Resources has provided $200,000 in funding to the University of Minnesota Department of Forest Resources and to the Natural Resources Research Institute to study the effectiveness of the timber harvesting and forest management guidelines in riparian areas.

The focus of much of the public and professional debate on guideline adequacy has been the riparian recommendations.

Designed as a short-term (one-year post-harvest) effectiveness monitoring study, the study will establish the basis for conducting long-term assessments of the adequacy of specific riparian guideline recommendations.

The objective of this study is to evaluate the impact of applying specific riparian guideline management recommendations on several variables:

❒ Aquatic (including stream temperature and benthic macroinvertebrate populations)

❒ Terrestrial (including tree regeneration and coarse particulate organic matter input to streams)

❒ Both aquatic and terrestrial wildlife (including breeding bird populations)

Riparian Monitoring

The SFRA directs the DNR, with program advice from the MFRC, to accelerate efforts to monitor the trends and conditions of riparian areas in Minnesota. In 2001, the DNR undertook an initial evaluation of riparian areas in Minnesota. The results of this analysis were published in the report *Riparian Forests in Minnesota: A Report to the State Legislature.*

The DNR, working with the MFRC, has revised the methodology for identifying riparian areas to use change detection from satellite imagery in combination with aerial photography. Results from this analysis will be provided to the Legislature and the MFRC in March 2002.

Citizens Concern Monitoring

The Public Concerns Registration Process (PCRP) was set up in 1998 to accept "comments from the public on negligent timber harvesting and forest management practices" (M.S. 89A.07 Subd. 5). The PCRP provides a way for citizens to inform landowners, foresters, and loggers of specific concerns about timber harvesting and forest management practices that they see in Minnesota. Since its inception in 1998, the PCRP has received a total of 14 concerns.

Although it is not a regulatory or punitive program to stop timber harvests or resolve disputes over contractual issues or forest management activities, the PCRP does encourage sustainable management of Minnesota's forests by emphasizing education of those involved.

Through the PCRP, citizens can:

❒ Formally let the MFRC know their concerns about forest management activities they see.

❒ Be a catalyst for mitigation of any problems on a site.

❒ Learn more about forest management and sustainable forestry.

Benefits of the PCRP

Landowners, loggers, and foresters benefit by becoming more aware of public concerns regarding forest management, and by learning more about guidelines for sustainable forest management.

The MFRC benefits from receiving summaries of concerns registered through the PCRP. These summaries help the MFRC understand citizens' expectations for how Minnesota's forests should be managed.

The MFRC can use these insights to decide which, if any, additional guidelines are needed and to identify continuing education programs needed for forest managers, forest owners, loggers, and citizens.

Landowners, loggers, and foresters benefit by becoming more aware of public concerns regarding forest management, and by learning more about guidelines for sustainable forest management.

How PCRP Concerns Are Addressed

In 2001, three concerns were registered with the PCRP. The three concerns dealt with federal, state, and private land. The harvest sites involved were in Cass, Cook, and St. Louis counties.

One of the three concerns was an issue relating to an area proposed for harvest, which is beyond the purview of the PCRP. The citizen who registered that concern was advised that the PRCP dealt only with areas that have been logged.

The other two issues generated full reports by the MFRC:

❒ **One concern** addressed a number of issues affected by a timber harvest on private land: visual quality along a road, the condition of the road and a recreation trail, the potential for fire, and effects of the harvest on wildlife habitat.

The landowner and logger were contacted and given educational material relating to forest management and visual quality. The landowner also received information on the Forest Stewardship Program, which provides professional management assistance.

❒ **The second concern** was related to a timber harvest along a lakeshore and its impacts on visual quality from large slash piles left on the site. The resource manager involved with the site was contacted to encourage mitigation of the concern. The registrant was also given information dealing with a law on management of shorelands that was part of the basis for their concern.

These registered concerns provided an opportunity to improve participant knowledge on forest management and communicate ways to mitigate the impacts on the sites involved.

The MFRC is increasing public awareness of the PCRP by placing advertisements and notices about it in appropriate publications (including *Better Forests, Focus on the Waters*, and various conservation and environmental organization newsletters). This enhanced effort will likely increase the number of concerns received by the PCRP.

These concerns provided an opportunity to improve participant knowledge on forest management and communicate ways to mitigate the impacts on the sites involved.

Education

As a result of the SFRA, two continuing education programs were established:

❒ Loggers created the Minnesota Logger Education Program (MLEP) to promote high operational standards and enhance professionalism for loggers.

❒ The Center for Continuing Education in the University of Minnesota College of Natural Resources (CNR-CCE) was established to provide innovative education programs for natural resource professionals.

Continuing Education for Loggers

In the past year, MLEP activities and accomplishments have included the following:

❒ Achieved a membership of 549 logging business owners and associates. Independent research has determined that MLEP's membership currently represents more than 80% of Minnesota's annual timber harvesting activities.

❒ Played a primary role in design, development, and delivery of forest management guideline introductory programs, along with the Minnesota Forest Resources Partnership and the CNR-CCE.

❒ Delivered core membership training programs on the following topics: Timber Cruising and Silviculture, Tree Species Identification, Forest Management Guideline Monitoring Results, Timber Availability, and Legislative Updates.

❒ Documented attendance of 907 participants at training events over the year, including 778 loggers and 129 resource managers.

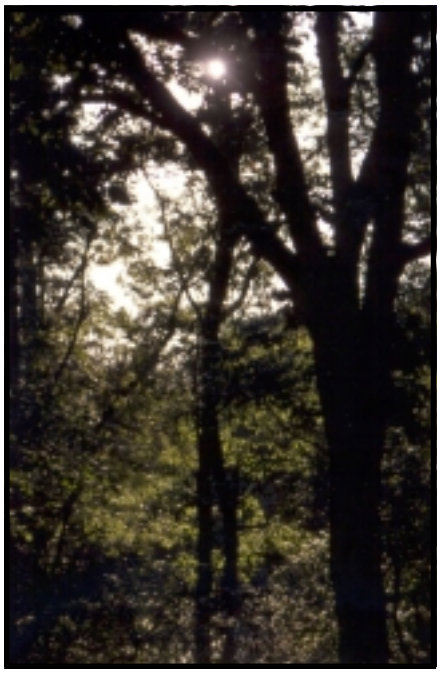
In addition, two important training programs are being developed by MLEP for loggers and resource managers:

❒ Protecting Site Quality: Forest Management and Timber Harvesting will be delivered during 2002 to assist in the increased application of those practices identified through guideline monitoring as having the lowest rates of implementation.

❒ Core Certification Training will be used, mainly to deliver the International Standards Organization and the Sustainable Forestry Initiative certification training standards during 2003.

Primary participants assisting in the development of the two training programs include MLEP, University of Minnesota, DNR, USFS, county land departments, Minnesota Forestry Association, and the primary forest products industry.

Field-training sites will be developed and maintained throughout the state to deliver these programs. Forest management guideline monitoring results and established certification training standards will direct the development and delivery of both programs.



Continuing Education for Natural Resource Professionals

The CNR-CCE continues to be an active MFRC partner in promoting excellence in natural resource management. It offers a broad range of technical and professional education programs for practicing natural resource managers in all sectors of the forestry profession. It has been a co-leader in the planning and implementation of guideline education programs. More than 850 participants attended CNR-CCE workshops during 2001.

In 2001, educational programming for natural resource professionals included workshops targeted at forest management guidelines, new research findings, and new technologies. Guideline training included a continuation of the introductory and field sessions for the forest management guidelines, as well as a more focused workshop titled Understanding Field Applications of Riparian Guidelines.

During 2001, CNR-CCE completed plans for a symposium on recent research findings related to forest systems of the Upper Midwest. Cosponsored by the MFRC, the symposium was titled Forest Research Review.

Held in early January 2002, this popular and successful symposium attracted 190 participants, with an additional 60 interested professionals placed on the waiting list.

Because of the high level of interest demonstrated for this type of program, plans are under way to make the Forest Research Review an annual event.

CNR-CCE also coordinated the Third North American Forest Ecology Conference, which attracted more than 200 participants from across the nation.

Other educational programs offered during 2001 included:

- ❒ Managing Northern Hardwoods
- ❒ Managing Forests for Wildlife with Views on a Changing Climate
- ❒ White Spruce Management: Forest Stewardship in the North Woods
- ❒ Cultural Resources on Forested Lands
- ❒ Managing for Reptiles and Amphibians
- ❒ Practical Silviculture in an Ecological World
- ❒ Using Handheld Personal Computers in Field Forestry
- ❒ Global Positioning Systems in Forestry
- ❒ Gypsy Moth Silviculture
- ❒ Identifying Plants to Classify Forest Habitats

Interagency Information Cooperative

The Interagency Information Cooperative (IIC), created in response to the SFRA, is designed to increase information-sharing among agencies involved in forest resources. Throughout the past year, the IIC maintained a website that provides the public with references to forest resources data in Minnesota (www.iic.state.mn.us). Since the inception of this website in 1999, use has continued to increase (Figure 9).

During the past year, the IIC has also worked with the MFRC Landscape Program in updating forest inventory GIS data merged from the USFS, DNR, and county land departments.

This data has been used to assist in landscape-level planning, various agency planning processes, and forest resources research.

The common forest inventory GIS data is available to the public on the Internet at http://deli.dnr.state.mn.us

Another important function of the IIC has been to hold meetings of its members to assess new opportunities for increased interagency information-sharing. Due to reduced SFRA funding in recent years, these meetings have not been held. In the future, the IIC hopes to receive adequate funding to fully meet its objectives.

Information Management Committee

This has been a landmark year for the MFRC's Information Management Committee. The results of the committee's three-year investigation into the availability and accuracy of Minnesota's forest information show significant and widespread gaps in knowledge about Minnesota's forests.

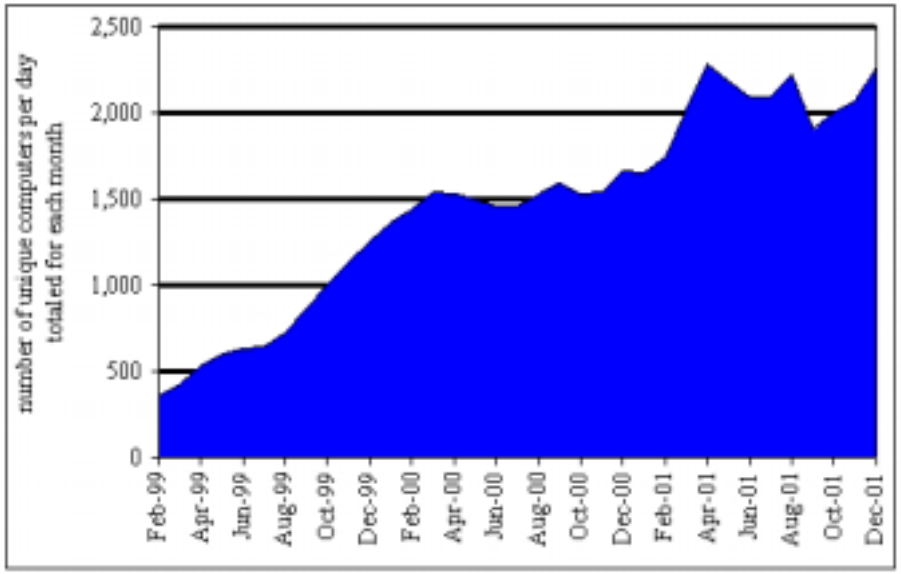


Figure 9. Unique computers accessing the IIC website daily, totaled for each month.

A report will be available later this spring summarizing these findings and making recommendations to strengthen the state's forest resource information base and information-gathering capacity.

The Information Management Committee also recognizes that the IIC has not been entirely successful in achieving the information management goals assigned to it under the SFRA.

The IIC has the potential to enhance the ability of both the natural resource community and the broader community to improve forest sustainability through expanded information-sharing and use of the website.

The IIC has lacked adequate funds, leadership, and staff, however, to meet its goals. The absence of primary funds makes cost-sharing unattractive to most of the groups involved, including the MFRC. One solution would be to transfer lead responsibility for the IIC from the DNR to the MFRC.

Outreach

Disseminating Information

In the last year, the MFRC has continued its outreach efforts through many different mechanisms:

❒ An additional 1,700 guideline brochures were sent to nonindustrial private landowners in northwestern Minnesota.

❒ The MFRC has added additional reports and information on its website (www.frc.state.mn.us).

❒ Numerous news releases have been distributed throughout the past year.

❒ Advertising for the PCRP process has continued in several magazines.

❒ At the State Fair, several hundred brochures on the MFRC and its programs were handed out at the DNR building.

Encouraging Participation

The MFRC and SFRA programs all require the participation of individuals interested in forest resources in Minnesota. There are many ways to become involved:

❒ **Attend MFRC meetings.** Scheduled meetings are posted on www.frc.state.mn.us/Info/calendar.htm, or call 651-603-0109 for meeting dates.

❒ **Participate in landscape regional committees.** Contact Dave Miller for more information at 218-720-4256 or dmiller@nrri.umn.edu

❒ **Use the Forest Management Guidelines.** They are available on the Internet at www.frc.state.mn.us/FMgdline/Guidebook.html, or call 651-603-0109 for a paper copy.

❒ **Notify the MFRC of specific timber harvesting or forest management activities that concern you.** Call toll-free 1-888-234-3702, or register your concern online at www.frc.state.mn.us

❒ **Access information on forest resources data** from the IIC at www.iic.state.mn.us

❒ **Attend forest resources educational programs.** Additional information can be obtained from the CNR-CCE at 612-624-4986 or www.cnr.umn.edu/CCE and from MLEP at 218-722-5442 or www.mlep.org

MFRC Documents

Produced in 2001

All MFRC documents are available via the Internet at www.frc.state.mn.us

MFRC Annual Report

Sustainable Forest Resources Act Implementation in 2000: Minnesota Forest Resources Council Annual Report to the Governor and Legislature (CP-0201)

Forest Resources Information

A Review of the Availability of Information about Minnesota's Forests: Phase II Report (IM-1201)

Landscape Program

Northeast Landscape Desired Future Condition Statement (Updated Draft) (LT-0501)

Northeast Landscape Range of Natural Variation Analysis: Methods, Data, and Analysis (NRRI)

Minnesota's White Pine in the Future (LT-0301a)

An Educational Guide Comparing Different GIS Data for Three Neighboring Subsections (Laurentian, Nashwauk, and Toimi Uplands) (LT-0301b)

Minnesota Northern Landscape Current Conditions and Trends Assessment (LT-0301c)

Minnesota West Central Northern Landscape Current Conditions and Trends Assessment (LT-0301d)

Minnesota East Central Landscape Current Conditions and Trends Assessment (LT-0103e)

Finding the Appropriate Scale for Forest Management Coordination Across Multiple Ownerships to Achieve Landscape Scale Goals: A Starting Point Discussion (LP-0601)

Northern Minnesota Forestry Analysis (UMD)

Drift and Lake Plains: A Comparison of Range of Natural Variation and Current Conditions (NRRI)

North Central Landscape Desired Future Condition Statement (Updated Draft) (LT-1201)

Monitoring Program

Monitoring the Implementation of the Timber Harvesting and Forest Management Guidelines on Public and Private Forest Land in Minnesota: Report 2000 (MP-0201)

Riparian Forests in Minnesota: A Report to the State Legislature (DNR)

Research

Wildlife Species: Responses to Forest Harvesting and Management in Riparian Stands and Landscapes (RR-0101)

Impacts of Harvesting on Regeneration, Productivity, and Floristic Diversity of Quaking Aspen and Northern Hardwood Ecosystems (RR-0301)

Evaluating Riparian Area Dynamics, Management Alternatives, and Impacts of Harvest Practices (RR-0601)

Comparing Riparian Management Zones to Riparian Areas in Minnesota (Pilot Study) (RR-1001)

Acronyms

CNR-CCE
University of Minnesota-Twin Cities College of Natural Resources: Center for Continuing Education

DNR
Minnesota Department of Natural Resources

GIS
Geographic Information System

IIC
Interagency Information Cooperative

MLEP
Minnesota Logger Education Program

MFRC
Minnesota Forest Resources Council

NRRI
University of Minnesota-Duluth Natural Resources Research Institute

PCRP
Public Concerns Registration Process

SFRA
Sustainable Forest Resources Act

UMD
University of Minnesota-Duluth

USFS
U.S. Department of Agriculture Forest Service