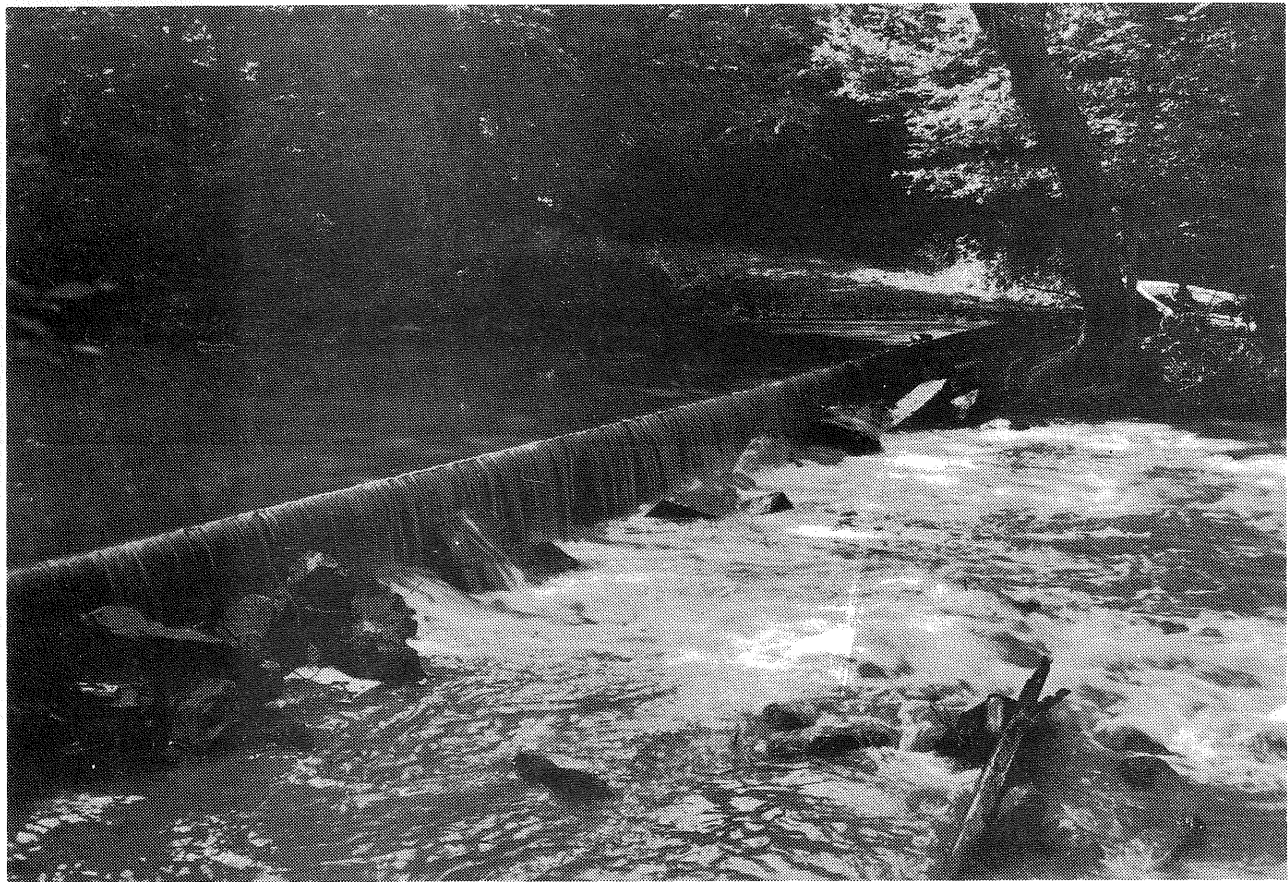




Incorporation of the Silviculture Portion of the Minnesota Water Quality Plan into the Minnesota Forest Resources Plan



**Funding and technical assistance were provided by the
Environmental Protection Agency, the Legislative
Commission on Minnesota Resources, and the USDA
Forest Service, S&PF**

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(Funding for document digitization was provided, in part, by a grant from the Minnesota Historical & Cultural Heritage Program.)

September 1982

**Minnesota Department of Natural Resources
Division of Forestry**

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INCORPORATION OF THE SILVICULTURE PORTION
OF THE
MINNESOTA WATER QUALITY PLAN
INTO THE
MINNESOTA FOREST RESOURCES PLAN

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Environmental Protection Agency, the Legislative
Commission on Minnesota Resources, and the USDA
Forest Service, S&PF

Denise Mitten

September 1982

Minnesota Department of Natural Resources
Division of Forestry

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Introduction

INTRODUCTION

The purpose of this document is to record the process of integration of the Minnesota Water Quality Management Plan (MWQMP) recommendations into DNR Division of Forestry programs.

While this integration project has several components the primary purpose is the inclusion of the water quality recommendations found in the silvicultural section of the MWQM Plan into the Minnesota Forest Resources Plan (MFRP). The MFRP is still in progress and in fact is at the early stage of Assessment. Nevertheless significant inroads have been made.

In addition to using the MFRP as a vehicle for incorporating water quality concerns into forest management in Minnesota other avenues are examined. The use of cost-share programs and/or regulation to encourage private landowner participation in water quality management is evaluated. The training and expertise needs of the Division of Forestry are also discussed. Finally the state-of-the-art recommended "Best Management Practices" (BMP's) are listed.

Throughout this project the strength of commitment on the part of the Division of Forestry staff has been welcomed. Both the field personnel and the division's planners have been supportive in defining the most appropriate "Best Management Practices" (BMP's) and implementation procedures.

This report fulfills the requirements of the Water Quality Management Project (208 prototype project linking the silviculture portion of the State 208 plan with the appropriate section(s) of the State Forest Resources Plan). This document will explain how Water Quality Management has been and will be integrated into the Division of Forestry's programs.

Forestry and Water Quality Management in Minnesota

FORESTRY AND WATER QUALITY MANAGEMENT IN MINNESOTA

Minnesota's water resource is an integral part of our economy. It is important for industrial uses, domestic needs, recreation and wildlife habitat. Since it is used for so many different pursuits there are many actors in the role of decision maker about our water resources. Agencies that influence or set water policy concerning Minnesota's waters are numerous (Table 1).

The link between forestry and water quality planning originates with the passage of the 1972 Federal Water Pollution Control Act Amendments (WPCA) which gave us legislatively mandated water quality goals. The objective is to restore and maintain the chemical, physical and biological integrity of the nation's water. One section of the complex 89 page document, section 208, addresses non-point sources of pollution. With the exception of gravel crushing and log sorting, most forestry activities fall under section 208 of the WPCA. Section 208 requires governors to designate a state agency to develop statewide quality management plans to control non-point source pollution.

This document says that states should define and implement packages of "Best Management Practices" (BMP's). BMP's are defined as "...practices or combination of practices that are...the most effective, practical means of preventing or reducing the amount of pollution generated by non-point sources..." [40CFR35.1521-4 (c) (1)]. In Minnesota, the Pollution Control Agency (PCA) was designated as the primary water quality management planning agency. Using funding from Environmental Protection Agency (EPA) the PCA entered into a cooperative agreement with the Department of Natural Resources (DNR) Division of Forestry to compile a statewide assessment of the effects of silvicultural activities on water quality. The division completed the report, Minnesota Forest Management Non-Point Sources of Pollution Assessment, in 1979. Another report, Non-point Pollution Related to Forest Management Practices - Focus on Northeastern Minnesota, by staff at the Department of Forest Resources, College of Forestry, University of Minnesota was also submitted to the PCA.

Other useful reports available to the PCA were the Minnesota River Basin and the Southeast Minnesota Tributaries Basin (SEMT) studies. These studies were made under the authority of Section 6 of the Watershed Protection and Flood

Table 1. LEVELS OF GOVERNMENT IN WATER MANAGEMENT

THE FEDERAL LEVEL	
A. Executive Agencies	B. Independent Agencies
<ol style="list-style-type: none"> 1. Department of Agriculture 2. Department of Commerce 3. Department of Defense, Department of the Army 4. Department of Energy 	<ol style="list-style-type: none"> 5. Department of Health and Human Services 6. Department of HUD 7. Department of the Interior 8. Department of Transportation
<ol style="list-style-type: none"> 1. Environmental Protection Agency 2. Federal Emergency Management Agency 3. Water Resources Council 4. Interstate Commerce Commission 5. National Science Foundation 	
C. Executive Office of the President (e.g., Office of Management and Budget)	D. Special Boards, Committees, Councils (e.g., International Joint Commission)
THE INTERSTATE LEVEL	THE INTRASTATE LEVEL
<ol style="list-style-type: none"> 1. Upper Mississippi River Basin Association 2. Missouri Basin States Association 3. Great Lakes Commission 4. Red River Water Resources Council 5. Minnesota Wisconsin Boundary Area Commission 6. South Dakota-Minnesota Boundary Waters Commission 7. Upper Great Lakes Regional Commission <u>1/</u> 	<ol style="list-style-type: none"> 1. Regional Development Commissions (11) 2. Metropolitan Council 3. Lower Red River Watershed Management Board 4. Resource Conservation and Development Areas (2) 5. Mississippi Headwaters Board 6. Project Riverbend Board 7. Metropolitan Waste Control Commission
THE STATE LEVEL	
<ol style="list-style-type: none"> 1. Department of Agriculture 2. Department of Energy, Planning, and Development 3. Department of Natural Resources 4. Department of Transportation 5. Department of Public Safety, Division of Emergency Services 6. Environmental Quality Board 7. Department of Health 	<ol style="list-style-type: none"> 8. Iron Range Resources and Rehabilitation Board 9. Minnesota Historical Society 10. Minnesota Pollution Control Agency 11. Soil and Water Conservation Board 12. Southern Minnesota Rivers Basin Board 13. University of Minnesota 14. Waste Management Board 15. Water Planning Board 16. Water Resources Board
THE LOCAL LEVEL	
<ol style="list-style-type: none"> 1. Counties (87) 2. Municipalities (855) 3. Townships (1,795) 4. Watershed Districts (37) 5. Soil and Water Conservation Districts (92) 6. Drainage and Conservancy Districts (3) 7. Lake Improvement Districts (3) 	<ol style="list-style-type: none"> 8. Lake Conservation Districts (2) 9. Rural Water User Districts (5) 10. Sanitary Districts (7) 11. Port Authorities (5) 12. ASCS County Committees (90) 13. Farmers Home Administration County Committees (63)

() = Number of districts 1/ Discontinued at federal level, but to be continued by states

Prevention Act of the 83rd Congress (Public Law 566, as amended). This act gives the Secretary of Agriculture the authority to cooperate with other federal, state, and local agencies in their investigation of river basins, watersheds, and waterways to develop coordinated plans and programs. In 1971 the Agricultural Appropriation Act provided funds for the United States Department of Agriculture to cooperate with the State of Minnesota in studies of the southern Minnesota rivers basin. During the 1971 Minnesota Legislative Session, the Southern Minnesota Rivers Basin Board (SMRBB) was created and charged with developing and implementing a comprehensive environmental conservation and development plan for the basin. In the reports the forest resource is described, problems and concerns are raised, and management recommendations are made.

The PCA summarized the reports and produced three documents, Forestry Package I, II, and III describing the state's current situation, agencies and programs, and potential recommendations. These were distributed for public review. After a state task force (which included representatives of regional development commissions and various state agencies) made recommendations, PCA completed the final 208 Water Quality Management Plan.

In 1980 Minnesota's Governor signed the plan and it was sent to EPA. The following summary highlights what the forestry section of the plan states:

Goal: To continue to prevent silviculture activities from harming water quality.

Objective: To strengthen the implementation of silvicultural management practices and programs on Minnesota forest lands by establishing forest hydrology and soil science capabilities in the Department of Natural Resources.

Their study of forestry activities in Minnesota identified several areas of concern: construction of roads in forest lands, recreational activities, grazing, and clearing for firebreaks. Certain site preparation activities also have a high potential for causing problems (root and rock raking and plowing). Three types of site disturbance are of concern: 1) exposure of mineral soil, 2) compaction of mineral soil, and 3) removal of growing material.

Problems occurring because of these activities can be corrected and prevented by the implementation of both Best Management Practices and sound planning practices.

Findings and Conclusions: "The study of the relationship of forestry activities to water quality in Minnesota indicates that water pollution is not generally severe in forested areas. However, in both the current and proposed revised water quality classifications, an extremely high proportion of highly classified waters are in forested areas. Therefore, whenever pollution does occur from forested lands, it is likely to harm a high-quality environment."

One important step in the planning process is the provision for implementation. Part of the implementation strategy for 208 planning in Minnesota is to include the recommendations in the MWQP in the Minnesota Forest Resources Plan (MFRP) with more specific references and solutions. Then, when the MFRP process is on the unit planning level water quality concerns will be addressed for specific conditions of that region.

Other parts of our implementation strategy include educating and training the land managers about conditions and solutions; using incentive programs (such as cost-sharing) to encourage compliance and using regulation to achieve compliance.

Water Quality Components of the Minnesota Forest Resources Plan (MFRP)

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WATER QUALITY COMPONENTS OF THE MINNESOTA FOREST RESOURCES PLAN (MFRP)

The Planning Process

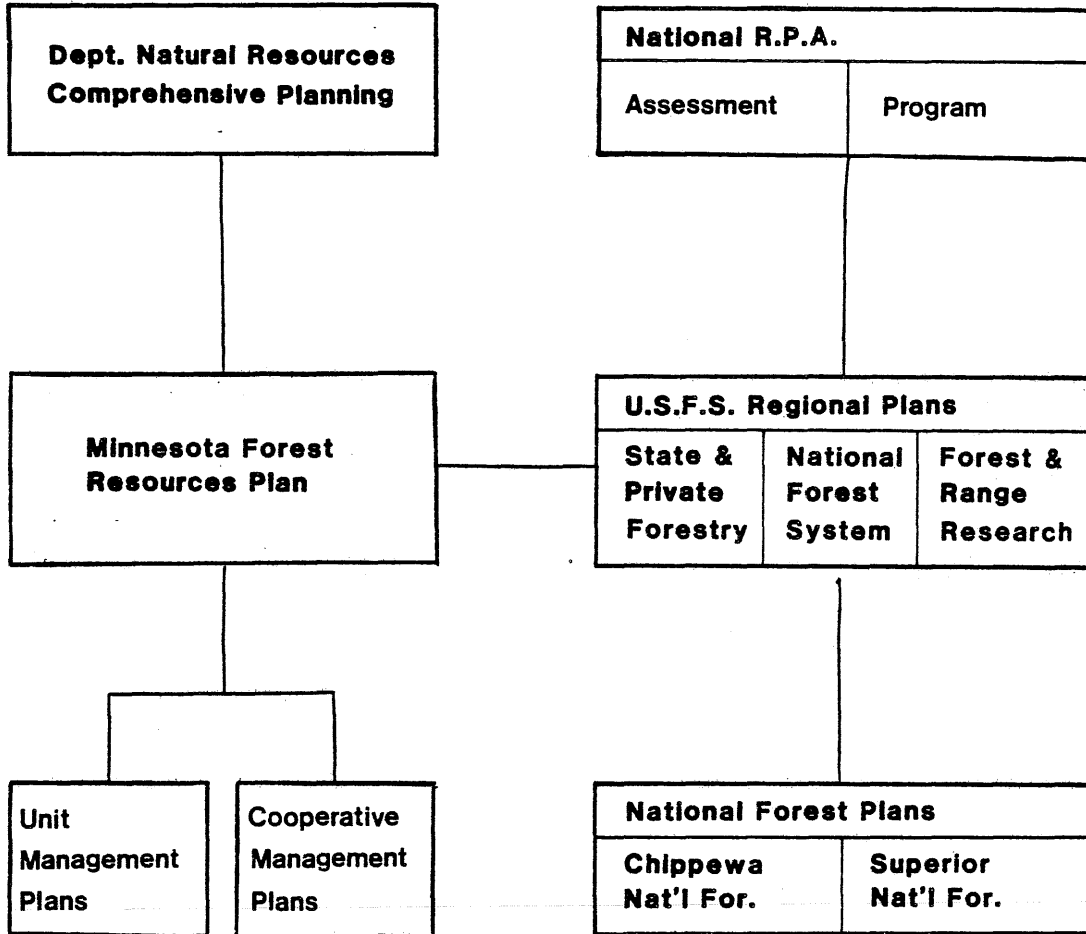
Statewide forest resource planning is a systematic way to improve the ability of decision makers to develop responsible and national policies and programs affecting the future use and management of the state's forest resources. Numerous environmental, social, economic, and political concerns make planning a necessity.

While many parts of the Division of Forestry have developed and used plans in the past, this is the first long-range comprehensive coordinated planning effort. It was in December of 1975 that the Commissioner of Natural Resources instructed the division to prepare a long-range plan.

The federal government has required such long-range plans from the U.S. Forest Service since the national Forest and Rangeland Renewable Resources Planning Act (RPA) was passed in 1974. Long-range forest planning by the states received added emphasis in 1978 when Congress passed the Cooperative Forestry Assistance Act (P.L. 95-313), which authorized financial and technical for states to engage in forest planning.

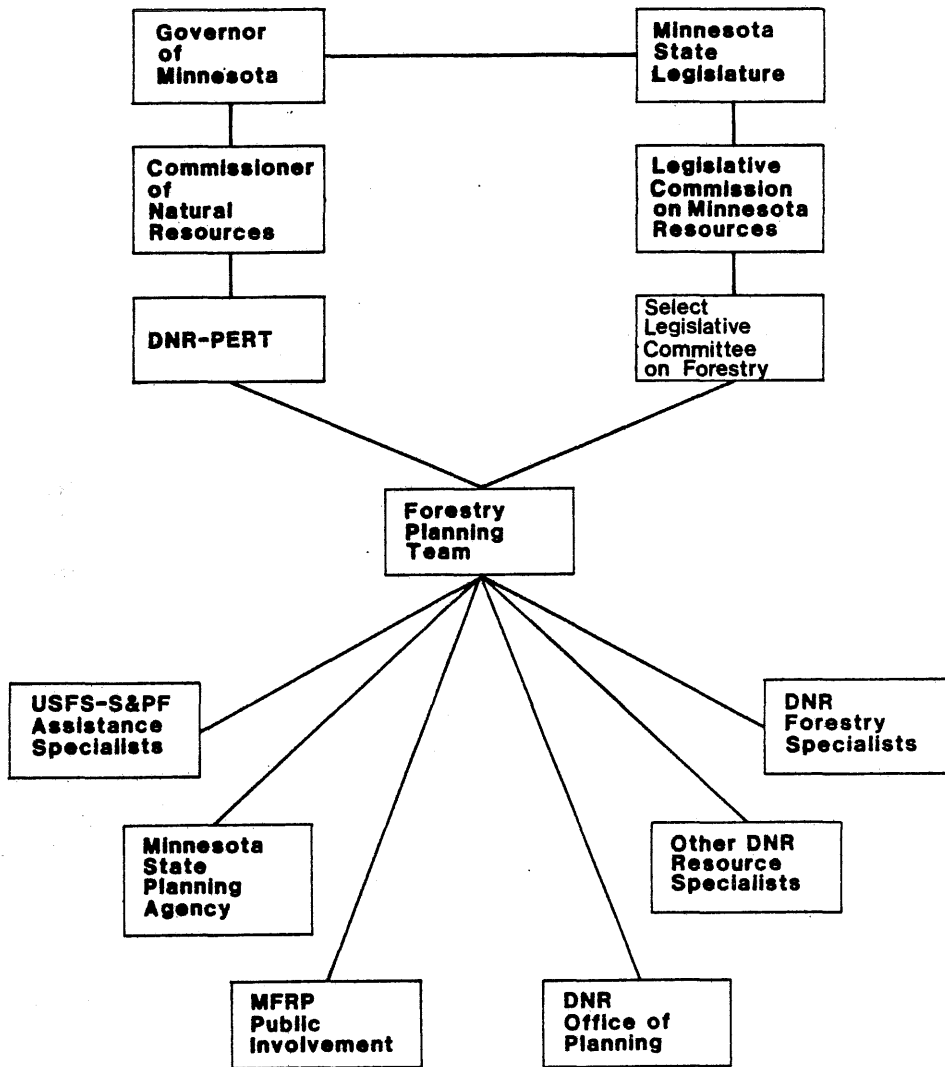
The purpose of the MFRP is to describe Minnesota's forest resources, to project supplies and demands for forest-related goods and services, and to provide management policies and programs that will benefit all interests and ownerships. This process will help ensure the effective use and conservation of Minnesota's forests. As one of the building blocks in the Department of Natural Resources' comprehensive planning effort it will complement other divisions in their planning process and most importantly, provide direction for more specific administrative unit plans to be developed in the future (Figure 1).

Figure 1
Planning Levels and Relationships



A staff of seven planners in the Division of Forestry's Operations and Planning Section have primary responsibility for the development of the plan. The plan will consider all forest resources and their interrelations on all forested lands, regardless of ownership. Forest resources include aesthetics, fish and wildlife, forage, outdoor recreation opportunities, timber and water. The broad scope of the plan necessitates coordination both within the division and with outside groups. These include the Department of Natural Resources; various legislative committees; the Legislative Commission on Minnesota Resources; the Minnesota State Planning Agency; United States Forest Service, State and Private Forestry; the public and other advisors (Figure 2).

Figure 2
Minnesota's Forest Resources Planning Coordination

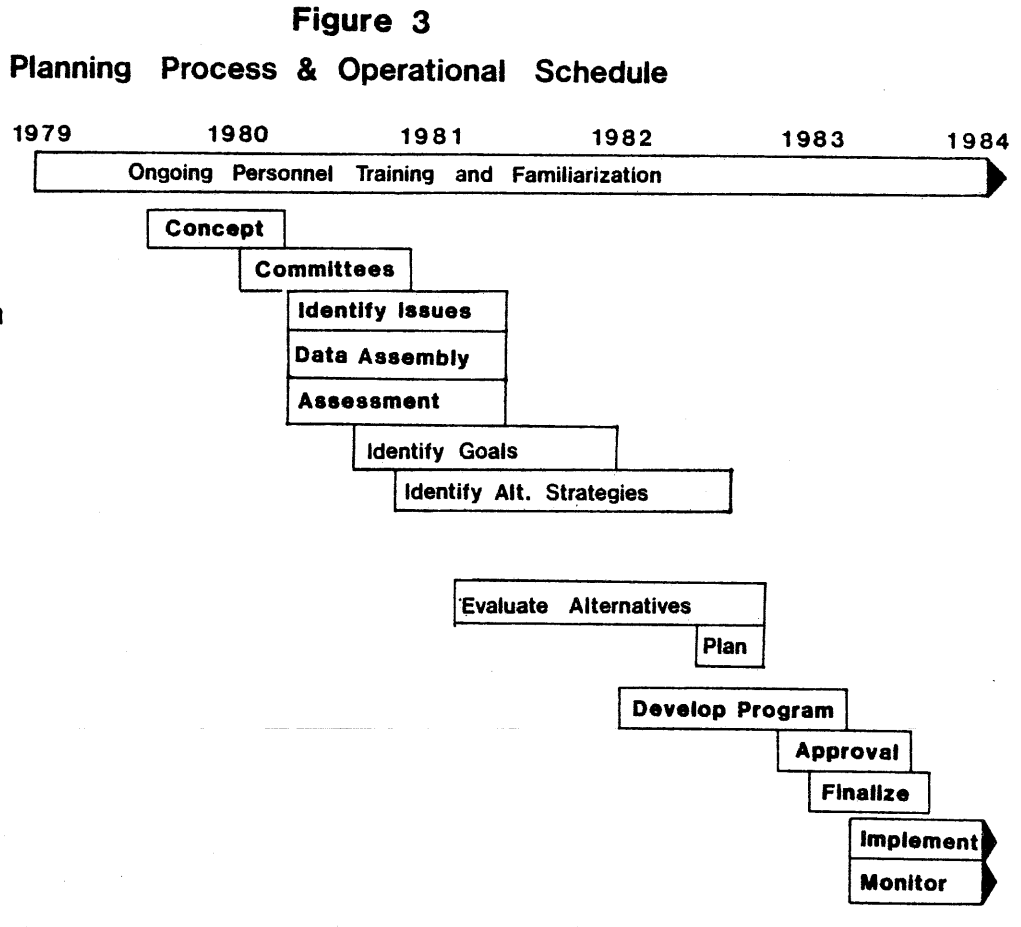


The planning process for the MFRP formally began in July 1980. The order of events for the planning process are summarized as:

- To identify specific subjects or issues of concern that must be addressed by the plan and any ensuing program
- To assess past, present and prospective resource conditions so that the issues may be fully understood
- To evaluate what lands are producing and what they are capable of producing
- To develop and evaluate alternative policies and activities for resolving each issue

- To choose a strategy, a group of policies, from among alternatives and develop a program to implement that strategy
- To develop a budget for future forest management
- To implement the program and monitor its success
- To review and revise the plan and program as issues and conditions change

Figure 3 combines the summary of process with a time schedule.

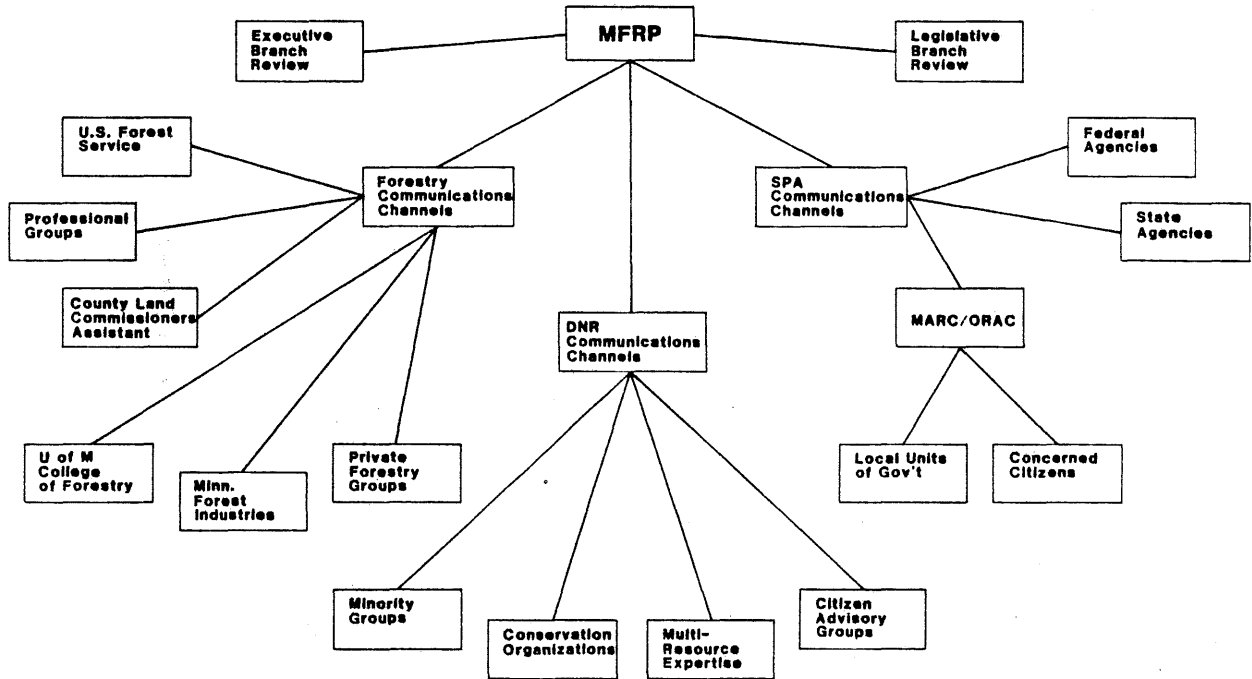


Seven documents are projected:

1. Planning Concept
2. Issues Document
3. Assessment
4. Goals
5. Strategies
6. Plan and Program
7. MFRP Action Program

Each final volume will be preceded by a draft to be review by interested individuals and by those listed in the communications channels (Figure 4).

**Figure 4
Public Involvement in the MFRP**



The MFRP is intended to aid many groups: the Division of Forestry, other divisions of the Department of Natural Resources, the U.S. Forest Service, other agencies, the legislature, and the general public. The plan will provide direction for the Division of Forestry. State legislators will be able to use the plan as a guide for the formulation of agency budgets and forestry management with that of the Division of Forestry. The U.S. Forest Service will be able to use the MFRP to define Minnesota's role in the nation's forest management program. Finally the public will be able to use the MFRP to obtain information about Minnesota's forest resources and future programs of the Division of Forestry.

The broad exposure and the extensive use of this plan make it most opportune and important that Water Quality Management Issues as they relate to forest activities be directly addressed.

Integration of the MWQP with the MFRP process begins with the first step of identifying issues of concern and continues to be woven into the plan throughout the planning process. The following is a summary/explanation of the integration process in Minnesota. As this is a prototype project, we have found that there are certain changes or additions that would be useful. These are incorporated in this discussion.

Summary of the Integration Process

- Designate one person on the MFRP planning staff to oversee the inclusion of Water Quality Management concerns as they relate to forest practices in the Forest Resources Plan.

This person should:

- Be thoroughly familiar with the planning process. Be aware of time schedules and deadlines in order that their input can be timely and appropriate.
- Provide the planning staff and advisors with background information and history of Water Quality Management planning--Federal, state and local.

- Know what other agencies, groups and individuals play a role in the planning process and need to have an understanding about the 208 planning process and the importance of including water quality concerns in the MFRP. Take appropriate action.
- Provide the planners with suggested BMP's specific to your state:
 - annotated bibliographies
 - summary of review papers
 - slide shows
- Assist the planners in developing creative methods and programs to inspire voluntary compliance with Forestry BMP's from all persons associated with forestry activities.
- Provide the planners with a list of current regulations and their utility or potential utility for enforcing compliance.
- Review all documents.
- Continue promoting, explaining and researching BMP's with the planners and all agencies, groups and individuals connected with the plan throughout the planning process.
- Be available to repeat a similar process for the more detailed Unit planning.

It is important to designate one person on the MFRP planning staff with the responsibility of overseeing the inclusion water quality concerns into the MFRP. This person should a) be knowledgeable about water quality issues, b) have a fundamental understanding of forestry, c) have some familiarity with water quality legislation and planning, and d) have some administrative experience developing efficient programs. While this person may also be assigned other planning tasks, abundant time must be available for the primary tasks.

Each state has a somewhat unique planning process, dependent on the organizational structure, staff, needs and resources. Being familiar with the planning process is essential. This includes the history of the state's forest

planning and the current goals or mandates. One needs to be familiar with the people and agencies involved in order to effectively coordinate involvement. Knowing time tables and deadlines will help ensure timely and appropriate input. The other planners will often need water quality information at an early stage in order to incorporate it into their material. The form of the material or writing style will need to be consistent with that in the planning document(s). This education about the planning process also includes attending planning staff meetings and other relevant meetings, reading all drafts of documents, and arranging informal meetings with staff members.

The planning staff needs to be aware of water quality management concerns as they relate to forestry. This will take some effort on the part of the designated water person. Planners will need to know the history of water quality legislation, especially Section 208, both on the federal and state level. They need to be aware of the importance of 208 planning and the legislated water quality goals. The planners will then also be more prone to help point out places to include water quality issues and to help inform other group and individuals the reasons for including water quality concerns in the MFRP.

One useful educational tool is a slide/tape presentation titled National Forestry Water Quality Training Program. It consists of three basic courses, each targeted to a specific audience. It was assembled by the EPA and USDA Forest Service.

Course A, which is directed to policy level management personnel such as Corporate Officers, State Foresters and Legislators, consists of two units which present the historical basis for water quality concerns in the forest and the potential for water quality degradation from silvicultural activities. A hand-out brochure is provided for the participant's future reference.

Course B consists of nine interdependent but individually presentable units that describe in substantial detail the potential impacts forestry activities have on water quality. This course is intended to reach management level staff: woodland managers, State Forestry staff, and consulting foresters. A workbook is included designed to provide for interactive problem solving during the presentations.

Course C will consist of general resource materials the individual states can use to develop their own state-specific training programs directed toward locally identified target audiences. These resource materials will include: narrative information, sample training aids, and graphic slides that follow the subject matter content contained in Course B.

Course B was useful in Minnesota for educating and sensitizing planners and other staff to water quality issues. The format for Course B is a nine module slide tape program and requires approximately a day and a half for the prepared formalized presentation. Subjects covered in Course B are as follows:

- Unit 1 Forest and Water Quality Policy
- Unit 2 Potential Effects of Forest Practices on Water Quality
and its Beneficial Uses
- Unit 3 EROSION: Nature's Phenomenon or Man's Dilemma!
- Unit 4 Road Construction
- Unit 5 Harvesting Operations
- Unit 6 Site Preparation
- Unit 7 Forest Chemicals
- Unit 8 The Streamside Management Zone
- Unit 9 Planning for Water Quality Management: the KEY to
Erosion and Pollution Control

The slide/tape presentation is supplemented with a printed student guide and handbook and an instructor's guide.

In Minnesota, Unit 1 Forest and Water Quality Policy, was useful in clarifying 1) the history of silvicultural water pollution control, 2) how the Federal Water Pollution Control Act (P.L. 92-500) affects forest operations, and 3) what the roles of federal and state agencies and private industry are. Unit 4 Road Construction presents a comprehensive description of the water quality problems associated with roads and the BMP's useful in alleviating the problems. This unit provided valuable input for the Minnesota State Forest Road Plan (prepared in conjunction with the MFRP). Other units are also useful in educating the planners about both the need for and suggestion about BMP's necessary for water quality control. The program may be available for distribution by October 1982.

Planners also need to know about state and region specific BMP's that are now used, proposed or need to be recommended. This information can be summarized in the form of annotated bibliographies, summary or review papers, seminars, or slide shows. In Minnesota several documents concerning forestry and 208 previously written were useful for providing background information.

Other areas providing possible channels for implementing 208 concerns that were examined in Minnesota include a) regulations now in place that directly or indirectly help maintain water quality standards in forested areas, b) incentives currently used to encourage private landowners, timber harvesters, and timber industries to use BMP's in their work, and c) timber contract addendums requiring BMP's or restricting certain activities on sensitive areas. The planners need to be aware of these areas and have material evaluating the effectiveness incentives, regulation, etc. in promoting 208 water quality concern so these ideas can be appropriately integrated into the plan.

Throughout the planning process the designated water quality person will need to be available to answer questions both from the forestry planners and from persons from other agencies reviewing the MFRP. This person will brainstorm with the planners, review documents, write sections when necessary and continue to promote, explain and coordinate water quality concerns with the MFRP.

A Case Example: The Minnesota Forest Resources Plan

This section will highlight specific places in the completed Minnesota Forest Resources Plan (MFRP) documents where specific references or at least inferences have been made to the environmental issues associated with water quality management. In order to insure clarity in this section I have included detailed quotes of sections of the documents.

Volume 1: Planning Concept

It is important that the awareness of environmental concerns including water quality management be established early in the planning process. This way water quality considerations can continue to naturally evolve along with the plan. On page 3 of Volume 1 under Purpose and Scope conservation of Minnesota's forest is specifically named as a goal.

PURPOSE AND SCOPE

The purpose of the MFRP is to describe Minnesota forest resources, to project supplies and demands for forest-related goods and services, and to provide management policies and programs that will benefit all interests and ownerships. This process will help ensure the effective use and conservation of Minnesota's forests. If the MFRP is to accomplish its purpose, its scope must be broad.

Continuing to page 5 one of the objectives to be used to accomplish the purpose is:

To develop from those alternatives a long-range program to guide the Division of Forestry's management activities in a manner that will balance economic, environmental and social benefits.

It is positive that the plan states that conservation of forests and environmental benefits are considerations. In addition, an even stronger naming specifically of 208 planning when defining the scope of the plan such as: the plan will incorporate the recommendations concerning forest activities in the Minnesota Water Quality Management Plan (MWQMP) would be a more direct approach and gain valuable visibility. Setting this precedent at the beginning will make future inclusion smoother.

Appendix A of Document 1 lists agencies and interest groups that are possible sources of forest planning advice. For this state the Minnesota Soil and Water Conservation Board is named as an agency that would be particularly dealing with water conservation. In other states a different agency(ies) might be appropriate.

In Minnesota the Planning and Environmental Review Team works as an inter-disciplinary screening board in all internal Department of Natural Resources (DNR) plan development and provides a recommended departmental stance on external issues, legislative proposals or related matters affecting those areas of jurisdiction assigned by law to the department. This review process outlined in Volume 1 will help maintain consistency between what is written about water quality management in the MFRP and DNR policy.

Volume 2: Issues Document - Review Draft

The MFRP is an "issue driven" plan. A major function of the MFRP is to develop forestry programs and policies that will help resolve the issues. Thus it is extremely important to be sure issues are identified at this stage in order to ensure their inclusion throughout the plan.

This process began with a lengthy draft issue list. To this I added under the appropriate section the following general water quality issues:

ISSUES - WATER QUALITY

Recreation

Recreational activities such as biking, camping, cross country skiing, hiking, hunting, horseback riding, ORV driving, picnicking, snowmobiling, and snowshoeing often have a detrimental effect on water quality.

Roads

Forest roads create a situation with high potential for water quality degradation.

Policy Administration and Legislation

Foresters and private landowners need regional recommendations regarding silvicultural practices and water quality.

Timber

1. Grazing on forest lands can lead to soil erosion and effect water quality.
2. Harvesting operations can degrade water quality. Site preparation for planting such as rock raking, scarification, discing and chopping can lead to water quality problems.
3. Applications of herbicides and pesticides may contaminate water courses.
4. Soil erosion on firebreaks can degrade water quality.

This draft list was evaluated, resorted, rewritten and packaged to become Volume 2: Issues Document (review draft).

Two major purposes of this draft are to 1) inform members of the public and public agency representatives of the already identified issues and 2) provide all interested parties with an opportunity to comment on these issues and to suggest other forest-related issues to be considered in a statewide resource plan. This review draft and all the comments were combined to form the final draft of the Issues Document.

To aid in the development of the issues advisors were recruited both with Division of Forestry individuals and non-DNR individuals. The 208 project coordinator served as an advisor to the silvicultural practices issue area. This provided another opportunity to share ideas and information. Water quality was not designated a separate issue area, rather it was included in other areas.

The following ten categories or major issue areas were discussed:

- Timber supply and demand
- Silvicultural practices
- Private forest management
- Forest recreation
- Fish and wildlife
- Land use and land ownership
- Transportation
- Forest fire management
- Energy
- Administration and funding of public forestry agencies

After a short 1-3 page discussion of each issue area, specific issues (defined as any concerns, conflict or opportunities related to the particular area) were listed.

Water quality management issues can be found in this draft in several areas. As silvicultural practices are discussed the general need for environmental protection is acknowledged.

The silvicultural practices area and issues are reprinted here as an example. References to environmental quality are highlighted.

SILVICULTURAL PRACTICES

Sound silvicultural practices will be required if Minnesota's forests are to produce greater quantities of higher quality timber to meet future forest products demands. The need for improved timber management becomes more critical in light of the decreasing forest land base and the public desires for environmental protection and economic efficiency in government programs. There are a number of silvicultural issues that must be addressed if current efforts to intensify forest management are to be successful.

In the past timber harvest decisions have not always reflected consideration as to the future use of the land. At other times the land was found to be unsuited for the intended future use. The result has been inadequate forest regeneration. There are currently about 40,000 acres of recently harvested land in need of replanting and over 300,000 acres of understocked commercial forest land. On public lands the problem is exacerbated by short term funding cycles while on private lands there is often an unwillingness to make reforestation investments that will not provide a return for several decades. This situation would be improved if management agencies and private landowners had regeneration plans prior to harvest. The plans could address the need to reduce logging residue, appropriate site preparation techniques, and anticipated costs. Advance regeneration plans would also help in scheduling nursery operations so that adequate seed and stock are available when needed. Production of genetically improved seed and nursery stock may also help meet future timber demand. Plantation spacing guidelines based on site quality and product objectives could also increase timber management efficiency.

Another area of concern is the current age class and species distributions within the state's forests. Many of the aspen and birch stands were established following heavy logging and repeated fire in the early 1900's. These stands are becoming overmature. Orderly conversion to a more even age class distribution could

help ensure an even flow of timber in the future. Pines and other softwoods make up a smaller proportion of today's forest than they did in presettlement times. Efforts to reestablish softwoods on certain poor or medium quality upland hardwood sites and to maintain lowland conifer sites could result in a more valuable and diverse forest. However, in certain areas it may be desirable to diversify by increasing hardwood acreages to improve habitat, provide fire breaks, and reduce economic dependence on a single species.

An estimated 50 percent of the annual volume of Minnesota's timber is lost to insects and disease. Thus, efforts to reduce insect and disease damage can contribute significantly to future timber supplies. The Division's Forest Insect and Disease Management Unit conducts pest surveys, evaluates pest management techniques, directs pest control programs, and works to improve silvicultural practices in order to reduce insect and disease problems. Integration of forest pest management guidelines into silvicultural treatments presents the greatest potential for reducing losses. Integrated pest management strategies including improved silvicultural practices, pest resistant planting stock, and biological and chemical controls are generally more efficient than extensive direct control strategies. Direct control efforts using pesticides are only used when it has been determined that they are environmentally and economically sound. Development of a stand risk rating system would be helpful in determining stand treatment priorities. Insect and disease problems often involve large areas and several ownerships. Several agencies, including the DNR, the U.S. Forest Service, the University of Minnesota, and the Minnesota Department of Agriculture have responsibilities for various aspects of forest insect and disease management. Establishment of an interagency forest insect and disease working group could increase cooperation among all forest owners and reduce duplicate efforts.

The use of herbicides and other pesticides for forest management has been a concern for a number of years. In 1981 approximately 5,000 acres of state land and approximately 10,000 acres of national forest land were treated with herbicides in Minnesota. Herbicides currently used in forest management in Minnesota are federally approved and include round-up, weedone 170, 2,4-D, simazine, amazine, delapon, tordon RTU, and atrazine. Herbicides are applied using ground application, basal spraying, frilling, and aerial spraying. The chemicals are applied as part of site preparation on certain sites and as an aid to release the desirable vegetation from competition from undesirable species during timber stand improvement practices. Guidelines for herbicide application are included in the Division of Forestry's forest development manual. There is no reported knowledge of any instance of aquatic ecosystem damage directly attributable to the use of presently registered herbicides for forest management, although there are many records of detectable concentrations of chemicals remaining in the environment after applications. Thus, herbicides are potential nonpoint sources of pollution to surface and ground water.

The total forest environment cannot be overlooked in a program of timber management intensification. The effects of management on air and water quality must be carefully monitored and controlled. The environmental impact of forest management practices has received increased attention in recent years. Fortunately, in Minnesota the topography, soils and location of forests are such that instances of forestry-caused water pollution would be site specific as opposed to regional problems. In fact, a Minnesota water quality study of the relationship of forestry activities to water quality indicated that water pollution is not generally severe in forested areas. Minnesota's water quality plan identifies road construction in forested areas, clearing for fire breaks, certain harvesting and site preparation techniques, herbicide use, recreation, and grazing as potential nonpoint sources of pollution. Three types of site disturbance are of primary concern. They are exposure of mineral soil, compaction of mineral soil, and removal of growing material. These site disturbances can lower the productivity of a site and/or lead to a degradation of water quality.

Another issue related to silvicultural practices is research. A strong research program is necessary for the management of forest resources and is critical to an intensification program.

Timber management can often be practiced in areas where recreation, wildlife, aesthetics, or environmental protection are the primary objective. There is a need to develop silvicultural practices that are appropriate in such areas.

Silvicultural Practices Issues

Concerns, conflicts, or opportunities related to silvicultural practices are:

1. Increasing yields from existing forest lands.
2. Economic efficiencies possible through land consolidation.
3. Ensuring adequate regeneration of harvested sites.
4. Requiring regeneration plans prior to harvest.
5. Site preparation and planting techniques.
6. Management of nurseries to ensure adequate supplies of seed and seedlings.
7. Development of genetically improved tree seedlings.
8. Establishment of plantation spacing guidelines.
9. Manipulation of age class distributions.
10. Diversification of species for wildlife and pest management concerns.
11. Conversion of certain hardwood sites to softwood forest types and maintenance of lowland conifer sites.
12. Extent of resource losses to insects and diseases.
13. Integration of pest management practices and silvicultural treatments.
14. Development of a stand risk rating system.
15. Establishment of a forest insect and disease working group.
16. Use of pesticides for forest management.

17. Monitoring and/or restricting the use of pesticides.
18. Mitigating the environmental impact of certain management practices.
19. Establishing permanent soil scientist positions in the Division of Forestry.
20. Using cost sharing programs to encourage environmental protection on private forest lands.
21. Monitoring the effects of acid rain on the forest environment.
22. Silvicultural research for improved productivity.
23. Silvicultural practices for use in recreation and other special use areas.
24. Forestry practices for soil and water conservation in agricultural areas.

Other areas also mention water quality. In the Private Forest Management area, environmental protection was listed as a justification for cost-share payments to private landowners for certain approved forest management practices.

The discussion area about forest recreation points out that "some recreational uses may cause environmental damage." This statement is part of the findings of the MWQMP (see page 5). And of course this concern is also listed as an issue at the end of the discussion. One of the concerns listed with Fish and Wildlife area issues is habitat protection which in many cases directly means maintaining the water quality.

In the Land Use and Land Ownership area it is pointed out that forest protection measures favor larger management units, thus consolidated ownership may improve forest protection.

The MWQMP named forest roads as the largest contributor to sedimentation related to forestry. However in the transportation area of the review draft the environmental concerns related to roads was merely alluded to. This oversight was somewhat remedied in the final draft.

In the draft document the energy area failed to include mention of water quality concerns. These issues and opportunities do have environmental consequences which should be stated. Environmental concerns were covered in the final draft.

The section covering Administration and Funding of Public Forestry Agencies needs to include reference to environmental protection. Without adequate designated funding programs to maintain or enhance water quality would not exist. In this section environmental protection is stated as one of several factors to be considered when determining allocation of limited timber management funds.

Volume 2: Issues Document - Final Draft

The final draft of Volume 2: Issues Document was released in May 1982. The Division of Forestry planners used about 100 sets of comments received from interested individuals and representatives of the following groups: the Division of Forestry, other state agencies, federal agencies, the University of Minnesota College of Forestry, local government (including regional planning commissions), the timber industry, and conservation organizations in order to determine the relative significance of each issue. Based on public comments, one issue area was added, two issue areas were combined and several issue areas were modified.

This Issues Document is organized as follows: Each of the 10 issue areas has a title (e.g., COUNTY FOREST MANAGEMENT). Under this title there is an Issue Statement which concisely summarizes the major issue within the issue area and provides focus for the Discussion section. The Discussion section provides background information on the issue and a description of the different aspects of the issue. The final section, Opportunities for Resolving the Issue, lists a variety of ways in which the major issue could be addressed or at least partly resolved. The opportunities listed should not be construed as final policy recommendations. Rather, they should be interpreted as potential ways to deal with specific issues that could form the basis for detailed policy recommendations in subsequent MFRP volumes.

This Issues Document is intended to serve two major purposes. First, it will inform members of the public and public agency representatives of the issues on which the MFRP will focus. Second, it will provide the basis for subsequent MFRP volumes. For example, Volume 3: Assessment of Forest Resources, will include more detailed discussion of opportunities for resolving each issue based on resource assessment information. Volume 4: Goals and Strategies will

outline forestry program goals corresponding to each issue and alternative strategies for attaining the goals. The alternative strategies will be combinations of opportunities that will have been listed in Volume 2 and discussed in Volume 3.

The ten issue areas are:

- Economic Contribution of Timber Resources
- Energy Production from Forest Resources
- Forest Protection Program Effectiveness
- Forest Resource Management on Private Land
- County Forest Management
- Forest Land Use and Ownership
- Division of Forestry Outdoor Recreation Management
- Integration of Timber and Fish and Wildlife
- Forest Road System
- Division of Forestry Funding, Planning, Information Management, and Program Coordination

The Forest Protection Program Effectiveness issue, added in this draft, allows for more concrete inclusion of soil and water conservation concerns. The issue statement:

Cyclical funding of the Wildfire Protection Program and increased development of permanent and seasonal homes in rural areas diminish the program's effectiveness in reducing losses of forest resources, life, and property. The effectiveness of forest insect and disease and other forest protection programs in reducing resources losses is restricted by insufficient integration of the programs into land use, silvicultural, and other forest management decisions.

points to the need for more program integration and cooperation in order to effectively ensure resource protection. "Forest protection programs administered by the Department of Natural Resources (DNR), Division of Forestry include the wildfire protection, forest insect and disease management, and soil and water conservation programs. These programs are designed to reduce losses of natural resources to acceptable levels and to maintain or improve soil, water, and aesthetic resources."

The discussion begins with an overview of the Division of Forestry's fire protection program, then the forest insect and disease program, followed by a discussion of non-point sources of pollution related to forestry. At the end of the discussion the acid precipitation situation is briefly described. An excerpt beginning with the paragraph on pesticides is included in order to illustrate how water quality was discussed.

...Pesticides have been used to a limited extent in forest management in Minnesota for a number of years. In 1981 less than three-tenths of one percent of Minnesota's commercial forest land was treated with pesticides. This same percentage also holds true on state lands. This percentage of use is small but it is critical to the success of DNR's forest management program. All pesticides used in forest management in Minnesota are authorized for use by federal and state regulatory agencies. Insecticides are rarely used except during insect epidemics. Herbicides are applied as part of vegetation management in site preparation, release, and timber stand improvement. The DNR has established policies and guidelines for pesticide use on state lands.

Public concern currently exists over the use of pesticides in forest management. This concern is often the result of philosophical differences between forest managers and some segments of the public regarding how forests should be managed, what levels of chemical substances in the environment are acceptable, and the degree of threat posed by growing worldwide chemical use. These differences intensify concern regarding potential environmental or health hazards caused by use of pesticides in forest management.

The environmental impact of forest management practices has received increased attention in recent years. Many forestry operations tend to be quite visible. For example, clearcutting, herbicide application, and road construction have dramatic visual impacts on the landscape. However, the actual soil disturbance and resulting water pollution is usually much less than disturbance due to agriculture.

Minnesota's water quality plan identifies several potential non-point sources of pollution, including road construction in forested areas, forest clearing for fire breaks, certain harvesting and site preparation techniques, herbicide use, recreation, and grazing. When incorporated into forest management activities "Best Management Practices" (BMP's) minimize these non-point sources of pollution and maintain or improve water quality. BMP's are defined as practices or combinations of practices that are the most effective, practical means of preventing or reducing the amount of pollution generated from silvicultural activities. Examples of such practices include:

1) leaving an uncut strip along streams, 2) constructing all stream crossings at right angles, 3) skidding logs uphill, 4) constructing roads with grades between 3 and 10 percent, 5) restricting logging during wet seasons, and 6) constructing waterbars and other erosion control measures on roads.

In Minnesota the topography, soils, and location of forests are such that instances of forestry-caused water pollution are site specific as opposed to statewide problems. Regions need to develop packages of BMP's specific to their needs and monitor the results of their use. The services of a soil scientist are needed to advise foresters on site specific applications of BMP's.

A concerted effort is needed to assist landowners, land managers, and persons engaged in silvicultural operations in reducing or preventing non-point pollution. Government agencies and private landowners need to include BMP requirements in timber sale contracts. Motivation, technical assistance and economic incentives are necessary to encourage attainment of water quality standards...

Following the discussion, in the Opportunities for Resolving the Issue section, six statements specifically address ways to improve integration of water quality management with silvicultural practices. These are listed below as they are numbered in the report.

16. Continue and increase monitoring of the use, effectiveness, and environmental impacts of pesticides used in forest management.
17. Develop a comprehensive forest road plan that will help minimize adverse impacts on soil and water resources and aid in attaining other forest protection goals.
18. Provide more training for forest managers on the best management practices available for use in forest management.
19. Include provisions in state timber sale contracts that require the use of best management practices to minimize detrimental effects on soil and water resources.
20. Expand the state cost-sharing program, which will provide increased education and management assistance to private landowners to help them reduce adverse impacts of forest management practices on soil and water resources.
21. Conduct more research and monitoring programs to assess the impact of acid precipitation on Minnesota forests.

While it is important that soil protection water quality can be specifically discussed in the forest protection section, it is also wise to continue to integrate references into this area throughout the document.

Water quality management is referred to in the Economic Contribution of Timber Resources issue. Considering water quality can contribute to the expense in accessing certain timber stands.

The current road system permits access to only a portion of the commercial forest lands in Minnesota. As new roads are put into remote areas, additional timber is made accessible for harvesting. Physical boundaries such as rivers and streams, as well as rough and fragile or wet soils, are barriers that limit the availability of harvestable timber. A well-designed forest road system can overcome many of these limitations.

In addition, this discussion points out that if soil and water conservation practices are ignored long term forest productivity may decrease.

Some management practices can have adverse effects on long-term forest productivity, especially site preparation, road construction, and road maintenance. If management practices are improperly applied, soil productivity may be reduced as a result of soil erosion or soil compaction. A reduction in soil productivity will result in reduced timber production.

An opportunity listed is:

24. Encourage protection of soils, nutrients, and water in all phases of forest management to increase productivity.

This specifically acknowledges the positive economic contribution of soil and water protection programs.

The Energy Production from Forest Resources issue statement:

Minnesota's forest resources can help meet increasing energy demands, but a managed harvest program will be required to maintain environmental and forest resource quality.

acknowledges the danger of uncontrolled harvesting of forest resources for energy. This concern is noted in the first two opportunities:

Opportunities for Resolving the Issue

1. Initiate a managed fuelwood harvest program on public and private lands to ensure that fuelwood harvesting improves timber stand quality and protects other forest resources.
2. Increase information and education programs for private forest owners and others harvesting fuelwood to explain how they can remove fuelwood while simultaneously improving future timber crops and protecting other forest.

The Forest Resource Management on Private Land issue mentions forest protection as a public benefit derived from cost-sharing programs. These benefits are realized if land owners properly install and adequately maintain the forest practices. In addition, these practices of course contribute to the long-term timber supply. In the Opportunities section it is suggested that improved coordination of PFM activities with fisheries, wildlife and recreation specialists will ensure that non-timber considerations are adequately considered.

The Forest Land Use and Ownership issue notes the importance of farm woodlots especially in the southern and western portions of Minnesota in providing local wood-based industries with raw materials, protecting soil from wind and water erosion (thereby maintaining water quality) and serving as badly needed wildlife habitat.

Intensive recreational use can cause environmental damage in addition to reducing the quality of recreational experiences. The Division of Forestry Outdoor Recreation management issue discussion specifically includes off-road vehicles and overcrowding of campsites as problems:

For example, off-road vehicle (ORV) use on steep slopes with fragile soils can cause accelerated soil erosion, damage to vegetation, and fish and wildlife disturbances. ORV use is occurring on state forest lands without regulation to protect fragile soils and without regard for the needs and desires of all forest users. Overcrowding of campsites can have a detrimental effect on vegetation and water quality in nearby lakes or streams. Knowledgeable and considered planning, development, and management can prevent or greatly reduce these problems.

As a way to help resolve this issue the document suggests:

9. Increase public education about the forest environment and forest management by developing more interpretive programs on Division of Forestry properties.

High water quality is very important to fish and wildlife management. The Integration of Timber and Fish and Wildlife Management issue talks about possible effects of forest management on water quality and the need for appropriate control measures:

Fish are often affected by timber and wildlife management practices near lakes and streams. These practices need to be closely coordinated with fisheries management efforts. Fisheries managers recommend that at least 100 foot buffer strips be retained along streams and around lakes to control erosion and maintain water quality. They also recommend that appropriate measures be taken to control erosion during road construction, since much of the silt entering streams due to logging operations comes from logging roads and stream crossings. They further recommend that crossings be constructed so that they do not impede migration of desirable fish species. These protection measures sometimes preclude timber harvesting on significant acreages, raise the cost of management, and reduce the total value of timber harvested. Compromises need to be negotiated between foresters and fisheries managers in cases where conflicts arise. There is a need for a specific DNR policy statement to address problems between fish management and timber and wildlife management practices, since no policy statement exists at present.

The Minnesota Water Quality Management Plan identifies forest roads as a primary potential source of pollution. The Forest Road System issue acknowledges that protection of forest resources is constrained by an inadequate, deteriorating state forest road system. It points out that potential environmental problems exist and that upgraded standards for design, construction and maintenance of forest roads and bridges are necessary for protection of resources.

In general water quality issues were better integrated in the final issue document than in the review draft. Having its own place in the forest protection issue gives it a chance to be specifically discussed. Integrating it in with the other issues illustrates the relationship of water quality to each of the other areas.

The Effectiveness of Using Forestry Cost-Share Programs in Stimulating Private Forest Landowners into Implementing (water quality related) Conservation Practices

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THE EFFECTIVENESS OF USING FORESTRY COST-SHARE PROGRAMS IN STIMULATING PRIVATE FOREST LANDOWNERS INTO IMPLEMENTING (WATER QUALITY-RELATED) CONSERVATION PRACTICES

OVERVIEW

Cost-sharing is a specific tool that can be used to implement 208 management programs. The programs are designed to conserve resources and protect water quality. It is important to thoroughly explore the potential of these programs in meeting our water quality management objectives. One objective stated in the Minnesota Prototype Planning project contract is:

Development of comprehensive analysis of state forestry cost-share program, for southeastern Minnesota, in order to evaluate its effectiveness in stimulating private landowners into implementing (water quality-related) conservation practices and to develop recommendations for modifying the program as necessary to provide for protection of water quality.

The tasks/activities required in the contract were:

1. Development of forestry cost-share program (Objective 1).
 - (a) Review expenditure of state cost-share funds on specific practices (quantitative review).
 - (b) Determine local, state and federal levels of participation (in dollars spent).
 - (c) Statement of water quality improvement and other benefits assumed through the practices put on the land (assumptions or benefits).
 - (d) Develop the summary analysis of the state program--in evaluating its benefits and limitations.
 - (e) Identify proposed legislative revisions to state cost-share program including expansion to statewide coverage and integration into 208 management planning.

The output for this objective is a report: An Analysis of Cost-Sharing Programs in Minnesota and Their Effects on Water Quality. This report provides a solid discussion of management aids available to private forest landowners and emphasizes the multi-benefits that result from cost-share programs. The following summary highlights the major points contained in the report. The complete report follows.

Summary: An Analysis of Cost-Sharing Programs in Minnesota and Their Effects on Water Quality

Incentive programs, especially with technical advice, are an effective, responsible way to impact private forest activities.

Private Forest Land and the State Economy

1. As the third largest industry the forest products industry is important to our economy. Private land constitutes 46% of Minnesota's total commercial forest base.
2. Presently private forest lands are basically free of any governmental regulation, and Banzhaf reported that landowners have little or no technical knowledge about forest management opportunities or techniques.
3. Much of the non-industrial private forest land is too small for efficient forestry operations and there is often an added cost of performing forest practices in such a way as to minimize impacts on water quality. Landowners are not in a position to invest in the long-term low-return forest management.

Forest Practices and Water Quality

1. There is not a severe statewide water quality problem due to forestry. There are, however, regional or site specific water quality problems which can be quite severe.
2. Road construction in forested areas, clearing for fire breaks, certain harvesting techniques, herbicide use, recreation and grazing are potential non-point sources of pollution associated with forestry in Minnesota.

Short-term and Long-term Benefits of Cost-Sharing

1. Cost-sharing forest practices provide both economic and environmental benefits. Forest productivity increases; erosion and sedimentation decreases.

2. Woodland Access Roads

- properly designed, located and built will not cause a severe erosion problem
- provide continuous accessibility to forest land which in turn will help insure continuous management
- keep areas accessible for fuel wood thinning
- make residues left after harvesting available for fuel wood by local residents

3. Planting

- stabilizes critical areas, thus reducing erosion potential
- increases the forest base
- provides an option to farming marginal agriculture lands
- provides wildlife and trout stream protection

4. Fencing

- prevents grazing, and in SE Minnesota can reduce soil loss due to grazing by 96%
- decreases the amount of livestock lost or injured in woodlots
- makes areas more feasible to plant, thereby increasing the forest base

5. Timber Stand Improvement

- maintains the vigor of the forest stand and thus helps to stabilize critical areas
- provides a management option to conversion to marginal agriculture use
- increases the value of the forest stands treated
- provides fuel wood during the thinning process
- provides clean forests for aesthetic and recreational enjoyment

6. Cost-sharing helps prevent irreversible land clearing and conversion by making it feasible for landowners to invest in long-term forest management.

7. Cost-sharing forest practices in order to maintain the timber base is a viable option to government land acquisition.

8. Abandoned tax-forfeited land may be purchased by private individuals and managed for forestry with the help of cost-sharing.

9. Sedimentation is the most often cited lake quality problem in a survey of southeast Minnesota lakes. Appropriate forest management can decrease sedimentation thereby positively affecting recreational activities--fishing, boating, swimming, etc.

Highlights of the Minnesota Accelerated Private Forest Management Program:

1. The number of landowners assisted through the state private forest management program increased over 80%.
2. 82% of the landowners assisted are local residents.
3. Increased interest in landowners in forest management.
4. First biennium accomplishments:
 - planted 467.3 acres
 - timber stand improvement 1,316.5 acres
 - woodland fencing 5,826 rods
 - woodland access roads 35,875 feet
5. Rapport has been established between PFM foresters and private landowners leading to greater involvement of landowners in managing their woodlots.
6. Water quality problems due to forest practices have been positively impacted.

ANALYSIS OF FORESTRY COST-SHARING PROGRAMS IN MINNESOTA AND THEIR EFFECTS ON
WATER QUALITY

I. INTRODUCTION

In Minnesota our water resource is an integral part of our economy. It is important for industrial uses, domestic needs, recreation and wildlife habitat. At the same time the public is voicing increased concern over maintaining and enhancing the quality of outdoor environments. In recent years the environmental impact of forest management practices has received increased attention. Fortunately in Minnesota we do not have a severe statewide water quality problem due to forest management (MPCA 1980). However there are regional or site specific problems which can be quite severe.

In 1972 the Federal Water Pollution Control Act Amendments were passed with the goal to restore and maintain the chemical, physical and biological integrity of the nation's waters. One section of the complex 80-page document, section 208, addresses non-point sources of pollution. Forest practices (silvicultural) are considered to be potential non-point sources of pollution.

This document says that states are required to define and implement packages of "best management practices" (BMP's). BMP's are defined as "...practices or combination of practices that are...the most effective, practical means of preventing or reducing the amount of pollution generated by non-point sources..." [40 CFR 35.1521-4(c)(1)].

Minnesota's water quality plan (208) identifies road construction in forested areas, clearing for fire breaks, certain harvesting and site preparation techniques, herbicide use, recreation, and grazing as potential non-point sources of pollution (MPCA 1980). Sediment is the most common form of water quality degradation resulting from forest management in Minnesota. Therefore if we prevent erosion we will reduce sedimentation and probably prevent a decrease in the productivity of certain areas. Cost-sharing programs in addition to continuing educational efforts may be

one way to accomplish 208 goals on private lands. Cost-sharing encourages forest practices such as tree planting, fencing out livestock, improving a stand of trees through thinning and/or pruning, and helping to maintain or construct fire breaks or woodland access roads. The specific practices vary among programs. These practices can help reduce or eliminate the impact of the forest uses identified as potential non-point sources of pollution. The justification for payments to landowners is based on public benefits derived from the resulting watershed protection and increased timber supply. Thus, cost-shared practices directly meet the mandate of the National Forest Management Act, which requires that "all management practices will conserve soil and water resources and not allow a significant or permanent impairment of the productivity of the land" [36 CFR 219.13(6)(1)].

II. PRIVATE LAND

The forest products industry is very important in Minnesota; it is the state's third largest industry employing 40,000 people. Our economy benefits from the use of and continuous productivity of our forest lands.

Private lands are an important part of Minnesota's commercial forest land base. They constitute 46% of Minnesota's total commercial forest land base and 49% of the commercial timber harvested is removed from these lands. Private lands generally show the same volume, growth and mortality, and the same or higher productivity as public lands. Private lands also generally are more accessible as compared to other forest holdings (Minnesota's Soil and Water Conservation Program 1981).

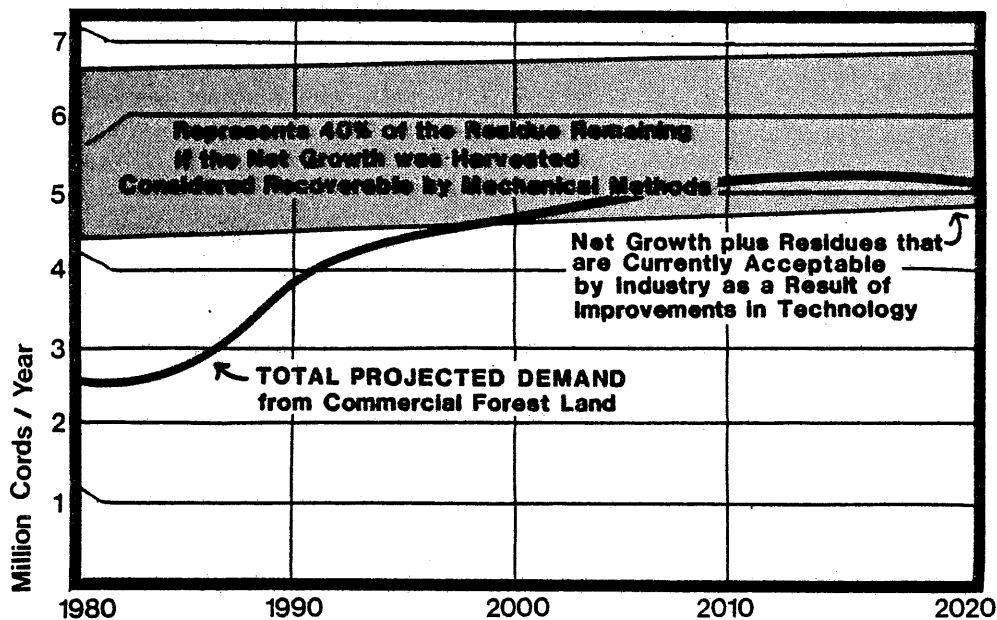
Forty-one percent of the commercial forest land is in small non-industrial private forest holdings (NIPF); therefore it is important that NIPF landowners have accurate and ample information on which to base land management decisions.

However, the Minnesota Timber Resource Study (Banzhaf & Company 1980) reported that most landowners have little or no technical knowledge about opportunities for using forest management techniques to meet their land use

objectives, nor do they know where to get technical advice. It is useful to recognize the importance of the non-industrial private forest resource and to examine ways to use this resource without degrading water quality.

By the year 2000, consumption of Minnesota's forest products is expected to almost double (J. Krantz, Utilization and Marketing Specialist, MN/DNR 1981). In fact, the projected demand for traditional forest products from commercial forest lands will surpass the ability of the commercial forest lands to supply those products by the year 2000 (Figure 5). This puts pressure on all lands, including NIPF land, to produce quality timber while maintaining stand productivity and environmental quality.

Figure 5. RELATIONSHIP BETWEEN PROJECTED NET GROWTH AND DEMAND FOR MINNESOTA'S TIMBER RESOURCE FROM COMMERCIAL FOREST LAND, 1980-2020.



Source: DNR, 1981.

Non-industrial private lands show higher timber removal rates than other lands. This is largely due to land clearing. According to Banzhaf & Company (1980), studies from other states indicate that NIPF owners are highly diverse in age, occupation and income. Owners keep their land for a variety of reasons including recreation, emotional satisfaction, forest products, hunting, livestock grazing, speculation, and residence.

Unfortunately, Gregerson et al (1979) report that most NIPF properties and their owners share some common characteristics which are adverse to investment in forestry.

- Properties are too small for efficient forestry operations.
- Tenure is too short for the continuity in inputs essential to long-term investments.
- Ages of owners are too high for remote returns to be of interest and also too high for personal participation in the often heavy work of forestry operations.
- Low income farmers and other NIPF owners are in no position to invest in forestry.
- The high income owner tends to have non-resident status and is thus poorly situated to supervise such investments and his time horizon is often too short for the benefits of forestry investment to be of interest.
- In many cases forest land ownership is essentially accidental in nature and the owner is unwilling to incur the costs of learning about management possibilities.

It is in the state's economic interest to maintain our timber resources and a certain environmental quality. Since individuals may not be able or willing to tie up money and land in long-term, low-rate-of-return forestry investments and because private forest land has a significant role in the Minnesota timber industry, then the state needs to provide assistance.

There are several ways to influence private forest activities. According to Ellefson (1979) and Skok and Gregerson (1975), three categories stand out:

Educational Programs - (e.g., extension forestry programs and service forestry programs)

Subsidy Programs - (e.g., incentive payments and tax relief)

Regulatory Programs - (e.g., state forest practice laws)

These methods can be and are used in combination with one another to:

1. Insure continuous productivity of forest lands.
2. Protect the state's waters from pollution due to forest practices.
3. Maintain and/or enhance aesthetic values.

This report examines subsidy programs, cost-sharing in particular. Many of the examples of the application and usefulness of cost-share programs will come from southeastern Minnesota. This is because 1) the pilot state cost-share program was initiated in southeastern Minnesota and an analysis of this program provides useful information on the applicability of cost-share programs in Minnesota, 2) in southeastern Minnesota most of the land is privately owned and most forest management is done on private lands, and 3) due to its soils and terrain southeastern Minnesota has been studied more than other regions in terms of potential water quality problems caused by forestry.

III. ASSISTANCE AVAILABLE TO PRIVATE LANDOWNERS

There are several types of assistance available to private landowners in Minnesota:

- A. Federal Assistance Programs
- B. State Assistance Programs
- C. Minnesota Agricultural Extension Service, University of Minnesota, College of Forestry
- D. Private Consultants
- E. Industrial Assistance

A. Federal Assistance Programs

In 1978 the National Cooperative Forestry Assistance Act combined portions of several earlier acts including the Clark-McNary Act of 1924 and the Cooperative Forest Management Act of 1950 into one comprehensive bill providing for rural forestry assistance, rural fire protection, and assistance in state planning and management. Some funds go to state agencies to maintain state programs providing technical assistance and some money goes directly to private individuals who qualify. These federal funds are administered on a local level.

1. The Forestry Incentives Program (FIP), initiated in 1974, is a program now included under this act which provides direct financial assistance to NIPF landowners. Funds and guidelines are granted from the USDA Forest Service and are administered through local (county) Agricultural Stabilization and Conservation Service (ASCS) offices. Federal funds can reimburse landowners for as much as 65 percent of the cost of implementing approved forestry practices.
2. The Agricultural Conservation Program (ACP) is another program similar to FIP. This program is not part of the Cooperative Forestry Assistance Act and comes out of the Soil Conservation and Domestic Allotment Act of 1936, also known as the Rural Environmental Assistance Program (REAP). The objective of ACP is to protect the soil and reduce the pollution of water, air or land from agricultural or silvicultural non-point sources. This is done through cost-sharing certain soil and water conservation projects on agricultural land. Only two practices (FR1 and FR2) out of twenty-two are directly forestry-related (see below). In 1979 the State Agricultural Stabilization and Conservation (ASC) Committee, appointed by the State Secretary of Agriculture, decided to set aside a certain amount of money from the state's federal ACP allocation specifically for forestry use. In 1980 and 1981 this was \$3,000,000. This has been extremely beneficial for forestry. When funds were not reserved for forestry, agricultural practices consumed almost all the funds in certain counties. In addition,

state foresters did not always promote cost-sharing because the funding was unreliable. It is important that the new ASC Committee continue the successful set-aside program in order to ensure that the current level of forestry work is maintained. Local ASCS offices administer the funds.

Both of these federal programs provide funds to the state for technical supervision of projects in addition to direct payments to landowners. Under both programs DNR forestry personnel are responsible for technical services, establishing the need for the project, and completing a compliance check in order to ensure that the current forestry guidelines are followed. ACP and FIP differ somewhat in intent and landowner qualifications; however, several practices they fund are essentially the same.

Practices Cost-Shared Under ACP and FIP Programs

ACP Forestry Practices

FR1 Forest Tree Plantations
Land clearing and preparation
Planting
Interplanting

FR2 Forest Tree Stand Improvement
Thinning crop trees
Pruning crop trees
Releasing desirable seedlings
and young trees

FR3 Site preparation for natural
regeneration under certain
conditions

FIP Forestry Practices

FP1 Forest Tree Plantations
Land clearing and preparation
Planting/Interplanting
Erosion control measures

FP2 Improving a Stand of Forest Trees
Thinning
Pruning crop trees
Releasing desirable seedlings
and young trees

FP3 Site preparation for natural
regeneration under certain
conditions

These federal programs do not cost-share woodland access road construction or stabilization. This is important because logging roads by far are the primary source of sedimentation problems due to forest practices (EPA 1975) (see Section IV-A). The federal guidelines from the USDA to the states for FIP and ACP programs include the possibility of cost-sharing roads. However, in October 1981 some program modifications were developed through agreement between ASCS and the Forest Service which further eroded cost-sharing opportunities for roads. Cost-sharing roads has long been debated. On the one hand roads are the primary source of sedimentation, and on the other hand it is not cost effective in terms of timber production to cost-share expensive road construction. This fall (1981) the Acting Deputy of the Federal Conservation and Environmental Protection Division, ASCS, asserted that "roads were not a priority for cost-sharing because the amount of money spent on them was disproportionate to the silvicultural benefit." (O. Hanson).

Forest access is necessary in order to perform the silviculture activities that will increase timber production. Roads are costly and if a special design or certain erosion control structures are needed the cost may be prohibitive. If we expect landowners to adequately manage their woodlots for timber production while simultaneously complying with federally mandated water quality standards, then federal support is needed. Cost-sharing roads is not cost effective in the short term. However, there are important long term benefits including clean water and increased forest productivity. Unless long term investments are made, long term benefits cannot be guaranteed. It is generally agreed upon that cost-sharing for erosion control measures on roads (water bars, etc.) would be beneficial for water quality.

Alternatives to directly cost-sharing road work include:

- 1) encouraging landowners to install their own woodland access road with the understanding that they would receive preferential treatment or guaranteed cost-sharing for their forestry practice,

2) refusing cost-sharing to landowners until a proper access is constructed, and 3) cost-sharing only those practices specifically installed for erosion control (water bars, culverts, fords, seeding and outsloping necessary to minimize sedimentation), and only on woodland roads where there is a potential or current water quality problem associated with the road.

3. The Rural Clean Water Program (RCW) was initiated in 1980 as a federal pilot cost-sharing program in Winona County on the Garvin Brook Watershed. It covers 30,720 acres over an area 9 miles long with an average width of 5 miles. The ASCS is the administering agency for the project. The Soil Conservation Service (SCS) working through the Winona Soil and Water Conservation District (SWCD) as well as Minnesota Pollution Control Agency (MPCA), Minnesota Department of Natural Resources (MN/DNR), and Minnesota Department of Health (MDH) will cooperate in planning and applying the Best Management Practices (BMP's). Priorities for program assistance will be determined by the Winona County local coordinating committee.

The project objectives are to decrease the amount of contaminants (nitrates, pesticides, coliforms) entering the ground water aquifer and to improve the recreational potential, including fish populations of the Garvin Brook Watershed. Sixteen Best Management Practices (BMP's) have been designated to control agricultural pollutants and contaminants at their source. The DNR Division of Forestry has technical responsibility for BMP 14 (tree planting). The purpose of the BMP is to improve water quality by protecting soil from erosion through planting trees. Fencing can be done as part of this practice if it is needed to protect plantings from grazing. In addition to BMP 14, tree planting also can be a part of BMP 10 (stream protection system) and BMP 11 (permanent vegetation cover on critical areas).

Because of the cost of road work the woodland access BMP, which at one time was included in the RCW project, was removed. The Director of the Division of Forestry requested that the BMP be reinstated in

the project and this is still being negotiated. Because of the soil structure and terraine a woodland access road built in southeastern Minnesota without proper design is very likely to affect water quality. A woodland access road BMP is cost-shared through the Minnesota state program, which will be discussed later.

B. Minnesota State Assistance Programs

The state assists private landowners in a variety of ways. Much of the technical assistance comes from the DNR Division of Forestry. This is because the Commissioner of the DNR has been given the authority and responsibility to ascertain the best methods for encouraging private forest owners to grow timber for commercial purposes, to cooperate with private owners in preparing management plans, and to use her/his influence to establish scientific forestry in the state (Minnesota Statutes 89.01). Another statute (88.79) specifically empowers the Commissioner to furnish assistance to private landowners and to promote maximum sustained yield of timber on their lands.

1. Minnesota Accelerated Private Forest Management Program

In addition to federal programs, a state forestry cost-share pilot program, the Minnesota Accelerated Private Forest Management Program, was implemented in Minnesota July 1, 1979. The stated objective is to provide forest and wildlife management assistance for the non-industrial private woodland owners in order to improve productivity on small private forest lands and to minimize environmental loss due to erosion or water quality degradation. This is a joint program with the DNR Division of Forestry and the State Soil and Water Conservation Board funded by the Legislative Commission on Minnesota Resources. The first biennium ended June 30, 1981 and the program received funding for a second biennium. During the budget reviews the funding for the technical positions was retained; however, to help balance the growing deficit the cost-share portion of the money was pulled back.

The Minnesota Accelerated Private Forest Management Program has two components: a) technical assistance, and b) cost-sharing assistance.

a. Technical Assistance (Private Forest Management Specialist)

Ten private forest management (PFM) positions are funded through the program. These PFM foresters are stationed throughout the state in order to advise private woodland owners who have less than 1,000 acres. Most often this assistance includes an on-the-ground inspection of the lands to be managed followed by a written forest management plan. PFM foresters advise landowners about reforestation, timber stand improvement practices, harvesting, wildlife habitat improvement, and insect and disease problems.

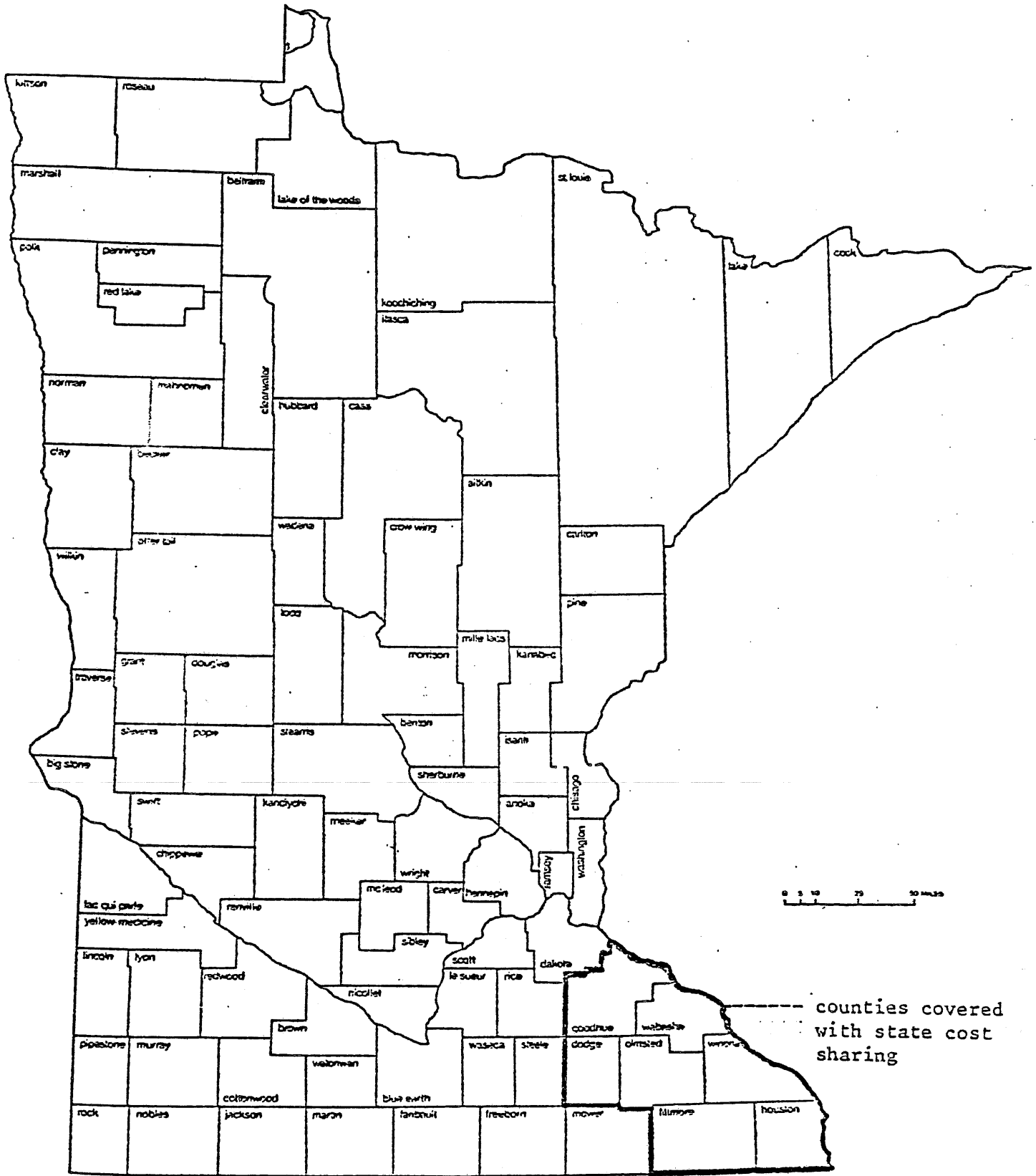
There are approximately 120,000 landowners that may qualify for PFM assistance. Statewide the nine PFM specialists are expected to reach 1,800 landowners per year. In addition, insect and disease control requests and tree farm inspections total 125 per year. The tenth position is for clerical support.

In the past, District Foresters, in addition to managing state forest lands, were also solely responsible for NIPF lands. The district forester did not have time to work with many private individuals, especially in districts with large acreages of state land. The nine PFM specialists now provide additional assistance to landowners.

b. Cost-Sharing Assistance

A seven county area in southeastern Minnesota was targeted to receive \$100,000 for direct aid to individual landowners. The counties involved are Goodhue, Wabasha, Dodge, Olmsted, Winona, Fillmore and Houston (Figure 6). Each county represents one

Figure 6. Seven County Area targeted for Minnesota's pilot cost-sharing program.



Soil and Water Conservation District except Winona County. Winona County includes both the Rood River District and the Burns-Homer-Pleasant District.

The practices cost-shared include: 1) establishing forest tree plantations, 2) improving existing forest stands through thinning and/or pruning, 3) fencing woodlands to protect them from grazing, and 4) constructing logging or access roads.

The program was set up both to increase forest management activities on private land, which will increase forest productivity, and to reduce soil erosion and sedimentation in these southeastern counties, which will maintain forest productivity and protect water quality. The cost-sharing program is administered by the State Soil and Water Conservation Board through the local Soil and Water Conservation Districts in cooperation with the Division of Forestry.

State cost-sharing is used with federal ACP and FIP and will pay half of the landowner's share above the federal rates. On forest access roads and some woodland fencing, half of the total cost is paid to the landowner, as federal program cost-sharing for these practices is often not available.

Many of the landowners receiving cost-sharing money in Minnesota are farmers who live on the land. In a seven county area in southeastern Minnesota farmers and resident owners accounted for 86% of the cost-share applicants.

c. Accomplishments of the Minnesota State Cost-Sharing Program

The state monies allocated for the first biennium were all encumbered. As of June 30, 1981 about half of the scheduled practices had been completed, paper work processed, and monies paid (Table 2). The county personnel expect all of the pending participants to complete their projects (Table 3).

Table 2. Progress Report of the Cost-Sharing Assistance Program.
 Private Forest Management Program for Southeastern Minnesota -
 First Biennium 7-1-79 - 6-30-81.

	Units	Amount	Units	Amount
	<u>Approved</u>	<u>Encumbered</u>	<u>Installed*</u>	<u>Spent*</u>
Forest Tree Plantations (ac)	446.6	\$ 16,526.95	221.0	\$ 8,114.51
Planting Black Walnut Trees (ac)	309.9	9,068.60	246.3	6,342.99
Forest Tree Stand Improvement (ac)	2,073.5	32,640.07	1,316.5	17,409.86
Woodland Fencing (rod)	11,518.5	28,251.56	5,826.0	10,409.86
Logging and Access Road (ft)	70,509.0	14,237.01	35,875.0	8,661.51
TOTAL		\$100,724.19		\$51,511.35

*These columns reflect only those landowners who have actually turned in their bills, had the paper work processed, and are paid. When payments are completed they should be comparable to the units approved and units encumbered columns.

Table 3. *Number of Landowners Assisted in the State Private Forest Management Program.

	<u>Approved</u>	<u>Pending</u>	<u>Cancelled</u>	<u>Completed</u>	<u>Resident</u>	<u>Absentee</u>
Dodge	6	2		4	6	
Goodhue	75	25	20	30	73	2
Olmsted	41	35		6	38	3
Root River						
(Houston Co)	112	28	24	60	108	4
Fillmore	53	9	9	35	44	9
Wabasha	97	9	18	70	78	19
Winona	42	9	6	27	29	13
Burns-Homer-						
Pleasant (Winona Co)	44	14	10	20	30	14
TOTAL	470	131	87	252	406	64
PERCENT	100%	28%	18%	54%	86%	14%

*Each practice was considered separately, therefore if a landowner signed up for two different practices s/he was counted twice.

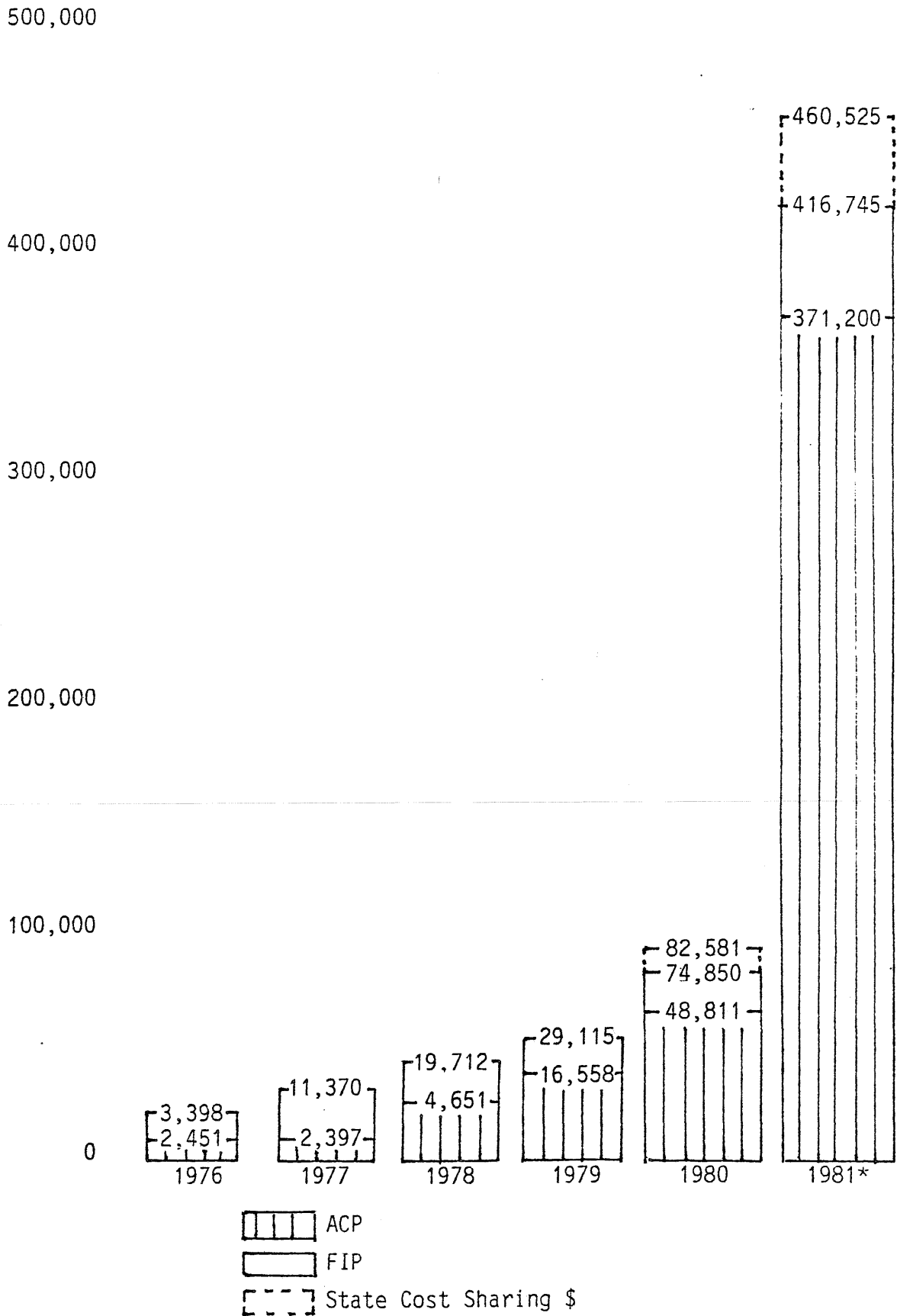
The Accelerated Cost-Share Program has greatly added to the private forest management accomplishments in southeastern Minnesota. In combination with FIP and ACP funds it helps more landowners to invest in forest management. FIP payments to landowners increased from \$12,557.00 in 1979 to \$45,545.00 in the first nine months of fiscal 1981 and ACP increased from \$16,558.00 in 1979 to \$371,200.00 in 1981 (Figure 7). This jump was in part due to the added state funds. It also shows an increase in the number of landowners committed to investing in forestry.

During the first biennium of the state program 252 forestry projects were completed (Table 3). A total of 470 landowners were approved for state cost-sharing. Eighteen percent of these cancelled their applications due to change of land use objectives, illness, lack of time or funds, or communication programs (primarily an absentee landowner problem). Of the remaining 383 applications 54% were completed and the monies paid before June 30, 1981. Many of the applications listed as pending have also been completed but were not tallied by the counties because the paper work is not completely processed. Most of the applicants (86%) are local residents which is helpful in maintaining the practices and continuing a forest management program.

2. Other State DNR PFM Aid

- a. District foresters have historically been responsible for the DNR's PFM program and they continue to work part-time in this area.
- b. Some districts also employ PFM technicians who assist the 9 PFM specialists mentioned earlier. These technicians are regular state employees and also are involved in tasks other than PFM.

Figure 7. - Agricultural Conservation Program (ACP), Forestry Incentive Program (FIP), and Minnesota State Cost Sharing Program earnings by private woodland owners in the 7 county area in southeastern Minnesota.



*1981 ACP and Minnesota State are complete fiscal years; FIP is through 6-30-81. The federal fiscal year ends 9-30-81, however, the final FIP numbers are not yet compiled.

- c. The state has also hired PFM technical contractors who promote ACP and FIP programs. These consultants educate landowners as to the need for appropriate forest management and provide technical assistance necessary to complete projects. This state project is supported with technical assistance (T.A.) funds from the federal ACP program.

C. Minnesota Agricultural Extension Service

The Minnesota Agricultural Extension Service is part of the University of Minnesota. The Agricultural Extension Service has been involved in woodland field day programs for 25 years in cooperation with other agencies. A telephone information line is maintained to answer questions, a mail service supplies forestry materials in response to requests, and a forestry marketing bulletin primarily aimed at wood processors is published quarterly. The Extension Service has also directed an education program specifically for urban NIPF owners for ten years. Only 13 percent of annual natural resources Extension effort is directed specifically at NIPF owners. This is divided among several persons, both office and field agents.

D. Consultants/Industrial Assistance

Private forestry consultants work with landowners and help relieve the DNR of some of the responsibility of NIPF land management. In addition to providing services offered by the state agency, consultants can administer timber sales or cultural operations, activities which state employees are prohibited from doing (Banzhaf and Company 1980). The state is in the process of creating a referral system in order to more effectively link landowners needing forestry assistance to private consultants. With insecure government funding, consultants can help stabilize management on NIPF lands by providing technical assistance on a long-term basis.

The American Tree Farm System is a nationwide program sponsored by the American Forest Institute. Their goal is to encourage private forest landowners to manage their forest resources. In Minnesota there are

approximately 1,500 members who manage a total of about 840,000 acres of forest land. Most of this acreage is in corporate ownership. The Minnesota Forest Industries Information Committee is the sponsoring organization in this state.

Some forest product companies offer assistance to private landowners. Blandin Paper Company manages land for other large companies such as Reserve Mining and Hana Mining. Three goals of their program are 1) to obtain wood now, 2) to get people involved in managing their land for the future wood supply, and 3) public relations. Program participants sign an agreement giving Blandin Paper Company preferential treatment for timber sales (J. Marshal 1982).

IV. IMPACT OF COST-SHARED FOREST PRACTICES ON WATER QUALITY

The forestry practices described earlier that are cost-shared through State and Federal programs can be grouped into 4 categories: 1) woodland access road construction and maintenance, 2) tree planting, 3) fending, and 4) timber stand improvement. Activities in each group have a direct impact on 208 considerations and on the long-term future of our wood supply. The effects of each are described below.

A. Woodland Access Roads

Woodland access roads are an essential component of an integrated forest management program. The construction and maintenance of access roads have been identified as the primary sources of sedimentation problems due to forest practices (EPA 1975).

The Minnesota Water Quality Management Plan that was prepared to comply with the Clean Water Act (P.L. 9200, Sec. 208) has been approved by the governor of Minnesota and the Environmental Protection Agency. It states that certain woodland access roads on certain forest lands contribute to water pollution by disturbing the forest site (MPCA 1980). Woodland access roads built in southeastern Minnesota without proper design are very likely to turn into gullies. Proper design and construction of roads lessens their impact on water quality and increases their life span.

Permanent forest roads will provide continuous accessibility to forest lands, which in turn will help insure continuous management and prevent forest projects from being isolated actions. It means that the areas will not only be available for harvest but also for replanting, as well as other follow-up cultural activities.

As part of the state cost-sharing program 35,875 feet of road were constructed in the seven county area in southeastern Minnesota. These were built according to state specifications and under the guidance of qualified foresters. An additional 34,634 feet of road are completed and awaiting paperwork processing, or will be completed soon. This will result in reliable access to woodlots without undue impact on the water quality of the area.

In the Lewiston Area along approximately four miles of road partially funded with state cost-sharing money have made about 1,770,000 board feet of timber accessible for improved management and for future harvest. In addition, about 4,862 cords of wood from tops and other logging residue have been made available for fuelwood use by local residents.

Proper construction and maintenance of woodland access roads is too expensive for many landowners; consequently many existing roads are of substandard quality relative to watershed protection and water quality. Cost-sharing is important for this practice because of the long-term benefits society receives from permanent, well-designed woodland access roads both through increased timber yields and through preservation of water quality. The latter is an especially important consideration in southeastern Minnesota, where water quality problems in specific areas are already severe.

B. Tree Planting

There are many benefits derived from planting non-agricultural open land or converting non-productive forests to more productive forest areas. The forest base will be increased which will lead to more timber

production. Farmers will have another option to farming marginal agricultural lands. New trees will aid in watershed protection and critical areas highly susceptible to erosion will be stabilized. Increased tree cover will provide habitat for wildlife, protection for trout streams, and increased recreation opportunities.

In the first biennium of the state cost-sharing program 467 acres of land were planted. Statewide 4,916 acres were planted using ACP or FIP aid in 1981. It is projected that there are at least 100,000 acres statewide that are available to be planted (W. Hanson, Forest Resources and Products, MDNR 1982).

C. Fencing

According to the Southeast Minnesota Tributaries Basin* report (Section II-2, April 1980):

"Accelerated erosion from grazed forest land is also a problem. Some 270,000 acres, or 44 percent of the forest, are grazed. The animals harm the site by causing severe soil compaction and by disturbing the soil's protective litter cover. As a result, infiltration and percolation rates decrease, runoff and erosion volumes increase, nutrients are lost, and site productivity declines. It is estimated that over 1.2 million tons of soil is (sic) lost each year from grazed forest land."

Table 4, taken from the Southeast Minnesota Tributaries Basin Report, shows that ungrazed forest land has the lowest soil loss from sheet and rill erosion in the basin (0.2 ton/acre/year).

The plan suggests that if measures are taken to correct the grazing problem the soil eroded per year from forest lands can be reduced by 46%.

*The Southeast Minnesota Tributaries Basin covers about 6,091 square miles and includes the seven counties involved in the Minnesota Accelerated PFM program and parts or all of Blue Earth, Dakota, Freeborn, Le Sueur, Mower, Rice, Scott, Steele, and Waseca counties.

Gully erosion as well as sheet and rill erosion is accelerated by a lack of vegetative cover. Undisturbed forest land normally has few gullies; however there are localized erosion problems which have occurred as a result of overgrazing, poor management or intensive land use on or above steeply sloping forest land. An additional benefit of fencing is to decrease the amount of livestock lost or injured in woodlots.

Table 4. Current Sheet and Rill Erosion Rates, Southeastern Minnesota Tributaries Basin

Source	Acres	Annual Soil Loss	
		(1000 Tons)	(Ton/Ac./Yr.)
Cropland			
Exceed Tolerance	696,280	10,426	15.0
Less than Tolerance	1,718,360	3,129	1.8
Pastureland	364,910	1,496	4.1
Forestland			
Ungrazed	340,230	76	0.2
Grazed	296,730	1,250	4.6
TOTAL	3,389,510	16,377	4.8

During the first biennium of state cost-sharing 5,826 rods of woodland fence were completely installed with 5,692.5 rods in process. This protected an average range of 2-8 acres per rod of fence (T. Romaine, Area Forester, MDNR 1981). Fencing is definitely a Best Management Practice (BMP) that needs to be encouraged through the use of incentives in regions with characteristics similar to southeastern Minnesota.

D. Timber Stand Improvement

Timber stand improvement includes removing less desirable trees in order to provide more growing space for future crop trees, preparing a site so that it will continue to regenerate naturally, and pruning crop trees.

As Gregerson et al (1979) pointed out, landowners may not be willing to make expenditures to improve their tree stands because of the long-term nature and low rate of return on forestry investments. In fact they will be more apt to convert the land to other, even marginal uses if there is a shorter payback period. If cost-sharing is used as an incentive landowners will be able to retain permanent tree cover and thus provide watershed protection, help to reduce flood runoff, and continue to stabilize critical areas. Using TSI to help prepare the site for natural regeneration in addition to reducing the potential for non-point source pollution is often a cost-effective alternative to clearing the land and planting trees.

At the same time the landowner can maintain maximum stand vigor, provide valuable timber by selective cutting, and provide fuelwood during the thinning process. As more homes heat with wood, fuelwood is becoming a valuable process. In 1980 one-third of the homes in Minnesota burned wood and 21% of these residences used wood for a primary or supplementary heat source (J. Krantz, Utilization and Marketing Specialist, MDNR 1981). Clean forests also provide aesthetic and recreational enjoyment.

E. Limitations of Cost-Sharing

There are certain forest practices including some harvesting and site preparation techniques to which cost-sharing guidelines do not apply. Also, there are added costs to performing practices in such a way as to minimize impacts on water quality (Ellefson and Weible 1980). Ellefson and Weible report that forestry operations, especially in southeastern Minnesota, operate very close to an economic breakeven point on small volume public timber sales. They point out that "rules and regulations requiring operators to undertake additional forest practices that may enhance or maintain water quality could lead to very serious negative economic impacts." For example, in their study skid trail design cost an additional 6.3%, which in turn lowered the net revenue by 45%. Recreation is another forest use cited as potentially causing non-point source pollution. These forest uses need to be influenced through education, regulation, or some other type of incentive.

Herbicide use is cost-shared for site preparation and to release seedlings from competing vegetation. Herbicide use in forestry was also identified in Minnesota's water quality plan as a potential non-point source of pollution. It is stated in the practice's policies that chemicals used in performing this practice must be federally and locally registered and must be applied in accordance with authorized registered uses, directions on the label, and other federal or state policies and requirements. Care needs to be taken to be sure that herbicide use is not inappropriately increased because cost-sharing will make it more available. The district personnel need to be educated about potential adverse water quality impacts of herbicide use. This is especially important in areas where surficial and groundwater quality is already threatened by natural or man-caused pollutants.

V. DISCUSSION

The Minnesota Accelerated Private Forest Management Program is a combination of educational programs and subsidy programs. During the first biennium, it has proven itself to be an important program in helping to promote wise forestry investments and achieve high environmental standards. It is useful in helping us meet our state's obligation to Section 208 of the Federal Water Pollution Control Act Amendments.

Both components, technical advice and cost-sharing, are necessary for this successful program. The local PFM forester needs to be explaining and promoting forest management practice to local landowners and be generally available to help follow through on recommendations. In the counties with the highest rates of completion of approved forestry projects, the PFM forester is the most important ingredient for success. Statewide, with the addition of 9 PFM foresters in 1979, the number of landowners assisted has gone up by over 80%. Rapport that has been established between PFM foresters and private landowners, while hard to quantify, is an important accomplishment and will provide lasting benefits. It is useful to note, however, that with adequate support from state personnel many of the functions of a PFM forester could be completed by private consultants. This being the case, it is very important that the cost-share funding remain

strong even if state personnel cutbacks are required. It may not be an ideal situation because landowners would have to pay for consultant services; however cost-sharing does cover some technical advice associated with the practices.

Presently private forest lands in Minnesota are basically free of any governmental regulation or controls, except in instances where private forest lands are involved in the DNR's private forest management program. For example, if a landowner opts to use cost-sharing for most practices there is a stipulation that the practice must be maintained for 10 years. It is not, however, attached as a lien on the property so if the owner sells the property the agreement is void. If the landowner does not sell the property and does not maintain the practice the cost-sharing money is to be returned to the state. This is rarely if ever enforced.

Using the cost-sharing program as a vehicle to talk with landowners and to provide them with management options, the foresters can be in the field and see the land. Thus they will be able to identify, evaluate, and help control non-point sources of water pollution from privately owned forests. This increase in personal contact between landowners and DNR forestry personnel may lead to greater involvement of landowners in managing their woodlots.

A. Land Conversion

One of the biggest benefits from a combined educational and subsidy program is that it helps prevent land clearing that may in the long run have negative impacts on our water and forest resources. In the long term it is in society's interest to invest in renewable resources including water and forests.

Well-managed land which may provide an income is not as likely to be converted to other uses and can help maintain environmental quality.

Having land forested, especially if it has steep slopes, prevents or reduces sedimentation. Converting this perhaps marginal forest land to marginal agriculture may severely increase erosion problems and costly

terracing may have to be installed. Air pollution due to wind erosion is also reduced if land is retained in or converted to forests.

With the growth of population, industries and associated services, more pressure is placed on forest land to shift to higher valued uses. Major land losses are to country homesites and expanded crop production. Especially in times of economic difficulty land managers/owners tend to think in terms of short-term investment as opposed to long-term financial investments such as forestry. Land use changes in the Southeast Minnesota Tributaries Basin if no further water resource projects are installed are projected in Table 5. Table 6 shows the projected statewide loss of commercial forestland due to conversion. Agriculture followed by urban expansion are projected to cause the largest change.

In general cost-sharing practices such as planting and/or timber stand improvement can reduce the amount of land converted from forests to other uses, and gives other options than government ownership to meet our natural resource needs for the future.

Table 5. Current Land Use and Projected Changes in Major Land Base, Southeast Minnesota Tributaries Basin.

<u>Land Use</u>	<u>Projected Change</u>			
	<u>1975</u> <u>(Acres)</u>	<u>1985</u> <u>(Acres)</u>	<u>2000</u> <u>(Acres)</u>	<u>2020</u> <u>(Acres)</u>
Cropland	2,414,640	- 2,900	-16,160	-23,450
Pastureland	364,910	-15,400	-38,360	-52,950
Forestland	609,960	- 2,010	- 4,830	- 7,260
Other Land	235,690	+ 6,590	+15,080	+21,160
Urban & Built-up	183,850	+13,370	+42,520	+60,750
Fed. Non-cropland	24,970	---	---	---
Water	64,620	+ 350	+ 1,750	+ 1,750
TOTAL	3,898,640			

B. Land Acquisition

A cost-sharing program can be a viable option to government land acquisition. In the state of Minnesota this is a complex issue. When the objective is to ensure quality water from forested land, there are both positive and negative aspects to public or private ownership.

Public ownership can ensure a long-term commitment, there is greater control over this particular public good (quality water) and there are fewer public service costs (e.g., school bus and road clearing).

At the same time a negative aspect is reduced taxes to counties or an added cost to the state treasury in the form of in lieu of tax payments. In 1979 a law was passed requiring the state to reimburse local governments for public lands that yield no taxes. Houston County alone received \$32,300 in 1980 from the state in the form of in lieu of tax payments.

The state also has at least part of the costs of purchasing the land and the full cost of water quality management practices. The Richard J. Dorer Memorial Hardwood State Forest, which has received much public attention in Minnesota, is an example where the state opted to acquire a large amount of land. The official forest boundary encompasses nearly 2 million acres, only 580,000 acres are considered forest land (the remainder being largely farm land). About two percent of the total acreage (40,600 acres) are state owned.

The acquisition per se has not been a total financial burden for Minnesota. Fifty percent of the state's cost of certain land acquisition can be reimbursed under the Federal Land and Water Conservation (LAWCON) program (P.L. 88-578, as amended), and there is the necessary environmental impact statement for the Memorial Hardwood State Forest on file with the federal agency responsible for administering LAWCON funds, the Bureau of Outdoor Recreation. As a result the DNR is eligible for LAWCON funds when acquiring or developing land for outdoor recreation, open space, or multiple use forestry purposes.

Table 6. Loss of Commercial Forest Land 1977 Through 2020 (Projected)

	(Cumulative acres x 1000)								
	1980	1985	1990	1995	2000	2005	2010	2015	2020
URBAN	21.0	56.0	91.0	126.0	161.0	196.0	231.0	266.0	301.0
AGRICULTURE	127.5	340.0	552.5	765.0	977.5	1190.0	1402.5	1615.0	1827.5
EXTRACTICES (minerals)	6.0	16.0	26.0	36.0	46.0	56.0	66.0	76.0	86.0
PEAT	16.5	44.0	71.5	99.0	126.5	154.0	181.5	209.0	236.5
ENERGY (transmission lines, pipe- lines, power plant sites)	1.88	5.01	8.14	11.27	14.4	17.53	20.66	23.79	26.92
PRESERVATION	10.5	28.0	45.5	63.0	80.5	98.0	115.5	133.0	150.5
TRANSPORTATION (roads, rights- of way, airport expansion, etc.)	.9	2.4	3.9	5.4	6.9	8.4	9.9	11.4	12.9
TOTAL LOSS	184.28	491.41	798.54	1105.67	1412.8	1719.93	2027.06	2334.19	2641.32

Minnesota, as of 1977, has received \$280,500 as reimbursement for Memorial Hardwood State Forest acquisition. Because of budget cuts and reprioritizing expenditures it is not certain that LAWCON funds will be available in the future.

The DNR had thought that an acquisition program would be popular because much of the wooded land in the forest is not suitable for agriculture. A lot of it is eroded or over-grazed by livestock, which destroys seedlings and reduces the potential for natural reforestation. Also, the highest grade timber has been removed. To date about 120 landowners with about 7,000 acres of land worth about \$7 million have asked the DNR to purchase their land. This is wooded rough land that could benefit from forest management. Original state plans in 1961 called for acquiring 200,000 acres of forest land over 50 years, but the DNR now has drastically reduced its plans for further acquisition. This reduction is due to a combination of funding problems and public pressure. There was a fear that the state was taking large amounts of agricultural land out of production combined with a negative attitude toward government ownership. It is useful to note that it is not the division's policy to retain ownership of large acreages of land primarily suited for agricultural use and in fact the exchange or sale of certain tillable lands in the forest is required under a law passed by the 1977 legislature and amended by the 1979 legislature (M.S. 89.022). As of 1978 tillable land amounted to about 8 percent of the division's land in the Memorial Hardwood State Forest.

Insuring quality water through subsidizing private owners may cost the public less. There are no land purchase costs, the land is still part of the tax base and there is only partial payment of water quality management practices. With an accelerated cost-sharing and technical information program landowners may be more willing to retain and manage rough wooded land. A drawback to private ownership is the uncertainty about long-term commitment to manage for water quality. Also, there is not the public access to forest land for recreation, hunting or firewood cutting.

C. Opportunity for Management

There is a good opportunity for forest management in Minnesota, and southeast Minnesota in particular (Table 7).

Table 7. Conservation Treatment Needs - Forest Land
Southeast Minnesota Tributaries Basin

Treatment Needs	Units	1975	1985	2000	2020
Reduce or eliminate	Acres	195,900	178,950	150,720	113,080
grazing	Percent	32%	29%	25%	19%
Reforestation*	Acres	93,980	86,380	75,070	60,220
	Percent	16%	14%	12%	10%
Timber Stand	Acres	282,460	277,800	270,910	262,360
Improvement*	Percent	46%	46%	45%	44%
TOTAL	Acres	572,340	543,130	496,700	435,660

*Includes some grazed forest land.

In addition to watershed protection, treatment of forest land is needed in order to realize the forest's potential to provide timber resources, recreational opportunities and wildlife habitats.

Productivity: In southeast Minnesota 60% of the forest land is less than 70% stocked with desirable trees. Timber growth is about 40% of its potential. Cultural practices will increase the forest's productivity which will have economic benefits for the region.

Recreation: In this region problems with sediment, eutrophication, water quality and depth restrict the use of many inland lakes for fishing and other recreational purposes. Sedimentation is the most often cited lake quality problem. Out of 26 lakes looked at by the S.E. Minnesota

Tributaries Basin report, 18 (69%) were identified as having a problem with sedimentation. Forested areas can enhance the physical appearance of the land. Good recreational opportunities can lead to more tourism which will have economic benefits for the region.

Wildlife Good forest management also improved wildlife habitat.
Habitats: More food and cover are available for winter. Managed mixed-age stands are good deer and grouse habitat. Hunting opportunities in the area will increase which will have economic benefits for the region.

VI. SUMMARY

A. Status of Federal Incentive Programs

The federal cost-share programs and technical programs can be very helpful in Minnesota both in increasing the productivity of private forest lands and in helping us meet our federally mandated water quality standards. Because Section 208 of the Clean Water Act does not reflect federal goals, it is important to have federal programs to help states meet these goals. The future of the FIP, ACP and RCW programs is of major concern. As stated in Section VI.A, roads are the primary source of sedimentation problems due to forest practices. These federal programs need to have the capabilities to deal with the actual on site problems. The recent directive to delete erosion control practices on roads in the FIP and ACP programs was not positive.

In the coming years money for cost-sharing will become even tighter. Karl Davidson (1981), State and Private Forestry, Broomall, said that the FIP program may be completely cut in 1983. Many counties even in 1980 did not have adequate FIP funds to fill requests for cost-sharing. The Rural Clean Water appropriations have already been cut. This may leave only ACP money to use to cost-share certain forest practices. This means it is especially important that the State ASC Committee set aside as it did in 1979 a certain amount of funds exclusively for

forestry. Knowing that the funds are available the Director of the Division of Forestry can then allocate field staff to meet the technical needs.

B. Status of State Incentive Programs

The first biennium of the state cost-share program was very successful. With federal funding uncertain, the use of state cost-sharing money is even more crucial if we are to protect and benefit from the state's private forest resources. The state cost-sharing program was recommended for funding for a second biennium; however, in the recent round of budget cuts much of the cost-sharing money was cut from the State Accelerated Management Program.

As has been emphasized in this report the water quality problems due to forestry in Minnesota are largely site specific as opposed to regional or statewide. This is one reason why local cost-sharing is a viable alternative to statewide regulation. The program can be flexible because of local control. The people serving on local committees are familiar with the area and should be able to identify critical areas in order to appropriately allocate money. The state cost-sharing money has been funneled through the local SWCD's who then, with the aid of recommendations of the PFM forester, appropriate money to projects. Rapport is more easily established when the people involved trust that people familiar with the area will administer the money. The local SWCD's have a program that identifies an "Outstanding Woodland Manager" for the year which is another useful way to promote forestry programs and give local recognition to participants.

1. Changes or Improvements

Through the success of the first biennium both strong advantages of the program and areas that can be strengthened have emerged.

- a. A helpful management tool for the program's administrators would be firm criteria to use in determining priorities for cost-sharing. This would include a means to identify 1) highly

erosive areas available to be planted or in need of specially designed access roads, 2) areas that if planted potentially would be productive but under present use are unproductive, 3) areas that have a good chance if they are maintained forested of providing a return from the planting investment. This could take the form of county private forest management plans.

- b. There needs to be more of an incentive to plant highly erosive nonproductive land. This includes land that is unsuitable for farming or grazing and land that may have a low return on forestry investment. In certain districts under certain conditions it may be useful to raise the cost-sharing to 75-90% of the cost of the practice.
- c. For expensive practices (such as woodland access roads) under highly erosive conditions rising cost-sharing to 75-90% would increase the use of the practice.
- d. Private forest management needs to become a permanent part of the state budget including funds for both DNR staff (technical assistance) and cost-sharing assistance. The numbers of PFM foresters can be conservative if the state and private consultants are able to work together effectively.
- e. The program needs to have ways to add new practices and capabilities as the need arises.
- f. A priority for followup treatments is necessary to ensure that there will be a return on investments and that money is not being wasted on unsuccessful projects. This includes scheduled periodic evaluations in order to determine the practice's effect.
- g. It is important to have the practice maintained even if the land is sold so the public realizes its investment in forestry. At least one state, Virginia, does tie cost-sharing money to the deed. The practice needs to be maintained for the required

number of years and this requirement is a lien on the land if it is sold or inherited. The water bank program for wetland preservation in Minnesota provides another good example. There is a provision stipulating that the owner pay back the money if the land is sold and the new owner discontinues the program.

- h. PFM foresters, district foresters and technicians involved in PFM work should have training specifically in regards to 208 BMP's. Training programs for state foresters such as the one used successfully in Oregon would be one model to follow.

2. Program Expansion

The success of the pilot cost-share program in southeast Minnesota indicates that a statewide program may produce even more benefits. The nine PFM positions currently being funded are statewide so it would be the cost-sharing part of the program that needs to be expanded. Even if the program is statewide there would need to be regional BMP's because of the diverse conditions. As discussed previously even BMP's would have to be flexible to allow for site specific conditions. A statewide cost-sharing program can help us have a well-integrated private forest management program and if federal cost-sharing funding is discontinued then counties will not lost all their cost-sharing at once. With a statewide program PFM foresters and others would not have to learn about new programs if they transferred to different regions.

The potential for incorporating 208 goals into a statewide cost-sharing program is great. They are not partially incorporated into this regional pilot program, however, if they are only tied into this existing program they will not be as effective and the BMP's will have only limited exposure and usage.

Regulation and Water Quality Management Implementation

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REGULATION AND WATER QUALITY MANAGEMENT IMPLEMENTATION

OVERVIEW

Forest regulation is not a new issue in the United States. The first regulation affecting forestry which protected soil was probably in Massachusetts in 1739. Timber cutting, grazing, and burning were regulated in order to help check the encroachment of sand dunes on part of Cape Cod.

More recently (1970's) eleven states have enacted forest practice legislation which specifically addresses soil erosion and water quality on private lands. Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) directs states to develop plans to control non-point sources of pollution and some states have chosen regulation as one tool.

While Minnesota currently is relying primarily on educational and subsidy programs to implement Best Management Practices (BMP's) it is useful to examine the present and potential role of forest practice regulation. The Forest Resource Management Act of 1982 (MN Laws 1982, Chap. 511) authorized the Division of Forestry to request permanent positions for three forest soil and hydrology specialists. These people could greatly influence forest manager's decisions regarding effective use of BMP's. While this is not directly regulating forest practices, it is a useful way to use legislation.

Forestry is the third largest industry in Minnesota and large acreages of land are affected. In addition there is growing concern for both more intensive protection of our natural resources and increased wood production. It is important that decision makers have adequate information concerning regulation and that discussion of regulation be included in the planning process. With adequate background, as situations arise decision makers will be better able to 1) determine whether or not existing regulation is adequate, 2) determine whether or not new regulation would be useful, 3) know how to critically analyze proposed regulation and 4) have alternatives to regulation prepared if that is appropriate.

As part of the 208 implementation project I presented a seminar titled Legislative Regulation of Private Forestry Practices. The purpose was to provide Department of Natural Resources staff including the Minnesota Forest Resources Plan planners, industry representatives and legislators background on forest legislation in the United States. Topics covered included: 1) reasons to direct forestry practices and when regulation is appropriate; 2) a brief history of regulation in the United States and Minnesota; 3) legal basis for forest practice regulation; 4) modern forest practices acts: Oregon, Washington, California; and 5) 1972 Federal Water Pollution Control Act (Figure 8).

For this project we also examined the existing Minnesota legislation that effects forestry as it relates to water quality. The following paper thoroughly summarizes our findings. This is important for several reasons: 1) to compile this information for district personnel so the laws now in place will be recognized and complied with; 2) to see if the current legislation can be adapted to achieve BMP compliance if regulation is desirable; and 3) to see what legislation needs to be adopted/proposed if regulation is desirable.

It is important to examine legislation as one means to achieve 208 water quality objectives. However, in Minnesota a forest practice act requiring specific BMP's is not at this time being considered.

Legislative Regulation of Private Forestry Practices

Figure 8

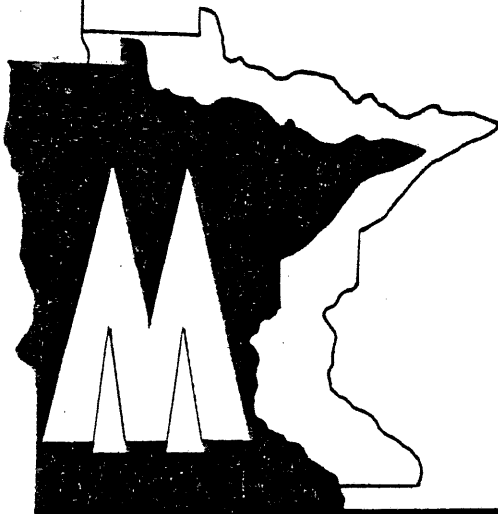
March 1, 1982

Forty-six percent of the commercial forest land in Minnesota is in private ownership. In the 1970's a dozen states adopted Forest Practice Laws or strongly revised old laws and regulations. Is legislation an effective way to ensure continuous timber supply from these lands while maintaining environmental quality?

On Monday, March 1 at 1:30 p.m. in the DNR Main Conference Room, Centennial Building, a seminar will be presented to discuss Legislative Regulation of Private Forestry Practices. Topics to be discussed include:

- Reasons to regulate forest practices
- History of regulation in America
- Legal basis for forest practice regulation
- Model acts
- Forest Practice legislation today

For additional information contact Denise Mitten, Operations and Planning Section, Division of Forestry.
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*REGULATION OF FOREST PRACTICES TO PROTECT WATER QUALITY IN MINNESOTA

I. INTRODUCTION

The Water Pollution Control Act Amendments of 1972 (P.L. 92-500) were a major piece of federal legislation aimed at restoring and maintaining the chemical, physical and biological integrity of the nation's waters. Section 208 (33 USC 1288), as interpreted by the courts, required the states to develop water quality management plans for the control of non-point sources of pollution. Water Quality Management, Minnesota's 208 Plan was completed by the state Pollution Control Agency in 1980. The part of the plan that addressed forestry identified road construction in forested areas, clearing for fire breaks, certain harvesting and site preparation techniques, herbicide use, recreation and grazing as potential non-point sources of pollution.

In 1980, the Environmental Protection Agency granted money to three states through the Northeastern Area State and Private Forestry division of the U.S. Forest Service to determine how the 208 plans for silvicultural activities in these three states could best be implemented. In Minnesota, the study was undertaken by the Division of Forestry, Department of Natural Resources. The study was to evaluate regulation, education and incentive programs as means of implementation, and was also to define best management practices (BMP's) for certain silvicultural activities.

This paper reports the results of research on existing federal, state and local controls that could be used to regulate forest practices in Minnesota for the purpose of protecting water quality. The research involved analysis of statutes and regulations and interviews with individuals familiar with the actual administration of each law.

All of the federal, state and local controls studies are summarized in Tables 1-3. Longer overviews are also provided at the beginning of each section. A brief summary is given below.

*The research and primary writing for this section was completed by Martha J. Hewett.

Most Federal statutes either 1) regulate activities on Federal land or activities that affect federal lands or public waters or 2) enable states to create their own legislation. Section 208 of the Clean Water Act of 1977 (33 USC 1288) is the only federal statute that exerts significant control over forest practices on private or public non-federal lands.

The State of Minnesota has sufficient regulatory authority through existing statutes to provide control over non-point sources of pollution in forested areas. The key statutes are the State Water Pollution Control Act and the Classification of Waters; Standards of Quality and Purity. The first of these charges the Minnesota Pollution Control Agency (MPCA) to establish such reasonable pollution standards as it shall deem necessary to protect the waters of the state, and to adopt standards and regulations, issue, modify, deny or revoke permits, develop schedules of compliance, and so on to prevent, control or abate water pollution. The PCA can enforce any of its statutes and regulations through criminal prosecution, civil penalties, injunction, action to compel performance, or other appropriate action. This Act gives the MPCA broad, strong authority to regulate non-point activities to protect water quality, provided that it perceives a need and has adequate funding to monitor pollution and enforce permits and regulations. The Classification of Waters directs the MPCA to classify and adopt standards of purity for all the waters of the state, and has an important non-degradation clause requiring that waters which are of quality better than the established standards be maintained at high quality unless the MPCA determines that a change is justified.

Minnesota's Shoreland Management Act (M.S., Chap. 105.485) and the program of Permits for Work in Public Waters (M.S., Chap 105.42) provide additional control by regulating activities such as cutting of vegetation, road building and stream crossings in the environmentally sensitive areas in and near public waters.

Counties and special governmental bodies created by joint powers agreements among counties are the only local units of government in Minnesota that have enough legal authority to regulate forest practices. The counties are required to exert some control over forest activities by such state statutes as the Shoreland Management Act and the Wild and Scenic Rivers Act and the Wild and Scenic Rivers Act. Beyond this, a few counties have experimented with

countywide ordinances controlling timber harvest or soil erosion, but without much effect. Local control offers the advantage of targetting efforts in those areas of the state that have critical erosion and sedimentation problems. But if the counties are to have a significant role in 208 forest management, they must first be educated to perceive the need, and then be provided with the technical and financial resources to carry their regulations out in a meaningful way.

II. FEDERAL LEGISLATION

A. OVERVIEW

Regulatory Legislation

Little federal legislation other than Section 208 of the Water Pollution Control Act Amendments of 1972 exerts any significant control over forest practices that could degrade water quality.

Section 404 of the same act requires a permit for the discharge of dredged or fill material into the waters of the U.S., but normal silvicultural practices are exempted from permit requirements. Discharge of dredged or fill material to construct or maintain forest roads is exempted where they are constructed in accordance with best management practices (BMP's). The BMP's issued by the Corps of Engineers are limited to activities in the waters of the U.S., to the exclusion of upland activities. No effort is made to distribute information on these BMP's systematically to all timber operators or to monitor compliance.

The River and Harbor Appropriations Act, as administered by the Coast Guard and the Corps of Engineers, seldom impinges on forest activities. Upland activities and stream crossings are not covered. Such activities as skidding logs up a stream or snagging logs off stream bottoms might require a permit in some cases.

The National Environmental Policy Act may be used to require an Environmental Impact Statement for forest activities on non-federal lands in very rare cases where federal funding or permit authority is somehow involved. The Coastal Zone Management Act has had an impact on forestry in some states, but due to intense citizen opposition Minnesota never implemented a coastal zone program.

Other regulatory legislation such as the Federal Wild and Scenic Rivers Act, the Shipstead-Nolan Act, and the Bridge Act of 1906 also only affects forest practices on federal lands.

Planning Legislation

The Water Resources Planning Act (1965) has little impact on forest practices. Plans prepared by the River Basin Commission were advisory and have been largely ignored. The state plan developed by Minnesota under this act did not address water quality in detail, since the Minnesota Pollution Control Agency was beginning 208 planning at the same time.

Legislation Providing Technical and Financial Assistance

Key federal assistance legislation for forestry includes: 1) the Cooperative Forestry Assistance Act (1978), which incorporates parts of the Clark-McNary Act of 1924 and the Cooperative Forest Management Act of 1950, and 2) the Soil Conservation and Domestic Allotment Act of 1936. These are discussed in detail in the "Analysis of Forestry Cost-Sharing Programs in Minnesota and Their Effects on Water Quality" (see PART III).

B. DESCRIPTION OF FEDERAL STATUTES

1. Clean Water Act of 1977, 33 USC 1251 et. seq.

This act revised and expanded the Water Pollution Control Act Amendments of 1972 (P.L. 92-500). The reader is assumed to be familiar with Section 208 of P.L. 92-500, which provided for areawide water quality planning.

Section 404 of P.L. 92-500 (codified as 33 USC 1344) had potentially large effects on forest practices. It prohibited the discharge of dredged or fill material into the navigable waters without a permit from the Secretary of the Army (Corps of Engineers). Navigable waters were expanded first by court decision (NRDC v. Calloway, 392 F. Supp. 685, DDC, 1975) and then by the 1977 amendments to include all waters of the U.S. Later court decisions have tended to broaden this further to include some areas never inundated by water (William Siegel, Attorney, Forest Resources Law, U.S. Forest Service, New Orleans, LA, pers. comm.). However, the 1977 amendments exempted harvesting, seeding and other normal silvicultural activities from permit requirements. Also exempted were forest roads, including stream crossings, where they are constructed

according to best management practices (BMP's). The St. Paul District of the Corps of Engineers, which has jurisdiction over all of Minnesota, sends copies of the BMP's to timber operators on request, but makes no effort to reach all timber operators or monitor compliance (Char Hauger, Supervisory Environmental Protection Specialist, Regulatory Functions Branch, Corps of Engineers, St. Paul). The BMP's relate primarily to activities in the waters of the U.S. (stream crossings and approaches), and do not deal with upland road construction (Hauger, pers. comm.). Neither the normal silvicultural practices exemption nor the forest road exemption would apply if the discharge were incidental to an activity having as its purpose bringing an area of the navigable waters into a use to which it was not previously subject, but since all of Minnesota has been logged, the exemptions do apply (Hauger, pers. comm.).

Section 404 is of some potential value in achieving 208 objectives, since it requires BMP's for forest road construction in the waters of the U.S. If the Department of Natural Resources could review the BMP's and participate in a cooperative effort to distribute information on them and monitor compliance, the section could be of some value. It will not help limit sedimentation from harvesting on steep slopes, rock raking, upland road construction, or other normal silvicultural activities.

2. River and Harbor Appropriations Act of 1899, 33 USC 401 and 403

Section 9 (33 USC 401) of this act requires a permit to construct a bridge, dam, dike or causeway over or in any navigable water of the U.S. Bridge and causeway permits are administered by the Coast Guard. The waterways over which they exercise jurisdiction for the purposes of this act, in Minnesota, are Lac Qui Parle Reservoir, Lake Traverse Reservoir, the Minnesota River below Chaska, the St. Croix River below Taylor's Falls, and the Upper Mississippi below Coon Rapids Dam ("Applications for Coast Guard Bridge Permits" 1981, p. 0-20).

Forest roads very seldom cross rivers of the size the Coast Guard regulates, so it has essentially no involvement in issuing permits for forest stream crossings. Dike and dam permits are administered by the Corps of Engineers. The waterways over which they exercise jurisdiction for the purposes of this act are more extensive, consisting of several hundred lakes and streams. However, foresters are seldom involved in building dams or dikes.

Section 10 of the River and Harbor Appropriations Act (33 USC 403) requires a permit from the Secretary of the Army (Corps of Engineers) for the creation of any obstruction to the navigable waters, including wharfs, piers, booms, jettys, etc. or for any excavation, fill or modification of the course, location, condition or capacity of any navigable water. Navigable waters are the same as those covered by Section 9. As a result of a major court case (Zabel v. Tabb, 430 F. 2d 199, 5th Cir., 1970), permit applications are reviewed for the effect on the general public interest, as well as navigability. There is some case law indicating that upland activities which affect navigable streams could be covered by this section, but the Corps has been reluctant to administer it this way (Michael Ferring, District Counsel, Corps of Engineers, St. Paul, pers. comm.). Hence, the effect of section 10 on forestry has been small (Siegel, pers. comm.). Permits would be required only for filling, excavation, construction or obstructions, or modification of the course, location, condition or capacity of a navigable water. The Corps has no authority to review bridges as obstructions under Section 10 (Ferring, pers. comm.). Hence, if the crossing is over a stream smaller than the Coast Guard deals with, no Section 9 or 10 permit is required. An activity such as skidding logs up a stream bed could be covered if effects on the course, capacity or condition of the stream were fairly permanent, but in practice, Section 10 is very seldom applied to forest activities (Ferring, Hauger, Siegel, pers. comm.). Hauger could recall only one instance in a seven year period, in which a permit was required for snagging old logs off the bottoms of some streams in the St. Paul District.

3. National Environmental Policy Act (1969), 42 USC 4321 et. seq.

The National Environmental Policy Act (NEPA) is a major piece of legislation which declares a policy of "productive...harmony between man and his environment" and prevention of damage to the environment. The key provision of the act (42 USC 4332(2)(c)) requires all agencies of the Federal government to include a detailed statement on the environmental impact of any proposal for

legislation or for other major Federal actions, when such legislation or action would significantly affect the environment. This requirement affects activities on federal lands and where federal funding or permits are involved.

The environmental impact statement (EIS) has generally had only a minor effect on activities themselves, since the courts have generally required improvements in the EIS, rather than a substantive change in the activity the statement described (Dana and Fairfax, 1980, p. 242).

NEPA would affect forest practices on private or public non-federal lands only when federal funding or permits are involved. Siegel could recall only one case where an EIS had been required for forestry activities on private land. The case involved joint cutting on federal and private land in Alaska. In his opinion applications of NEPA to forestry activities on other than federal land would be rare.

4. Coastal Zone Management Act (1972), 16 USC 1451 et. seq., 5 USC 5316, 15 USC 1511a

The Coastal Zone Management Act was intended to protect the national interest in effective management, beneficial use, protection and development of the coastal zone by encouraging states to exercise their full authority over lands and waters of the coastal zone through grants for coastal zone program planning and implementation. It was passed in 1972 in the wake of unsuccessful attempts to pass a general Land Use Planning Act (Dana and Fairfax, 1980, p. 268). In some southern states it has had a significant effect on forest practices (Siegel, pers. comm.).

Minnesota has no coastal zone program. Two coastal zone plans were proposed for the north shore of Lake Superior but were strenuously opposed by the residents of the area. Coastal zone planning was halted by Governor Quie, and no program was ever implemented. Therefore, the act is not relevant to forest practices or 208 objectives in Minnesota.

5. Federal Wild and Scenic Rivers Act (1968), 16 USC 1271 et. seq.

The Federal Wild and Scenic Rivers Act establishes a policy that selected rivers which possess outstanding scenic, recreational, or other similar values shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for present and future generations. The only federally designated river in Minnesota to date is the St. Croix from Gordon, Wisconsin to the confluence with the Mississippi. The Kettle River and the Upper Mississippi were enumerated for potential addition in 1975, but have not been federally designated. The Upper Mississippi is protected by a joint powers agreement among the affected counties (see chapter IV), who were strongly opposed to federal control and the Kettle River was designated as a Minnesota Wild and Scenic River.

The act affects forest practices on private and public non-federal land only slightly. The power provided under the act to restrict land and water use is limited:

- The Secretaries of Agriculture and Interior can acquire lands or interests in lands. State lands can be acquired only by donation. Lands owned by an Indian tribe or a political subdivision of a state cannot be acquired without consent as long as they are being managed in a manner consistent with the act. The Secretaries may acquire private lands by condemnation as long as less than 50% of the total acreage within the boundaries of the designated area is owned by federal, state or local governments. This provision can affect forest activities by removing land from private ownership.
- Federal lands within the boundaries are withdrawn from entry (commercial activity), sale or disposition, including timber harvest.
- No federal agency may assist by loan, grant, license or otherwise in constructing water resources projects that will adversely affect the river.
- The FPC may not license dams in designated rivers.
- The Secretaries may use their general statutory authorities (on federal lands) to carry out the purposes of the act.

The federal act will only achieve 208 objectives on federal land. However, it did provide the impetus for the state act, which regulates land use activities on private and public non-federal land (see chapter III).

6. Shipstead-Nolan Act (1930), 16 USC 577-577b

The Shipstead-Nolan Act was the first Congressional recognition of the wilderness concept (Dana, et al. 1960). It limited activities in certain parts of Cook, Lake and St. Louis counties. All federal lands in the area were withdrawn from public entry or appropriation. Logging was forbidden within a specified distance from the natural waterline of all lakes or streams in or contiguous to federal lands in the area. Alteration of natural water levels was forbidden, with minor exceptions. The act affects forest practices only on federal lands. Similar legislation establishes setback distances for logging on state lands adjacent to this area (Laws 1933, Chap. 412).

7. Bridge Act of 1906, 33 USC 491 et. seq.

This act essentially extends the River and Harbor Appropriations Act of 1899 to require that plans be submitted to and approved by the Secretary of Transportation before a bridge can be built over the navigable waters. Like the bridge portion of the Rivers and Harbors Act, it is applied only to rivers much larger than commonly spanned by forest roads.

8. Water Resources Planning Act (1965), 42 USC 1962 et. seq.

The Water Resources Planning Act was intended "to encourage the conservation, development, and utilization of water and related land resources of the United States on a comprehensive and coordinated basis by the Federal Government, states, localities and private enterprise..." The act had three titles. One created the Water Resources Council. The second authorized the President to establish river basin commissions (four commissions were established by Executive Order in Minnesota: the Great Lakes Basin Commission, Souris-Red-Rainy River Basins Commission, Upper Mississippi River Basin Commission, and Missouri River Basin Commission. The Souris-Red-Rainy RBC was later incorporated into the Upper Mississippi RBC. The third title provided funding for states to prepare comprehensive water and related land use plans.

The act has no direct impact on forest practices. Plans prepared by the River Basin Commissions were advisory and have been largely ignored (John C. Ditmore, Research Director, Water Planning Board, pers. comm.). The state plan prepared by the Water Planning Board did not address water quality in any detail, since PCA was beginning 208 planning at the time (Ditmore, pers. comm.). The only plan with any regulatory authority is the master plan for management of the Upper Mississippi River System, which covers only the commercial navigation channels on the Mississippi, Minnesota and St. Croix rivers.

The river basin commissions were abolished by Executive Order in summer of 1981 and funding for the commissions and for state planning efforts has been cut to zero for the 1982 federal fiscal year.

III. STATE LEGISLATION

A. OVERVIEW

Regulatory Legislation

Four state laws were found to have significant potential to help meet 208 objectives on forest lands. The two most comprehensive laws involved the Pollution Control Agency (PCA). The State Water Pollution Control Act charges the PCA with administration and enforcement of all laws relating to the pollution of any of the waters of the state. The agency is directed to classify the waters of the state, establish pollution standards, and adopt or issue regulations, permits, etc. to prevent, control or abate water pollution. The Classification of Waters; Standards of Quality and Purity, directs the PCA to group the designated waters of the state into classes and adopt standards of purity in accordance with considerations specified by the legislature. The rules promulgated by PCA under this statute contain an important non-degradation clause, requiring "waters which are of quality better than the established standards (to) be maintained at high quality unless..." PCA determines that a change is justified. These two statutes together give the PCA very strong authority to regulate non-point activities to protect water quality. Thus far, the agency has chosen to rely on the USFS, DNR, and the counties to control forest operations on public lands, and has looked to the DNR to provide technical and financial assistance to encourage responsible management of private land. However, a strong mechanism for regulatory action is definitely available if needed.

The Shoreland Management Act is intended to "preserve and enhance the quality of surface waters, preserve the economic and natural environmental values of shorelands, and provide for the wise utilization of water and related land resources..." The act requires counties and municipalities to enforce minimum standards established by the Department of Natural Resources for land uses near the shores of public waters. Standards of relevance to forestry include those for preservation of vegetation, grading and filling and placement of roads. Based on information supplied by Steve Prestin of the Shoreland Management Program (DNR Waters), it appears that these zoning provisions have virtually no effect on forest practices as adopted and enforced by the counties and

municipalities. However, the Division of Waters is undertaking a two year study to determine how well the existing state program and county ordinances meet the purposes of the act. One objective of the study is to develop recommendations for revisions to the program by late 1982. The Division of Forestry may be able to advance 208 objectives by offering input to the revisions.

The fourth law with potential for assisting 208 objectives requires permits for work in public waters. Again, the DNR establishes the standards and administers the program. Currently, low water fords and certain limited types of temporary bridges can be constructed without a permit if the stream and the ford or bridge design meet certain criteria. All other bridges, including several types common in forest operations, require permits. The permit criteria relate primarily to flood hazards, although permit applications are also reviewed for water quality impacts by regional DNR Fish and Wildlife personnel (Dave Milles, DNR Waters, pers. comm.). The Forestry Division could consider the following actions to make this law better serve 208 concerns: 1) make district foresters, PFM foresters, and private forest owners more aware of the existing permit requirements and the criteria for stream crossings which do not require a permit, 2) make Fish and Wildlife personnel aware of design criteria the Division finds important in protecting water quality, since they are the people who currently review applications to assess water quality impacts, 3) review the existing minimum standards for crossings not requiring a permit, and the existing criteria for issuance of a permit, to determine whether they adequately protect water quality. The existing rules are currently being revised by the Division of Waters.

Several other laws were found to have some relevance to forest activities and water quality. The public waters inventory relates to the two preceding acts. It requires the DNR to make a complete and final determination of which waters are public and which are not. The law also establishes the criteria which make a body of water part of the public waters.

The Minnesota Wild and Scenic Rivers Act, the Lower St. Croix Wild and Scenic Rivers Act - State Recognition and Implementation, and the Critical Areas Act are similar to the Shoreland Management Act in terms of the minimum standards they require, but cover limited geographical areas. All three require local units of government to control land use to protect natural resources.

Vegetative cutting and grading and filling criteria are similar to those in the Shoreland Management Act though the first two mentioned are more restrictive. The Wild and Scenic Rivers Act covers portions of the Kettle, Mississippi, Rum, Minnesota, North Fork of the Crow and Cannon rivers. The only designated critical area is the Mississippi River Corridor in the seven county metropolitan area. The Lower St. Croix Act covers the St. Croix River below Taylors Falls, Minnesota.

The following state regulatory programs do not at present have much effect on forestry practices as they relate to water quality:

The Environmental Policy Act requires Environmental Assessment Worksheets (EAW's) and Environmental Impact Statements (EIS's) to be prepared whenever there is potential for significant environmental effects resulting from any major governmental action. The Environmental Quality Board establishes categories of actions for which EAW's and EIS's are mandatory. Under the existing rules, no forest management activities require an EIS. Activities requiring the much less extensive EAW are not common silvicultural activities. Since most forest activities on private lands do not require a government permit or other government action, it is seldom possible to influence these activities through the EAW process. These rules are being revised; the Division of Forestry's input would be useful.

The PCA regulates land application of sewage sludge. This may become relevant if sludge is used to fertilize forest lands in the future.

Under Minnesota Statutes, the county boards control construction and maintenance of public drainage systems. Although forest management in Minnesota at present rarely includes drainage, this law could affect forestry in the future.

Incentive Programs

Programs which provide cost-sharing and technical assistance can be a valuable element in water quality management. State programs of this type which do or could provide funds or assistance for forest achievers include the Accelerated Private Forest Management Program (DNR and SWCB), the statewide Minnesota Cost-Sharing Program (SWCB) and the Streambank, Lakeshore and Roadside Program

(SWCB). The State Water Bank Program applies only to drainage that would provide high quality cropland where that is the projected use, and as such is not applicable to forest lands. Incentive programs are discussed in the "Analysis of Forestry Cost Sharing Programs in Minnesota and Their Effects on Water Quality" (Mitten, 1982).

Planning and Information Programs

The Soil and Water Conservation Board (SWCB) oversees the activities of the soil and water conservation districts. One of its duties is to develop programs to reduce or prevent erosion and sedimentation. The board has prepared a Soil and Water Conservation Program Plan under the federal Soil and Water Resources Conservation Act, and is in the process of completing a state mandated "program plan for the accomplishment of its duties." The Division may want to express its concern for erosion on forest lands to those preparing the plan.

The Water Resources Board establishes local watershed districts, approves their overall plans, and reviews their projects. Since one purpose of the districts is to prevent or reduce erosion and siltation, communication with the board may advance awareness of water-quality considerations in forest land management.

The Water Planning Board is charged with coordinating public water resource management and regulation activities among the state agencies. In addition, it has prepared a number of reports on the status of water management in the state useful to those working on water quality issues.

This analysis of state statutes was simplified by use of the "State Program Inventory and Problem Identification" (Technical Paper No. 5) prepared by the Water Planning Board in 1978. This report categorized all major state water management programs. John C. Ditmore of the Water Planning Board provided information on programs instituted since that report was written.

B. DESCRIPTION OF STATE STATUTES

1. State Water Pollution Control Act (MN Stat. 115.01 et. seq.) and classification of Waters; Standards of Quality and Purity (MN Stat. 115.44).

The State Water Pollution Control Act charges the Pollution Control Agency (PCA) with the administration and enforcement of all laws relating to the pollution of any of the waters of the state (MN Stat. 115.03, subd. 1(a)). Key responsibilities of the agency are to:

- classify the waters of the state (115.03 (b))
- "establish and alter such reasonable pollution standards for any waters of the state...as it shall seem necessary..." (115.03 (c))
- "adopt, issue,...modify, deny, or revoke...permits, variances, standards, regulations, schedules of compliance and stipulation agreements...to prevent, control or abate water pollution..." (115.03(e))
- "...adopt plans and programs and continuing planning processes, including, but not limited to, basic plans and areawide waste treatment management plans, and...provide for...implementation..." (115.03 (i))

All statutes and regulations for which PCA is responsible "may be enforced by any combination of the following: criminal prosecution; action to recover civil penalties; injunction; action to compel performance; or other appropriate actions..." (MN Stat. 115.071 subd. 1).

MN Stat. 115.44, which is separate from the Pollution Control Act, provides further direction to the PCA on how to "group the designated waters of the state into classes, and adopt classifications and standards of purity therefore...in accordance with considerations of best usage in the interest of public..." Seven classifications were established in the rules pursuant to this statute (6MCAR 4.8015): domestic consumption, fisheries and recreation, industrial consumption, agriculture and wildlife, navigation and waste disposal, other uses, and limited resource value waters. The first four classifications are further broken down into classes A, B, C, etc. In addition, the rules contain a general non-degradation policy (6MCAR 4.8015 A 7): "Waters which are of quality

better than the established standards shall be maintained at high quality unless a determination is made by the agency that a change is justifiable..." "(A)n extremely high proportion of highly classified waters are in forested areas. Therefore, whenever pollution does occur from forested lands, it is likely to harm a high quality environment" ("Water Quality Management, Minnesota's 208 Plan," PCA, Feb. 1980, p. 62).

The Pollution Control Act and the classification of waters taken together give the PCA very strong authority to regulate non-point activities to protect water quality. The agency can take enforcement action against a non-point activity if the water quality standards for a specific stream are being violated or if the activity is violating the general non-degradation clause.

To date, PCA has not taken action against any forest operations which threatened water quality (Paul Davis, Planning Development Directors Office, Division of Water Quality, PCA, pers. comm.). The agency's 208 plan ("Water Quality Management, Minnesota's 208 Plan," PCA, Feb. 1980) showed that forestry is not a major source of non-point pollution statewide, but could be a problem in localized areas. The plan found that the USDA Forest Service, the DNR and the counties had sufficient authority to control forest activities on public land, and suggested that the DNR encourage use of best management practices on private land by providing technical and financial assistance to small landowners. The agency assumes that large private timber operators will be fairly responsible out of economic self-interest (Charles Hayes, Planning Senior, Technical Review Section, Division of Water Quality, PCA, pers. comm.).

While the agency prefers to leave accomplishment of water quality control on forested lands to the DNR, it can take action if necessary. PCA investigates all complaints about water quality violations. If a significant problem were encountered they would probably first notify the landowner of the complaint and of the potential for violation of water quality standards, and they try to get the DNR to work with him/her to eliminate the problem. If this proved ineffective, they could take the landowner to court (Davis, pers. comm.). They could also issue a permit for the activity, including BMP's tailored to the specific situation. These BMP's could be different from and more strict than the generic BMP's developed for forestry by the agency.

2. Minnesota Shoreland Management Act (MN Stat. 105.485)

The Minnesota Shoreland Management Act was enacted in 1969. It originally covered shorelands only in unincorporated areas, but was amended to include shorelands within municipalities in 1973. The purpose of the act is to "preserve and enhance the quality of surface waters, preserve the economic and natural environmental values of shorelands, and provide for the wise utilization of water and related land resources of the state" (MN Stat. 105.485, Subd. 1).

The Department of Natural Resources is charged with promulgating standards and criteria for the subdivision use and development of shorelands in the state. Counties and municipalities are required to enforce these minimum standards by adopting shoreland ordinances. The standards include minimum lot sizes and setbacks, placement and construction of on-site sewage treatment facilities, designation of types of land, restriction of land uses to preserve natural shorelands, and so on. All of the counties have adopted these ordinances. Of approximately 650 municipalities containing shorelands, 50 have adopted ordinances and another 50 are in the process of doing so.

Shorelands are defined as "Land located within the following distances...from public waters: 1) land within 1,000 feet from the normal high water mark of a lake, pond or flowage; and 2) land within 300 feet of a river or stream or the landward side of floodplain delineated by ordinance..., whichever is greater." (MN Stat. 105.485, Subd. 2). For the purposes of the act, the regulations limit public waters to streams having a drainage area of two square miles or more, and lakes having an area of 25 acres or more in unincorporated areas, and 10 acres or more in municipalities.

Public waters are classified as natural environment waters, recreational development waters, and general development waters, with the first having the most restrictive subdivision and use standards and the last having the least restrictive standards.

The zoning provisions contained in the regulations (MN Reg. Cons. 70-84 and NR 82-84) impinge on forest activities by controlling a) cutting of vegetation, b) grading and filling, and c) placement of roads. As adopted and enforced by the counties and municipalities, these zoning provisions actually have only a small effect on forest practices.

Natural Vegetation

The regulations for unincorporated areas require that vegetation be preserved insofar as practical and reasonable (MN Reg. Cons. 73(c)(1)). Most county ordinances merely adopted this vague wording and contain no permit provisions or other mechanism to control cutting. According to Steven Prestin (Supervisor, Shoreland management, Division of Waters, DNR) the act has had little effect on forest practices in unincorporated areas. The regulations for municipalities (MN Reg. NR 83(c)(3)(aa)) prohibit clearcutting, but allow selective cutting. Municipalities are not required to have a permit process for cutting in shoreland areas, and most do not (Prestin, pers. comm.).

Grading and Filling

The regulations for unincorporated areas require that grading and filling be controlled to prevent erosion and siltation and impairment of fish and aquatic life (MN Reg. Cons. 73(c)(2)). Most counties simply adopted this wording without establishing permit procedures or any other method of enforcement. The regulations for municipalities require a permit system which controls grading and filling in accordance with the following criteria (MN Reg. NR 83(c)(3)(bb)): (i) the smallest amount of bare ground shall be exposed for as short a time as feasible; (ii) temporary ground cover, such as mulch, shall be used and permanent vegetative cover, such as sod, shall be provided; (iii) methods to prevent erosion and trap sediment shall be employed; (iv) fill shall be stabilized to accepted engineering standards. Since forest activities are rare in the municipalities which have adopted shoreland ordinances, the application of grading and filling permits to forest practices has not really been tested. Prestin believes forest road construction probably would fall under the interpretation of grading and filling. The state is really not sure at this point how effectively grading and filling is being controlled in the municipalities to reduce erosion and sedimentation.

Road Construction

Under the current regulations, only municipalities are required to control placement of roads. As currently interpreted by the DNR, the requirements apply only to impervious (i.e., paved) roads.

In summary, the Shoreland Management Act has considerable potential for serving 208 objectives. The regulations address those forest activities most likely to cause water quality problems: road construction, grading and filling, and the cutting itself (restricting cutting will eliminate erosion caused by associated activities). However, certain weaknesses in the regulations prevent effective control of these activities:

1. Placement of roads is not covered in the regulations for unincorporated areas.
2. DNR currently interprets "roads" in the municipal regulations to mean paved roads.
3. The setbacks for roads are at the first structure with at least a minimum of 50 feet, and so they might not be adequate to protect water quality even if forest roads were covered. Larger setbacks or a more special BMP approach might be more effective.
4. No permit procedure or other enforcement mechanism is required for grading and filling in shorelands of unincorporated areas. Grading and filling permit systems in municipalities may not necessarily provide much real control of these activities.
5. Buffer zones where cutting is prohibited are not established. These could serve as a method of controlling forest road construction, rock raking, etc. near water bodies.

The Division of Waters is currently conducting a two-year study of the Shoreland Management Program to determine its effectiveness. The staff hopes to propose revisions in the regulations about a year from now to consolidate regulations for unincorporated areas and municipalities, incorporate the results of the public waters inventory, and strengthen weak sections. DNR Division of Forestry could seek to have a voice in the revision to further 208 objectives.

Assuming the regulations could be revised to the Division's satisfaction, two factors would still limit their effectiveness in meeting 208 objectives. First the diligence of enforcement will always depend on the available staff and political climate within the counties and municipalities charged with enforcing the regulations. Second although the regulations apply to a large geographical area, they do not cover the entire state. Some streams and lakes fall below the

cutoff size, and these are typically in high quality headwater areas. According to Prestin, lowering the cutoff size has been discussed, but is generally not favored by the department because of the increased administrative burden it would cause and the feeling that the act was intended to protect larger recreational water bodies, rather than small ones. Upland areas beyond the boundaries of the shoreland zone are likewise excluded from regulation by this act. Neither the law nor the regulations require state lands to be administered in accordance with this act.

In spite of these limitations, the Shoreland Management Program appears to be a promising avenue for regulatory control of forest practices that can adversely affect water quality.

3. Permits; Work in Public Waters (MN Stat. 105.42)

The permit program for work in public waters was first established in 1937. The law requires all individuals, corporations and governmental units to obtain a written permit from the commissioner of the DNR in order "to construct, reconstruct, remove, abandon, transfer ownership or make any change in any reservoir, dam or waterway obstruction on any public waters; or in any manner, to change or diminish the course, current or cross-section of any public waters...by any means, including but not limited to filling, excavating, or placing of any materials in or on the beds of public waters..." (MN Stat. 105.42, Subd. 1). "After November 15, 1975 a permit shall be granted...only when the project conforms to state, regional and local water and related land resources management plans, and only when it will involve a minimum of encroachment, change, or damage to the environment, particularly the ecology of the waterway" (MN Stat. 105.42, Subd. 1a).

The primary forest activity requiring permits under this section is the construction of stream crossings. The Department rule (6MCAR 1.5025A) is to allow crossings only when less detrimental alternatives are unavailable or unreasonable. Crossings are not permitted if they obstruct navigation, will contribute to significant increases in flood damage, will involve extensive channelization, or will be detrimental to water quality and/or significant fish and wildlife habitat or protected vegetation.

Low-water ford type crossings do not require a permit provided all of the following conditions are met (6MCAR 1.5025B.1.a.):

1. The streambed is capable of supporting the crossing without the use of pilings, culverts, dredging, or other special site preparation.
2. The water depth does not exceed 2 feet under normal summer flow conditions.
3. The crossing conforms to the natural cross-section of the stream channel and does not reduce or restrict normal low-water flows.
4. The original streambank at the site does not exceed four (4) feet in height.
5. The crossing is constructed of gravel, natural rock, concrete, steel matting, or other durable inorganic material not exceeding one (1) foot in thickness.
6. The approach is graded to a finished slope not steeper than 5:1, and all graded banks are seeded or mulched to prevent erosion and sedimentation.
7. The crossing is not placed on an officially designated trout stream or on a federal wild, scenic, or recreational river.

Temporary bridges do not require a permit if (6MCAR 1.5025B.1.b.):

1. The streambank is capable of supporting the bridge without the use of foundations, pilings, culverts, excavation, or other special site preparation.
2. Nothing is placed in the bed of the stream.
3. The bridge is designed and constructed so that it can be removed for maintenance and flood damage prevention.
4. The bridge is firmly anchored at one end and so constructed as to swing away in order to allow floodwaters to pass.
5. The lowest portion of the bridge shall be at least three (3) feet above normal summer streamflow.

According to David Milles (Supervisor of Protected Waters Administration, Division of Waters, DNR), this category typically covers two types of bridges: 1) forest bridges constructed by spanning a stream with logs and freezing the logs into the banks in the late fall. These bridges are typically removed or washed out in the spring, and 2) snowmobile bridges.

All other bridges, including all bridges of the culvert and fill type whether temporary or permanent, require a permit. The criteria for issuing a permit deal almost exclusively with flood hazards, but applications are also reviewed by the regional hydrologist to insure that the project will not adversely affect aquatic organisms and wildlife.

According to Milles, the regional hydrologists work closely with the district foresters, so that individuals conducting forest activities on state forest lands are well aware of permit requirements. Private individuals become aware of the requirements through the Division of Forestry's Private Forest Management (PFM) foresters, or when a complaint is filed about their activities.

The permit program could be a valuable component of a package of programs to meet 208 objectives. The rules explicitly require that proposed developments be consistent with applicable federal, state and local environmental quality programs, including water quality management (6MCAR 1.5020A), providing a justification for strengthening the water quality provisions of the program.

Several changes may be necessary to effectively use the permit program to meet 208 objectives:

1. The conditions under which low water fords may be constructed without a permit (6MCAR 1.5025B.1.a.) should be reviewed to determine whether they adequately protect water quality.
2. The criteria for issuance of a permit (6MCAR 1.5025B.2.) may need to be expanded. The existing criteria relate almost exclusively to prevention of flood damages. Water quality considerations are relegated to a general statement in the policy section (6MCAR 1.5025.A.4). Adding specific, detailed criteria for evaluating water quality impacts could help to insure that these impacts receive adequate consideration.
3. An educational/publicity effort is needed to make private forest managers aware of a) the conditions they must meet to construct a low water ford without a permit, b) the types of bridges for which permits are required, c) the reasons for following good stream-crossing practices, and d) the penalties for non-compliance.

4. Since DNR Fish and Wildlife personnel are responsible for the water quality review of permit applications, Division of Forestry staff may want to go over with them the construction techniques necessary to minimize erosion and sedimentation. Staff should also educate PFM foresters and encourage them to stress road construction techniques in working with private forest owners.
5. If educational efforts do not provide adequate control of low water fords, it may be necessary to further limit the types of fords that can be built without a permit.

The Division of Forestry should take the initiative to influence the changes indicated in items 1, 2 and 5 above.

The permit program does have one limitation that cannot be corrected: it is limited to work in public waters. Streams which drain less than two square miles are not public waters unless they are officially designated trout streams. While this restricts the geographic scope of the regulations, educational efforts aimed at larger streams might tend to cause changes in stream crossing construction techniques on smaller streams as well. The draft revised rules would expand the two square mile drainage to five square miles.

4. Public Waters Inventory and Classification (MN Stat. 105.391)

The state has regulated modifications of public waters since the late 1930's but prior to 1976 the designation of public waters was handled on a case by case basis (Water Planning). The Waters Inventory and Classification Program was established in 1976 to allow a complete and final classification of all waters of the state. The definition of public waters was amended in 1979 and now reads as follows (MN Stat. 105.37):

Subd. 14. "Public waters" includes and shall be limited to the following waters of the state:

(a) All water basins assigned a shoreland management classification by the commissioner pursuant to section 105.485, except wetlands less than 80 acres in size which are classified as natural environment lakes;

(b) All waters of the state which have been finally determined to be public waters or navigable waters by a court of competent jurisdiction;

(c) All meandered lakes, except for those which have been legally drained;

(d) All waterbasins previously designated by the commissioner for management for a specific purpose such as trout lakes and game lakes pursuant to applicable laws;

(e) All waterbasins designated as scientific and natural areas pursuant to section 84.033;

(f) All waterbasins located within and totally surrounded by publicly owned lands;

(g) All waterbasins where the state of Minnesota or the federal government holds title to any of the beds or shores, unless the owner declares that the water is not necessary for the purposes of the public ownership;

(h) All waterbasins where there is a publicly owned and controlled access which is intended to provide for public access to the water basin; and

(i) All natural and altered natural watercourses with a total drainage area greater than two square miles, except that trout streams officially designated by the commissioner shall be public waters regardless of the size of their drainage area.

The public character of water shall not be determined exclusively by the proprietorship of the underlying, overlying, or surrounding land or by whether it is a body or stream of water which was navigable in fact or susceptible of being used as a highway for commerce at the time this state was admitted to the union.

For the purposes of statutes other than sections 105.37, 105.38 and 105.391, the term "public waters" shall include "wetlands" unless the statute expressly states otherwise.

Subd. 15. "Wetlands" includes, and shall be limited to all types 3, 4 and 5 wetlands, as defined in U.S. Fish and Wildlife Service Circular No. 39 (1971 edition), not included within the definition of public waters, which are ten or more acres in size in unincorporated areas of 2½ or more acres in incorporated areas.

As of October 1982, 62 counties had been inventoried using this definition. Inventories were underway in 25 more (Milles, pers. comm.).

The public waters inventory affects forestry indirectly, and is important because several other regulatory programs, including Shoreland Management and Permits for Work in Public Waters, apply only to public waters.

5. Minnesota Wild and Scenic Rivers Act (MN Stat. 104.31 et. seq.)

The Minnesota Wild and Scenic Rivers Act was passed in 1973 to "preserve and protect" certain Minnesota rivers and their adjacent lands which "possess outstanding scenic, recreational, natural, historical, scientific and similar values." The commissioner of natural resources is authorized to promulgate minimum standards and criteria for the preservation and protection of wild,

scenic and recreational rivers, and each local government which contains any portion of a wild, scenic or recreational river area must adopt land use ordinances complying with these standards and criteria. Land owned by the state must also be administered in accordance with the management plan for the river. In addition, the commissioner can acquire lands or interests in lands from willing sellers.

River segments are designated as wild, scenic or recreational in order of increasingly permissive land uses. The area along the river included within the system cannot exceed 320 acres per river mile.

Rivers designated to date are (approximate descriptions):

- the Kettle River from the Carlton County-Pine County line to the boundary of the St. Croix National Scenic Riverway (1975)
- the Mississippi River from St. Cloud to the city limits of Ramsey and Anoka and the city limits of Dayton and Champlin (1976)
- the North Fork of the Crow River from Lake Koronis to the Meeker County-Wright County line (1976)
- the Rum River from Lake Ogechie to the Mississippi River confluence (1977)
- the Minnesota River from Lac Qui Parle dam to Co. State Aid Hwy. 11 bridge near Franklin (1977)
- the Cannon River from Faribault to its confluence with the Mississippi River (1979)

The act has a limited effect on forest practices partly due to the small geographic area covered. Forestry, including logging and construction of roads, skidways, landings and fences, is a permitted use in wild, scenic and recreational land use districts, subject to the Vegetative Cutting and Grading and Filling provisions. The vegetative cutting provisions (MN Reg. NR 79(g)) prohibit clearcutting but allow selective cutting on lands within 200 feet of the normal high water mark (NHWM) of wild rivers, 150 feet of the NHWM of scenic rivers, and 100 feet of the NHWM for recreational rivers, 100 feet of the NHWM of designated tributaries (only as far upstream as the boundaries of the river corridor), and 40, 30 or 20 feet of the bluff line on wild, scenic and

recreational rivers respectively. In addition, standards and criteria are specified for clearcutting elsewhere in the wild, scenic or recreational land use districts.

Grading and filling are subject to substantially the same standards as those in the Municipal Shoreland Management regulations, though no additional permit system is required. There are well-defined grading and filling provisions which must be followed.

Few recreational uses of possible interest to state forestry staff are regulated. Government campgrounds and road-type public accesses are prohibited in wild river land use districts. Temporary docks are conditional uses in wild river and in scenic river land use districts.

Out of 16 counties containing portions of the system, 15 have adopted state approved Wild and Scenic River ordinances. Eighteen municipal ordinances out of the 27 required have been adopted and approved. The ordinances are enforced by local zoning and planning officials. Local support for the program ranges from good to negligible, and at this point the Division of Waters is monitoring rivers and conducting audits of adopted ordinances to gain a comprehensive sense of how well the ordinances are being enforced (William Zachmann, Hydrologist, Wild and Scenic Rivers Program, Division of Waters, DNR).

The rivers involved cover only a minute fraction of the state's land area. While the regulations as they are presently written and enforced do address some problems of erosion and sedimentation from forest roads and site preparation they could be more consistently enforced. Educating landowners along these waterways would improve compliance and help achieve 208 water quality goals.

6. Lower St. Croix Wild and Scenic Rivers Act - State Recognition and Implementation (MN Stat. 104.25)

Minnesota Statutes Sec. 104.25 recognizes and concurs in the inclusion of the Lower St. Croix River in the federal wild and scenic rivers system. The section

authorizes the commissioner of natural resources to promulgate standards for local zoning ordinances along the river and to acquire lands and interests in lands. State lands must also be administered in accordance with the act.

The vegetative cutting standards for the Lower St. Croix are somewhat stricter than for state wild and scenic rivers. A permit is required for cutting on lands within 200 feet of the ordinary high water mark (OHWM) in rural districts, 100 feet of the OHWM in urban districts, and 40 feet landward of blufflines and on slopes greater than 12% in all districts (NR 2201(b)(2)(aa)(i)). The cutting must be limited to diseased trees, or small trees which do not screen any structures from view of the river, and must preserve the essential character, quality and density of existing growth. In other parts of the St. Croix Riverway no permit is required, but the cutting must preserve the essential character, quality and density of existing growths and must maintain a continuous canopy as viewed from the river (NR 2201(b)(2)(aa)(ii)).

The vegetative cutting standards essentially prohibit commercial forestry in the immediate vicinity of the river or blufflines and on steep slopes. In other parts of the riverway timber harvesting can be practiced.

Grading, filling, excavating or otherwise changing the topography requires a permit. The permit criteria are the same as for the municipal shoreland management regulations, with the additional criteria that 1) slopes greater than 12% are not altered when erosion and visual scars may result, and 2) earthmoving, erosion, vegetative cutting, draining or filling of wetlands, and the destruction of natural amenities is minimized. Construction of forest roads seldom requires much grading or filling.

The act can be of some use in achieving 208 objectives in a limited geographical area, especially since the rules recognize the problems created by work on steep slopes.

7. Critical Areas Act of 1973 (MN Stat. 116G.01 et. seq.)

The Critical Areas Act is a program created by the legislature to coordinate planning and management of areas of greater than local significance and areas affected by major governmental actions when other avenues to ensure adequate and

coordinated planning and regulation are unavailable, inapplicable, or not being used effectively (MN Reg. MEQC52(a) and (b)). "The critical areas planning process is intended to be applied to a limited number of areas in the state. Critical area designation based on criteria that may characterize large or common areas of the state or region shall be avoided" (MN Reg. MEQC51(b)(4)).

Recommendations to designate a critical area may come from the Environmental Quality Board (EQB), a Regional Development Commission or local units of government. Critical areas are designated only by the governor.

The Lower St. Croix was the river to be designated as a critical area. However, it is now managed under the federal Wild and Scenic Rivers program and the state and local land use regulations. The Mississippi River Corridor within the seven county metropolitan area was designated as a critical area in 1976 and redesignated in 1978.

The EQB conducted an extensive inventory of potential critical areas in 1979. Of these, only the Mille Lacs Lake watershed came close to being designated and it was not designated due to local opposition. The only area currently under study as a potential critical area is a portion of the Minnesota River Corridor (Rand Klugel, Critical Areas Coordinator, Environmental Quality Board, pers. comm.).

The rules for the Mississippi River Corridor affect forestry only slightly. The designated area includes primarily the floodplains, bluffs and land immediately adjoining the bluffs within the seven county area, not an important forest resource area. The vegetative cutting and grading and filling provisions within the area are similar to those in the state Wild and Scenic River regulations.

The Critical Areas program is not likely to have a significant effect on forestry in the near future, since local governments generally oppose the establishment of critical areas. If critical area status is extended to large lake watersheds or groundwater recharge areas, as has been contemplated, the effect on forest activities may be greater.

8. Minnesota Environmental Policy Act of 1973 (MN Stat. 116D.01 et. seq.)

The purposes of the state Environmental Policy Act are "a) to declare a state policy that will encourage productive and enjoyable harmony between man and his environment; b) to promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; and c) to enrich the understanding of the ecological systems and natural resources important to the state and to the nation." (MN Stat. 116D.01). Policies, regulations and public laws of the state are to be interpreted and administered in accordance with the act to the extent practicable (116D.01, Subd. 1). In addition, the act sets up a procedure requiring that an environmental impact statement (EIS) be prepared whenever there is potential for significant environmental effects resulting from any major governmental action (116D.04, Subd. 2a). Governmental action is defined (116D.04, Subd. 1a(d)) as "activities, including projects wholly or partially conducted, permitted, assisted, financed, regulated or approved by units of government including the federal government."

The purpose of the EIS is "to provide information for agencies and private persons to evaluate proposed actions which have the potential for significant environmental effects, to consider alternatives...and to institute methods for reducing adverse environmental effects." The EIS is intended to serve as "a guide in issuing, amending and denying permits and carrying out the other responsibilities of public agencies to avoid or minimize adverse environmental effects..." (6MCAR 3.0218).

The Environmental Assessment Worksheet (EAW) is a brief document used to determine whether an EIS is required for a proposed action.

Rules promulgated by the Environmental Quality Board establish categories of actions for which EAW's and/or EIS's are required. Although there are other conditions under which an EAW or EIS may be required or voluntarily undertaken, in practice they are very seldom prepared for any but the mandatory categories (Lloyd Wagner, Environmental Studies Forester, Division of Forestry, DNR, pers. comm.).

The current rules do not require an EIS for any forest management activity. EAW's are required for the following activities directly or indirectly related to forestry, when a government permit, broadly defined, is involved (6MCAR 3.026):

- Conversion of 40 or more contiguous acres of forest cover to a different land use.
- Permanent removal of 640 or more contiguous acres of forest cover.
- Harvesting of timber within the BWCA Portal Zone or in a State Park or Historical Area, that is not included in an annual timber management plan filed with the EQB.
- Application of restricted use pesticides over more than 1,500 contiguous acres.
- An action that will eliminate or significantly alter a Type 3, 4 or 5 wetland or wetlands totalling 5 or more acres in the seven county metropolitan area, or 50 or more acres outside that area.
- Construction of new pulp and paper processing mills.

The proposed rules, which have been under development since 1980, do not differ greatly from the existing rules in their regulation of forest activities.

The Environmental Policy Act has had little effect on forest activities for several reasons: 1) The types of activities requiring assessment are limited. 2) Even these activities are affected only if some kind of government permit, lease, or other entitlement of use is required to conduct the activity. Thus, for example, conversion of forest land or permanent removal of forest cover requires an EAW only if it is conducted by a unit of government, or if the local government has land use ordinances controlling forest activities. 3) Even if the assessment does indicate adverse environmental effects, this does not require that the action be disapproved.

9. Land Application of Sewage Sludge (MN Stat. 116.07, Subd. 4)

Minnesota Statute 116.07, Subd. 4 directs the PCA to establish rules and standards for sewage sludge disposal. The agency currently regulates land application sites by means of temporary rules (6MCAR 4.8050, State Register, May

4, 1981). Permanent rules were proposed in the State Register on December 28, 1981 (6MCAR 4.6101 - 4.6108, 4.6111, 4.6112, 4.6121, 4.6122, 4.6131 - 4.6136). No public hearings were requested and the rules were adopted.

Although sludge is not currently disposed of on forest lands in Minnesota, there is some interest in the practice.

Requirements for land spreading sites address the following factors (proposed rules 6MCAR 4.6111):

1. Sewage sludge sampling and analysis.
2. Pathogen control. Grazing animals must be kept off the site for one month after application, and public access must be controlled by fencing or signs for a period of 12 months.
3. Soil pH and cadmium application. The pH of the soil-sludge mixture must be 6.5 or greater during the growing season following sludge application. Annual cadmium application must be limited, the limitation varying with crop type.
4. Cumulative heavy metal additions.
5. Sewage sludge application rates.
6. Organic priority pollutant limitations. Concentrations of PCB's and other toxic organics must be limited.
7. Suitable soil conditions, including water holding capacity in the zone above bedrock or the seasonal high water table, texture, permeability, cavernous or fractured bedrock, ponding and slope.
8. Separation distances from habitations, private and public water supplies, down gradient surface water and intermittent streams.
9. Prohibited sites.

10. Public Drainage (MN Stat. Ch. 106)

Chapter 106 of the Minnesota Statutes authorizes the county boards to "make all necessary orders for and cause to be constructed and maintained public drainage systems..." (106.021, Subd. 1). The boards must consider the private and public benefits and costs, present and anticipated agricultural land acreage

availability and use, flooding characteristics of project lands, alternative measures, water quality, fish and wildlife and environmental effects, shallow groundwater availability and use, and present and anticipated land use in the project area (106.021, Subd. 6).

"The fundamental purpose...of the drainage code...is to facilitate the creation and improvement of agricultural land through removal of excess waters. The drainage code reflects several basic assumptions and values: that agricultural land use is a higher use than wetland uses, that landowners have a 'property right' to improve their land for economic gain, and that economic benefits to landowners also serve a beneficial public purpose which will outweigh non-economic public purposes." (Water Planning Board Technical Paper No. 5, P. III-20).

In order for a public drainage system to be established, a majority of the resident owners of the land described in the petition or the owners of at least 60 percent of the area of such land must file a petition with the county auditor (MN Stat. 106.031, Subd 1). If the county board approves the petition, outlets may be secured across lands of non-petitioners by eminent domain, and they may be forced to pay assessment for the drainage "benefit" to their land.

Currently, this chapter has little effect on forestry, except that forest landholders may be forced to pay assessments if a drainage system crosses their land. In some parts of the country, land is drained to allow tree planting. This practice is rare in Minnesota, but if it becomes more common, the drainage code would probably allow the counties to establish drainage systems on forest lands, if in their view the benefits outweighed the costs.

C. DESCRIPTION OF STATE BOARDS AND PROGRAMS

1. Water Resources Board (MN Stat. 105.71 et. seq.)

The Water Resources Board has several functions which relate broadly to water quality:

- It establishes watershed districts and defines their boundaries (MN Stat. 112.36).

- It must review and approve local watershed district "Overall Plans" (MN Stat. 112.46) and make findings and recommendations on all proposed district projects (MN Stat. 112.49, Subd. 6). Since one purpose of watershed districts is to impose "preventive or remedial measures for the control or alleviation of land and soil erosion and siltation..." (MN Stat. 112.36, Subd. 2(10)), interagency communication with the board may help to advance the cause of water-quality-conscious forest management. (Watershed districts themselves are discussed further in the section on local units of government.)
- It serves as a forum where "conflicting aspects of public interest...can be presented and by consideration of the whole body of water law the controlling policy can be determined and apparent inconsistencies resolved." (MN Stat. 105.72). Recommendations of the board are non-binding.

2. Water Planning Board (MN Stat. 105.401)

The Water Planning Board was established by the legislature in 1977, replacing the Water Resources Council. Members of the board include the administrative heads of DNR, Health, PCA, Agriculture and the Soil and Water Conservation Board, three citizen members, and a chairperson appointed by the governor. The board's responsibilities include both planning and evaluation of existing programs. The staff of the board has prepared a number of reports of practical use to 208 water quality managers, including:

- Toward Efficient Allocation and Management: A Strategy to Preserve and Protect Water and Related Land Resources (the state water and related land resources plan, 1979)
- A number of supporting documents for the preceding study including: Technical Paper No. 5: State Program Inventory and Problem Identification (1978), and Technical Paper 11: Minnesota Water Quality: Management and Issues (1979)
- Toward Efficient Allocation and Management: Special Study on Local Water Management (1981)

Another significant responsibility of the board is to "coordinate public water resource management and regulation activities among the state agencies..." (MN Stat. 105.401, Subd. 2(8)) and "review water resources programs..." (Subd. 2(10)).

3. Other Programs

The following state programs related to water management are not relevant to silviculturally generated non-point pollution, based on the description given in the State Program Inventory conducted by the Water Planning Board:

- Great River Environmental Action Team
- Upper Mississippi Main Stem Study
- Minneapolis-St. Paul Water and Related Land Resources Study
- Copper-Nickel Study
- Power Plant Siting Inventory Study
- Health Risk Assessment*
- Surface and Groundwater Monitoring Program
- State Disposal System Permit Program
- Spills Unit
- Solid Waste Disposal Facility Permit Program
- Hazardous Waste Disposal Permit Program
- Feedlot Pollution Control Program
- PCB Program
- Waste Treatment Construction Grants Program
- Review of Municipal and Industrial Waste Treatment Facilities
- Municipal Sludge Disposal Program
- Operator Training Program
- Water Bank Program
- DNR Fish and Wildlife Water Quality Monitoring Program
- DOT Water Quality Monitoring Program
- Lake Restoration Program
- Pesticides Control Program*

*Programs relating to aspects of forest management other than or in addition to water quality.

- Minnesota Safe Drinking Water Act
- Water Well Construction Code Program
- Water Appropriation Permit Program**
- State Climatology Program
- Groundwater Evaluation
- Stream Hydrology
- Lake Hydrology
- State Floodplain Management Program
- Flood Control Coordination
- State Flood Control Development
- Dam Safety Program
- Fish Management Program**
- Scientific and Natural Areas Program**
- Wildlife Management Program**
- Ecological Services Program
- Canoe and Boating Route Program**
- Public Access Program**
- Comprehensive Recreation Planning**

**May be relevant to aspects of forest management other than water quality.

IV. LOCAL CONTROLS

A. OVERVIEW

Within Minnesota are a myriad of general and special purpose units of local government, including counties, watershed districts, soil and water conservation districts and many others. Of them, only the counties and certain special bodies created by joint powers agreements among counties have the legal authority to exercise direct control over forest practices. Although the counties bear the primary responsibility of land use control, few have attempted regulation of forest activities, except as they have been required to do so by such state acts as shoreland zoning (see section III). Use of local government to control forest practices offers the advantage of targeting efforts on those areas of the state which have critical erosion problems. However, if the counties are to play a significant role in 208 forest management, it will be necessary to educate them to the need for using Best Management Practices for forestry, and perhaps to provide financial or technical assistance to increase the capability of their zoning offices to assess timber harvest plans.

Analysis of local government activities for this report was simplified by use of the "Special Study on Local Water Management" prepared by the Water Planning Board in 1981.

Local Government Units with Regulatory Authority

A handful of counties primarily in the erosion prone southeastern part of the state have adopted or contemplated conditional use permit systems for tree removal. The impetus for these provisions has come primarily from certain planning consultants who have recommended their inclusion in county zoning ordinances, rather than from the counties themselves (Barry Morse, State Silviculturist, Division of Forestry, DNR, pers. comm.).

Carlton County, south of Duluth on the eastern border of Minnesota, has a significant forest resource. This county was also encouraged by consultants to regulate tree removal, but county officials, the DNR and timber companies were all opposed to the idea, and it was not included.

Two groups of counties have developed joint powers agreements for management of rivers. The first of these, the Mississippi Headwaters Board, was established in 1980 to forestall federal plans to designate the Mississippi headwaters area as a National Wild and Scenic River. The board has been officially recognized by the legislature, and the eight counties involved have passed ordinances complying with the comprehensive plan. The Six County Minnesota River Management Plan (Project River Bend) was developed by a second group of counties in response to a state proposal to include part of the Minnesota River in the State Wild and Scenic River system. It has been approved by the legislature. Both plans are similar to the state Wild and Scenic River rules in their provisions on cutting of vegetation and grading and filling. Since there is no state supervision, local enforcement of the ordinances developed under the plan could be quite variable.

Legislation passed in 1973 allows the counties to create and delegate authority to lake improvement districts, but the types of powers which can be delegated are limited, and do not affect forestry. Two lake conservation districts created by special legislation in 1969 and 1971 have powers similar to those of the lake improvement districts, and have no authority over forest activities.

Watershed districts and their earlier relatives, drainage and conservancy districts, have a limited sort of quasi-regulatory authority. They may be formed for such purposes as control of erosion and siltation, regulation of improvements of the beds, banks and shores of waters, flood control, and so on. Watershed districts cover about one-fourth of the state. They have the power to adopt floodplain and green belt ordinances in the absence of county or municipal ordinances, but this authority is sufficiently limited to be of no utility for 208 purposes. The districts achieve their purposes primarily by actually undertaking works of improvement, which are paid for with state or federal funds or by their authority to assess benefitted property owners. Districts tend to be formed in response to a specific problem, and thus far none have organized around forest activities (Erling Werberg, Exec. Sec'y., Water Resources Board, pers. comm.). They could in principle carry through a needed practice such as installing a waterbar on a forest road and charge the landowner for the improvement (Cooper Ashley, Special Assistant Attorney General, pers. comm.), but this would be an awkward and politically difficult form of 208 management.

There are only three remaining drainage and conservancy districts, and their powers are even more limited than those of the watershed districts.

Local Government Units Limited to Planning or Incentive/Education Programs

Soil and Water Conservation Districts (SWCD's) cover the entire state. Each district develops a comprehensive plan which forms the basis for allocation of financial aid, materials and equipment to landowners for conservation projects. Unlike watershed districts, SWCD's can obtain funds by assessments only with the consent of the counties; most funds come from the county or state with technical assistance provided by the federal government. District funds can be spent for any soil and water conservation practice the district feels is a priority, including erosion control on forest land (Dennis Pond, Soil and Water Conservation Board, pers. comm.). A pilot forestry program cosponsored by the SWCB is covered in detail in a separate report by Mitten (1981). Historically, the orientation of the districts and the state board has been almost exclusively toward agricultural and urban land.

Regional Development Commissions (RDC's) and the Metropolitan Council are charged with areawide planning. RDC's do not have any regulatory authority. They vary greatly in the amount of influence they have within their regions and the types of issues they work on (Leland Newman, Assistant Commissioner, Office of Community Development, Energy, Planning and Development, pers. comm.). The Metropolitan Council has limited regulatory authority, and has specifically avoided getting involved in local zoning (Robert Davis, Comprehensive Planning, Metropolitan Council, pers. comm.).

The Southern Minnesota River Basin Board is a special planning organization created by the legislature in 1971. The board has identified erosion, including forest erosion, and poor condition of the forest resource as major concerns in the southeastern part of the state, and has pushed for educational and incentive programs to improve forest management. Thus, the board has had a positive effect on forestry and on water quality in this part of the state. The board has the power to adopt rules to coordinate natural resources management as long as these do not unnecessarily overlap with similar activities by established agencies, but sees this as a politically undesirable approach. It also sees the

adoption of rules as unfeasible due to low budget and staff limitations (Marilyn Lundberg, Executive Secretary, Southern Minnesota Rivers Basin Board, pers. comm.).

B. DESCRIPTION OF LOCAL GOVERNMENTAL UNITS

1. Counties

Counties have the primary responsibility for land use control in unincorporated parts of the state. Except for state mandated controls, such as shoreland ordinances, few have taken any initiative to control forestry activities.

A few counties have adopted or contemplated conditional use permit systems for tree removal. The impetus for these provisions has come primarily from certain planning consultants (e.g., Wehrman Associates, George Jibeau) who have recommended their inclusion in county zoning ordinances (Barry Morse, pers. comm.).

One of the earliest tree removal permit provisions passed was in Winona County, in southeastern Minnesota. The ordinance requires a person to obtain a tree removal permit in order to "cut, fell, harvest or otherwise remove timber for the purpose of profit" (Sec. 15). Although it states several purposes, including prevention of watershed destruction and assuring continued restocking (Sec. 32, Subd. 6), the ordinance does not list conditions which must be met before a permit can be issued. According to Tom Romaine, DNR Area Forester, the county lacks the expertise and is unwilling to acquire the expertise to administer the ordinance. Only one permit was issued in the past year, although at least 150 tree removal operations took place in the county. Romaine has encouraged the county to restrict the permit requirement to operations on steep slopes which are not planned by a professional forester, but has not been successful. The county attempted to enforce the ordinance for timber operations on state land until it was pointed out that the state is exempt from local land use controls (MN Stat. 394.24 Subd. 3).

The same consulting company that worked with Winona County encouraged Houston County to include a tree removal permit system in their ordinance. Local DNR foresters convinced them it would create unnecessary ill will, and that the problems were not sufficiently serious to warrant a permit system.

Fillmore County, also in southeastern Minnesota, developed its own ordinance to prohibit clearcutting on steep slopes and require a conditional use permit for selective cutting on steep slopes. According to Romaine, their intent was only to limit conversion of areas with steep slopes from forestry uses to crop and pasture uses, not to regulate forest practices. Romaine said that the county zoning official and county attorney want to revise the language so that it will refer to land use conversion only.

Consultants encouraged Carlton County (south of Duluth on the eastern edge of the state) to add a section on tree removal when they were revising their zoning ordinance between 1974 and 1978. The county, the DNR and the timber companies in the area were all opposed to it. The planning commission felt that DNR and company foresters were more knowledgeable than the zoning administrator would be, and opted to leave the provision out of the ordinance (Bruce Benson, Zoning Officer, pers. comm.).

Although a complete survey has not been undertaken, preliminary inquiries indicate that these are the only counties which have passed or contemplated countywide tree removal provisions in their ordinances. The Winona County ordinance is virtually inoperative, and the Fillmore County ordinance was not intended to apply to ordinary timber harvesting operations. It is reasonable to state that with the exception of state mandated controls such as shoreland or wild and scenic river ordinances, the counties do not currently exert any significant control over the way in which forest activities are carried out.

The existing and attempted ordinances demonstrate the legal ability of the counties to control forestry activities, but these ordinances have arisen out of consultant recommendations rather than local conviction that a problem exists. The one county which wants to retain its ordinance is not committed to enforcing it. If the counties are to contribute significantly to control of forest erosion, either local awareness and support for doing so must be increased, or the state must require that counties adopt such an ordinance. Problems with inadequately trained zoning personnel and minimal enforcement could render a state mandated program ineffective.

Mississippi Headwaters Board

The Mississippi Headwaters Board was established in 1980 by a joint powers agreement among the eight effected counties, in order to forestall federal plans to designate the Mississippi River headwaters area as a National Wild and Scenic River (A Management Plan for the Upper Mississippi River, Goff/Priesnitz and Assoc., 1981, pg. 4). In 1981, the state legislature made the board permanent, authorized it to prepare, adopt and implement a comprehensive land use plan for the area, and required the eight counties to adopt ordinances consistent with the plan (MN Stat. 114B.01 et. seq.). This action was sought by the board in order to convince the National Park Service of the adequacy of local management.

The plan, which had already been written when the legislation was enacted, called for zoning, increased recreational opportunities, and cooperative agreements between federal, state and local units of government for management of public lands within a narrow zone along the river. All of the counties have adopted the required ordinances.

The vegetative cutting provisions (Sec. 9) are similar to those in the Minnesota Wild and Scenic Rivers Rules and Regulations (NR 79(g)). The language tends to be more permissive: for example, "clearcutting...shall not be permitted (within the building setback distance) unless approved as part of a specific management plan and subject to the requirements of Section 9(2)(c)..." as opposed to "clearcutting...shall not be permitted," or "selective cutting...shall...maintain as much forest cover as reasonably possible" as opposed to "selective cutting...is permitted provided that...a continuous tree cover is maintained..." or "clearcutting shall be conducted only in such a manner as to minimize damage to soils...that are fragile and subject to erosion..." as opposed to "clearcutting shall not be used...where soil (is) fragile and subject to injury." However, the plan does have some added standards for forest management in the building setback area which favor production of long lived, large and aesthetically pleasing trees, require a professional forester to prepare a written plan for clearcutting, and so on.

The grading and filling provisions (Section 10) are essentially the same as those in the Wild and Scenic Rivers rules (NR 79(h)).

The Management Plan calls for the counties to retain tax-forfeited lands within the river district and perpetually manage them for aesthetic, recreational and other qualities. Several counties have already dedicated these lands as parts of county memorial forests (Management Plan, pg. 26).

Ordinances passed pursuant to the plan will have some minimal effect on forest activities in the narrow zone along the river. The vegetative cutting provisions, if enforced by knowledgeable personnel, could serve to reduce erosion from forested land in this zone. However, the plan serves the purposes of 208 in a very limited geographical area.

Six County Minnesota River Management Plan

Project River Bend, or the Six County Minnesota River Management Plan, is very similar to the Mississippi Headwaters Board. The plan was initiated after the Department of Natural Resources proposed designation of the Minnesota River in LeSueur, Nicollet, Brown, Renville, Redwood and Blue Earth counties as a Minnesota Wild and Scenic River. Citizen opposition to loss of local control led the six counties to propose a cooperative management plan to be used in lieu of Wild and Scenic River designation (Project River Bend, pg. iv). The state put a moratorium on designation pending completion of the plan. The plan as adopted by the counties was approved by the legislature (Paul Swenson, Rivers Section Supervisor, Office of Planning, pers. comm.).

The proposed plan provides for management of a narrow zone along the river through zoning and through cooperative local-DNR recreation management. The management district is not as wide as would be in a Wild and Scenic Rivers designation, and there are limited provisions for recreation development (Zachmann, pers. comm.). The vegetative cutting provisions (Sec. 5.4) are similar in form to those in the Minnesota Wild and Scenic Rivers rules (NR 79(g)). The more closely controlled zone near the river is only 100 feet wide, compared with 150 feet for a designated scenic river. Clearcutting elsewhere in the district requires a conditional use permit and approval of an erosion protection plan by the Soil Conservation District, neither of which is required by the Wild and Scenic Rivers rules. The grading and filling provisions are essentially the same, except that the Six County Plan requires a

specific permit for grading and filling. According to the plan (pg. 18), "(f)orest resources provide recreation, wildlife habitat and grazing; very little timber is harvested in the valley."

The plan is of value in achieving 208 objectives only in the limited area covered, and the language does show some local awareness of erosion problems and willingness to address these problems in zoning ordinances.

Lake Improvement Districts

Legislation passed in 1973 (MN Stat. 378.41 et. seq.) provided for the creation of lake improvement districts. These districts are delegated authority by the counties and are funded by them, so they are not independent governmental units as are watershed districts. The types of power which can be delegated to the lake improvement districts (MN Stat. 378.51 and 378.31) are to construct, acquire and operate dams or control works, to maintain public beaches and docks, to require a local permit to change the course, current or cross section of public waters, to develop and implement a comprehensive plan to eliminate water pollution, and to make cooperative agreements with other units of government. Title 6 of the Minnesota Code of Agency Rules, Sec. 1.5062, specifically prohibits the districts from assuming land use zoning authority.

Only two districts are currently in existence, one for the purpose of building and operating an outlet dam, and the other to study water quality problems in a lake created from a marsh (Prestin, DNR, pers. comm.). Neither seems to have an impact on forestry.

The districts are not likely to have value in achieving 208 objectives for reduction of forest land erosion and sedimentation, due to their limited geographical coverage and statutory authority. They are not independent units of government and can be delegated only limited powers by the counties.

Lake Conservation Districts

Two lake conservation districts have been established by special legislation: the White Bear Lake Conservation District (Session Laws of Minnesota 1971, Ch. 355), and the Lake Minnetonka Conservation District (Session Laws of

Minnesota 1969, Ch. 907). These conservation districts have specific powers to regulate boating, beaches, docks, weed removal, etc., and do not have any effect on forest activities.

Watershed Districts

The Minnesota Watershed Act (1955) (MN Stat. 112.34 et. seq.) authorized the Water Resources Board to establish watershed districts upon the filing of a nominating petition by a fraction of the counties, cities or resident freeholders within the proposed district. Drainage and conservancy districts or watershed districts already in existence at that time under the provisions of MN Stat. 1953, 111.01-111.42 or 112.01-112.33 were given the option to operate under the new act. Thirty-seven watershed districts have been established, covering about one-quarter of the state (Figure 9).

Districts can be established for such purposes as flood control, drainage, irrigation, streamflow regulation, control of erosion and siltation, and regulation of improvements of the beds, banks and shores of waters. They achieve their purposes primarily by actually undertaking works of improvement, which are paid for either with state or federal funds or by assessment of the benefitted property owners. Hearings must be held on any proposed improvement, and any works to be paid for by assessment must be instituted by a petition or by unanimous resolution of the managers.

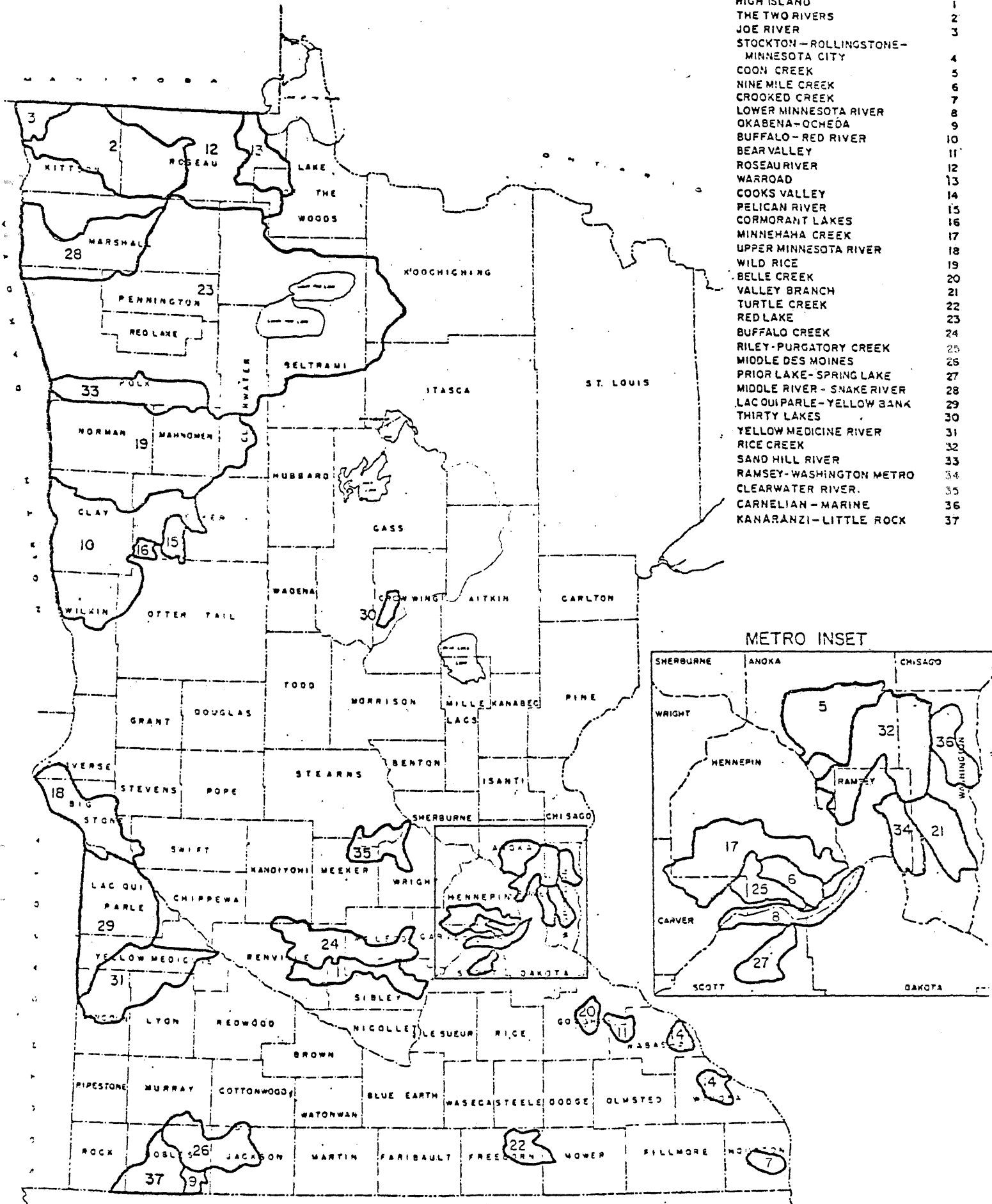
Existing district activities have little effect on forestry. Most of the districts are in agricultural or metropolitan areas, although some districts in the north central and southeastern parts of the state include significant amounts of wooded land. Districts are typically established in response to a specific problem (Cooper Ashley, pers. comm.), and thus far forest activities have not been an issue around which districts have organized (Erling Weiberg, Executive Secretary, Water Resources Board, pers. comm.).

If watershed districts decided to address forestry concerns then they could be useful in achieving 208 objectives. Districts cover only a fraction of the state, which excludes most of the forested area, and new districts can be created only if the local government or landowners perceive a need. Far from

Figure 9

WATERSHED DISTRICTS OF MINNESOTA 1981

WATERSHED DISTRICT	ORDER OF ESTABLISHMENT
HIGH ISLAND	1
THE TWO RIVERS	2
JOE RIVER	3
STOCKTON-ROLLINGSTONE-MINNESOTA CITY	4
COON CREEK	5
NINE MILE CREEK	6
CROOKED CREEK	7
LOWER MINNESOTA RIVER	8
OKABENA-OCHEDA	9
BUFFALO-RED RIVER	10
BEAR VALLEY	11
ROSEAU RIVER	12
WARROAD	13
COOKS VALLEY	14
PELICAN RIVER	15
CORMORANT LAKES	16
MINNEHAHA CREEK	17
UPPER MINNESOTA RIVER	18
WILD RICE	19
BELLE CREEK	20
VALLEY BRANCH	21
TURTLE CREEK	22
RED LAKE	23
BUFFALO CREEK	24
RILEY-PURGATORY CREEK	25
MIDDLE DES MOINES	26
PRIOR LAKE-SPRING LAKE	27
MIDDLE RIVER-SNAKE RIVER	28
LACQUIPARLE-YELLOW BANK	29
THIRTY LAKES	30
YELLOW MEDICINE RIVER	31
RICE CREEK	32
SAND HILL RIVER	33
RAMSEY-WASHINGTON METRO	34
CLEARWATER RIVER	35
CARHELIAN-MARINE	36
KANARANZI-LITTLE ROCK	37



being merely planning or advisory bodies, the districts have significant powers to undertake works of improvement, to secure lands by eminent domain, to levy taxes through the counties, and so on. However, their authority to control land use is very narrow, being limited to the power to adopt floodplain and greenbelt ordinances in the absence of county or municipal ordinances. The type of action open to a watershed district, if it decided forest erosion was a problem, would be to install waterbars on forest roads within the district and charge landowners for the improvement (Cooper Ashley, pers. comm.). However, any works financed by assessment can be instituted only by petition, or by unanimous resolution of the managers. Benefits and damages are determined by disinterested appraisers, and may be appealed by the landowner. Before an improvement is undertaken, the manager must hold a hearing and determine that the proposed improvement is for the public interest and welfare.

Drainage and Conservancy Districts

The Drainage and Conservancy Act (1919) authorized the district courts to establish drainage and conservancy districts upon filing of a petition by a fraction of the resident freeholders, counties or cities within the proposed district. Although the districts were given the option to reorganize as watershed districts in 1955, three chose to remain drainage and conservancy districts; namely the Wilkin County, Aitkin County, and Rushford Area Drainage and Conservancy Districts.

Districts may be formed to regulate streams, reclaim land by drainage, filling or diking, provide irrigation, prevent fires in agriculture or peat lands, regulate and control floodwaters, regulate the use of streams, ditches and watercourses for disposal of wastes, and build dams, canals, bridges, sluiceways, locks and other structures. Funds are provided by the sale of district or county bonds or by assessments on benefitted properties. The existing districts serve primarily as local cooperating agencies for Corps of Engineers projects (A. David Mepin, Senior Hydrologist, Division of Waters, DNR, pers. comm.). The districts have no direct influence on forest activities.

Soil and Water Conservation Districts

The legislature first provided for the formation of soil and water conservation districts (SWCD's) in 1937 (MN Stat. 40.04). There are currently 92 SWCD's covering the entire state, under the supervision of the Soil and Water Conservation Board.

The SWCD's have the power to develop a comprehensive plan specifying practices to be used to implement the state policy of conservation of soil and water resources. Each district then provides financial aid, materials and equipment to landowners in accordance with its plan. Funds may come from federal grants, state money through the Board, or at the discretion of the county, taxes on land within the district. The districts also serve as legal sponsors for major conservation projects undertaken by the United States or state agencies. They have no authority to regulate land use.

District funds can be spent for any soil and water conservation practice that the district feels is a priority, including erosion control on forest land. However, the focus to date has been on agricultural and urban lands. With the exception of the pilot forestry cost-share program in the southeastern part of the state, the Board is not aware of any districts having allocated funds for use on forest lands (Dennis Pond, Erosion Control Specialist, Soil and Water Conservation Board, pers. comm.). The pilot forestry cost-share program is covered in detail in a report by Mitten (1982).

Regional Development Commissions and the Metropolitan Council

The Regional Development Act of 1969 (MN Stat. 462.381 et. seq.) authorized the establishment of regional development commissions (RDC's). Nine existing commissions cover all of the state except the area covered by the Metropolitan Council and the area formerly covered by a recently disbanded RDC in southeastern Minnesota. Each commission is charged with preparing comprehensive development plans for its region. It can review city, town, county, watershed district and soil and water conservation district plans, and conduct hearings where differences of opinion among local governmental units can be aired, but it has no authority to control the content of these local plans. The RDC's differ greatly in how well they have been received, how much influence they have, and the types of issues on which they have worked (Newman, pers. comm.).

Unlike the RDC's, the Metropolitan Council (MN Stat. 473.122 et. seq.) does have some regulatory authority. Their development guide specifies the boundaries of the urban service area for any given year. Spending for sewer, roads, public transit and other metropolitan systems is controlled according to this development guide and local government plans must be consistent with the guide, but beyond this, local governments are free to control land use as they see fit. The council is concerned with regional planning and specifically avoids getting involved in zoning (Robert Davis, Comprehensive Planning, Metropolitan Council, pers. comm.).

Southern Minnesota Rivers Basin Board

The Southern Minnesota Rivers Basin Board was created by the legislature in 1971 (MN Stat. 114A.01 et. seq.) to guide the creation and implementation of comprehensive environmental conservation and development plan for the Minnesota River Watershed and the watersheds of rivers tributary to the Mississippi south of its confluence with the Minnesota River, an area covering approximately one-third of the state. A major reason for establishing the board was to provide state and local involvement in a USDA Type IV study of the basins (Southern Minnesota Rivers Basin Board 1981 Report, pg. 4).

The Board was effective in involving local people in the development of the Minnesota River Basin Report (1977) and the Southeast Minnesota Tributaries Basin Report (1980), the two parts of the plan. It works to foster implementation by providing information about existing programs to local groups, and developing and supporting new programs or program changes (ibid, pg. 1). The Board has the power to adopt rules to coordinate natural resources management, as long as its activities do not unnecessarily overlap or conflict with similar activities performed by established agencies (MN Stat. 114A.05). However, this is seen as not only politically undesirable but also impractical, since with only one staff person and limited funds they lack the capability to develop and enforce rules (Lundberg, pers. comm.).

Forest land covers 3% of the Minnesota River Basin (Minnesota River Basin Report, p.g III-15) and 15% of the Southeast Minnesota Tributaries Basin (Southeast Minnesota Tributaries Basin Report, summary).

The Minnesota River Basin Report identifies disease, fire, grazing and market structure as significant problems on forested land, and calls for educational and incentive programs to improve forest management (pg. IV-18 - IV-19). The Southeast Minnesota Tributaries Basin Report identifies the poor condition of the forest resources as the area's fourth most important water and related land resource problem and proposes woodland grazing control, tree planting, timber stand improvement and proper harvesting practices as solutions (pg. II-1, III-5). The Board has actively promoted and supported the state's pilot forestry cost-share program (Lundberg, pers. comm.). Thus, in spite of the small forest resource in the area, the Board has had and will continue to have a positive effect on forestry in this part of the state. The board believes that forestry is a very important land use in southeast Minnesota (Lundberg, pers. comm.).

The Board has identified erosion and sedimentation as major problems throughout the area. Both reports cite woodland grazing and poor management as key factors in erosion on forest land. By focusing local attention on forest erosion and supporting the cost-share program the Board is furthering 208 objectives. However, their action affects only a small fraction of the state's forest resource and is limited to identifying problems and recommending solutions.

Other Local Governmental Units

The following local water management units identified by the Water Planning Board are not relevant to silviculturally generated non-point pollution, based on the descriptions in the Board's study:

- Metro Waste Control Commission
- Solid Waste Management Districts
- Sanitary Districts
- Rural Water Systems
- Water and Sewer Commissions
- Lower Red River Watershed Management Board
- Bassett Creek Flood Control Commission
- Area II Minnesota River Basin Projects, Inc.
- FHA County Committees

TABLE 8. SUMMARY OF FEDERAL STATUTES EVALUATED

1 Statute and Citation	2 Responsible Agency	3 Relevant Provisions	4 Forest Activities Affected	5 Geographic Area Affected	6 Utility in Controlling Forest Practices To Protect Water Quality		7 Explanation of Ranking	8 Steps Needed To Make Statute More Useful
					Present	Potential		
Clean Water Act of 1977 (Sec. 404) 33 USC 1344	Corps of Engineers	Prohibits dis- charge of dredged or fill material into the navi- gable waters with- out a permit	Stream crossings, Harvesting, Site preparation	Navigable waters of the U.S. broadly defined, including virtually all streams, lakes and wetlands. Does not cover upland activities.	Slight	Slight	Harvesting, seeding and other normal silvicultural activities are exempted from permit requirements. Forest roads and stream cross- ings are exempted where constructed accord- ing to BMP's. BMP's are neither publicized nor enforced.	Strengthen, publicize and enforce BMP's. This appears unlikely to happen.
Rivers and Harbors Appropriations Act of 1899 (Sec. 9) 33 USC 401	Coast Guard	Requires a permit to construct a bridge or cause- way over or in navigable waters of the U.S.	Stream crossings	Coast Guard only asserts juris- diction over 5 large water bodies within the state.	Slight	Slight	Rivers and reservoirs of the size regulated are seldom crossed by forest roads.	Extend juris- diction to smaller streams This appears unlikely.
(Sec. 9) 33 USC 401	Corps of Engineers	Requires a permit to construct a dike or dam in navigable waters of the U.S.	None	Several hundred lakes and streams	Slight	Slight	Dikes and dams are rare forest activities in the state.	N.A.
(Sec. 10) 33 USC 403	Corps of Engineers	Requires a permit for the creation of any obstruction to the navigable waters (wharfs, piers, booms, jettys, etc.) or for any excavation, fill or modification of the course,	None	Several hundred lakes and streams	Slight	Slight	Corps of Engineers juris- diction under this section does not include stream crossings, as this responsibility has been specifically transferred to the Coast Guard under 33 USC 401.	N.A.

location, condition
or capacity of any
navigable waters.

National Environ- mental Act (1969) 42 USC 4321 et. seq.	Environ- mental Protection Agency	All agencies of the federal government must include a detailed statement on the environ- mental impact in any proposal for legislation or other major federal actions when such action would significantly affect the environment.	Potentially, all	Entire state	Slight	Slight	The Act is of value in protecting soil and water on federal lands. It affects forest activities on private or public non- federal lands only in those rare cases where federal funding or permits are involved. Even in those cases, the courts tend to require changes in the Environmental Impact Statement rather than in the activity itself.	N.A.
Coastal Zone Management Act (1972) 16 USC 1451 et. seq., 5 USC 5316, 15 USC 1511a	Office of Coastal Zone Mgmt., Natural Oceanic & Atmospheric Admin.	Protects the natural interest in the coastal zone by encouraging states to exercise their full authority over lands and waters in the zone through grants for planning and implementation.	Currently, none	North Shore of Lake Superior	Slight	Slight	Coastal zone plans pro- posed for the north shore were strenuously opposed by residents. The state decided not to implement a plan.	Implement a Coastal Zone Plan. This appears un- likely.
Federal Wild and Scenic Rivers Act (1968) 16 USC 1271 et. seq.	Interior (in some cases, Agri- culture)	Commercial activity on federal lands within designated areas is prohibited. Government may acquire land by condemnation to protect the river. Federal funding, financing or	Timber harvest on federal lands	Currently only one river in Minnesota has been desig- nated: the St. Croix River from Gordon, Wisconsin to its confluence with the Mississippi, including Namekagin River from Lake	Slight	Slight	The Act currently applies to a very small fraction of the state. It cannot control activities on private or public non- federal lands except by purchase. However, it did provide the impetus for the Minnesota Wild and Scenic Rivers Act and the Lower	N.A.

licensing of water resource projects with adverse effects is prohibited as is FPC licensing of dams.

Namekagin to its confluence with the St. Croix.

St. Croix Wild and Scenic Rivers Act (q.v.).

Shipstead-Nolan Act (1930) 16 USC 577-577b	Agriculture (Forest Service)	Prohibits logging near lakes and streams in or contiguous to federal lands and restricts other activities to protect the Boundary Waters wilderness.	Timber harvest	Parts of Cook, Lake and St. Louis counties.	Slight	Slight	Does not apply to private or public non-federal lands.	N.A.
Bridge Act of 1906 33 USC 491 et. seq.	Transportation (Coast Guard)	Extends Rivers and Harbors Act to require plans to be submitted and approved before a bridge can be built over the navigable waters.	Stream crossings	5 large water bodies within the state	Slight	Slight	Rivers and reservoirs of the size regulated are seldom crossed by forest roads.	Extend jurisdiction to smaller streams. This appears unlikely.
Water Resources Planning Act (1965) 42 USC 1962 et. seq.	Water Planning Board, Great Lakes Basin Commission, Missouri River Basin Commission, Upper Mississippi River Basin Commission (all three Commissions were dissolved by President Reagan).	Provided funding for basin planning and statewide planning.	Potentially, any that affect water resources.	Entire state	Slight	Slight	Minnesota's <u>state</u> plan did not address water quality in detail since the Pollution Control Agency was developing its 208 plan at the same time. The Master Plan for the Upper Mississippi River system is the only <u>basin</u> plan with regulatory authority, and covers only commercial navigation channels on the Mississippi, Minnesota and St. Croix rivers.	N.A.

TABLE 9. SUMMARY OF STATE STATUTES EVALUATED

1 Statute and Citation	2 Responsible Agency	3 Relevant Provisions	4 Forest Activities Affected	5 Geographic Area Affected	6 Utility in Controlling Forest Practices To Protect Water Quality Present Potential		7 Explanation of Ranking	8 Steps Needed To Make Statute More Useful
State Water Pollution Control Act MN Stat.115.01 et. seq.	Pollution Control Agency	Gives PCA regulatory authority over all activities which may pollute the waters of the state. Charges PCA to classify the waters, establish pollution standards, issue permits and adopt regulations. Provides civil and criminal penalties for noncompliance.	Any that affect water quality	Entire state	Moderate	Great	The Act provides strong control over any activities affecting water quality. PCA's 208 plan determined that non-point pollution from forested lands is not a severe problem in the state. As a result, they rely on: 1. USFS, DNR and the counties to control forest activities on public land, 2. Large timber companies to act responsibly on their own land, and 3. DNR to provide technical and financial assistance to small woodland owners to encourage use of BMP's. However, PCA can and would take an operator to court or impose strict BMP's through a permit if necessary to control a serious problem.	Increase fundin for monitoring and enforcement if more extensive use of the Act to control forest erosion becomes necessary.
Classification of Waters MN Stat. 115.44	Pollution Control Agency	Establishes the level of water quality which must be maintained in each body of water within the state. A non-degradation	Any that affect water quality	Entire state	Moderate	Great	The non-degradation clause and the classifications provide the basis for issuance or denial of permits and for prosecution of violators under the Water Pollution Control Act.	See notes under State Water Pollution Control Act

clause requires waters to be maintained at high quality unless a change is justifiable.

<p>Shoreland Management Act (1969) MN Stat. 105.485</p>	<p>Department of Natural Resources (Waters)</p>	<p>Establishes minimum standards for the subdivision and use of shoreland areas, including cutting of vegetation, grading and filling, and road construction. The standards are enforced by shoreland ordinances which counties and municipalities are required to adopt.</p>	<p>Timber harvest, forest roads</p>	<p>Lands near public waters (streams with drainage areas of two square miles or more and lakes with an area of 25 acres or more in unincorporated areas or 10 acres or more in municipalities). Does not cover shores of small headwater lakes, and does not cover upland areas.</p>	<p>Slight</p>	<p>Great</p>	<p>The Act has the potential to control key forest activities in the sensitive shoreland areas, but current DNR rules are vague. Cutting in unincorporated areas must preserve vegetation only "insofar as practical and reasonable." The cutting rules for municipalities are more specific, but in neither case is a permit required. Permits are required for grading and filling in municipalities, but not in unincorporated areas. Road construction is regulated only in incorporated areas, and the rules control only paved roads. Rules are currently being revised. Another problem is that the Act relies on local government for enforcement.</p>	<p>Require permits for cutting vegetation and for grading and filling. Add standards which specifically address erosion control on forest roads either in the "natural vegetation" section or the "roads" section. Provide education and technical and financial assistance to zoning officers</p>
<p>Permits; Work in Public Waters (1947) MN Stat. 105.42</p>	<p>Department of Natural Resources (Waters)</p>	<p>Requires a permit to construct or remove any reservoir, dam or waterway obstruction or to change or diminish the course, current, or cross-</p>	<p>Stream crossings</p>	<p>Beds and banks of public waters of the state (see explanation under Shoreland Management Act). Does not cover small headwater streams</p>	<p>Slight</p>	<p>Moderate</p>	<p>Stream crossings are a less significant element in forest erosion than upland roads. Low water fords and certain temporary bridges do not require permits under this statute if con-</p>	<p>Review and possibly revise conditions under which low water fords can be constructed without a permit, to ensure</p>

section of any public waters by any means.

or small lakes, and does not cover upland areas.

structured according to DNR specifications. The specifications are not widely publicized. Most bridges of the type used in forest operations would require a permit. The current rules and evaluation process are slanted more toward flood hazards than toward protecting water quality.

that these conditions adequately protect water quality. Expand criteria for issuing a permit to ensure that they prevent excessive erosion and sedimentation. Clarify who in DNR reviews applications for erosion and sedimentation potential, and make sure they are aware of construction standards that minimize these impacts. Ensure that DNR foresters make private forest managers aware of permit requirements.

Public Waters Inventory and Classification (1976, 1979)
MN Stat. 105.391

Department of Natural Resources (Waters)

Establishes the definition of public waters, important in the Shoreland Management Act and the program of Permits for Work in Public Waters. Orders DNR to make a complete and final classification of

None (except indirectly through Shoreland Management Act and Public Waters Permits)

Public waters of the state

N.A.

N.A.

N.A.

N.A.

all waters of the state.

Minnesota Wild and Scenic Rivers Act (1973) MN Stat. 104.31 et. seq.	Department of Natural Resources (Waters)	Establishes minimum standards for preservation of wild, scenic and recreational rivers. Rivers are designated by the Commissioner of DNR.	Timber harvest, forest roads	No more than 320 acres per river mile, along designated streams. Segments of six streams have been designated to date.	Slight	Slight	The geographic area covered is limited. The Act relies on local governments for enforcement. Standards are not extremely strict: Selective cutting is permitted with certain conditions. Clearcutting is prohibited near the river and near blufflines. Standards are given for grading and filling but no permit is required.	Add standards which specifically require timber harvest and road construction to be conducted in a way that controls erosion. Provide education and technical and financial assistance to zoning officers
Lower St. Croix Wild and Scenic Rivers Act-- State Recognition and Implementation MN Stat. 104.25	Department of Natural Resources (Waters)	Establishes standards for local zoning ordinances along the river. Cutting and grading and filling provisions are somewhat stricter than for state wild and scenic rivers. Commercial forestry is essentially prohibited in the immediate vicinity of the river or bluffline and on steep slopes.	Timber harvest, forest roads	Shorelands of the Lower St. Croix River.	Slight	Slight	The geographic area covered in a very small fraction of the state.	N.A.
Critical Areas Act of 1973 MN Stat. 116G.01 et. seq.	Environmental Quality Board	Allows coordinated planning and management of areas of greater than local significance.	Timber harvest, forest roads (potentially others)	The only existing Critical Area is the Mississippi River Corridor in the metropolitan area.	Slight	Slight	The geographic area covered is small. Standards are similar to those in the state Wild and Scenic River regulations. Establishment of further critical	N.A.

areas is generally opposed by local governments, and the Act was intended by the legislature to be applied to only a limited number of areas in the state.

Minnesota Environmental Policy Act of 1973 MN Stat. 116D.01 et. seq.	Environmental Quality Board	Requires an environmental impact statement whenever there is potential for significant environmental effects resulting from any major governmental actions (federal, state or local) Requires an environmental assessment worksheet in certain cases to determine whether an EIS is needed.	Timber harvest, use of pesticides	Entire state	Slight	Slight	EIS's are not mandatory for any forest management activity. EAW's are required for conversion of forest land to other uses, timber harvest in the BWCA, state parks, or historical areas, application of pesticides, or actions which eliminate large wetlands when some kind of government permit, lease or entitlement is involved. Even if the EAW indicates adverse environmental effects, this does not require that the action be disapproved.	N.A.
Land Application of Sewage Sludge MN Stat. 116.07 Subd. 4	Pollution Control Agency	Establishes standards for sewage sludge disposal.	Site preparation	Entire state	Slight	Slight	This statute may become relevant if sludge is used to fertilize forest lands in the future.	Future relevance of the act will depend on use of sludge in forestry.
Public Drainage MN Stat. 106	Department of Natural Resources (Waters)	Authorizes county boards to construct, finance and maintain public drainage systems.	None	Entire state	Slight	Slight	Drainage is not a common forest activity in Minnesota.	N.A.

Water Resources Board MN Stat. 105.71 et. seq.	Water Resources Board	Establishes the board and authorizes it to establish watershed districts and approve their Overall Plans.	Indirectly, activities which may cause erosion and sedimentation (see Column 8).	Slight	Slight	See Column 8, and also "Watershed Districts" under Summary of Local Units of Government Evaluated.	Since one purpose of the watershed districts is to control or alleviate soil erosion, communication between the Division of Forestry and the Board may add some emphasis on forest management in the Overall Plan.
Water Planning Board MN Stat. 105.401	Water Planning Board	Establishes the board and authorizes it to plan and evaluate state water resource programs and coordinate activities among state agencies.	None	Slight	Slight	Some publications of the board provide useful analyses of water resources management in the state.	N.A.

TABLE 10. SUMMARY OF LOCAL UNITS OF GOVERNMENT EVALUATED

1	2	3	4	5	6		7	8
Governmental Unit	Enabling Legislation	Relevant Activities	Forest Activities Affected	Geographic Area Affected	Utility in Controlling Forest Practices To Protect Water Quality Present Potential		Explanation of Ranking	Steps Needed To Make Agency More Useful
Counties	Various	Regulate land use	All	Entire state	Slight	Moderate	A preliminary survey identified only two counties that have county-wide ordinances controlling cutting of vegetation, and these are not rigorously enforced. Regional DNR staff are opposed to county ordinances controlling forest activities.	Educate county officials and citizens in areas with high erosion potential to the need to control forest erosion. Help counties in these key areas to develop ordinances controlling site preparation, forest roads, stream crossings and timber harvest. Provide technical and financial assistance to county zoning offices.
Mississippi Headwaters Board (1980)	MN Stat. 471.59, MN Stat. 114B.01 et. seq.	Joint powers agreement among eight counties, established to forestall designation of the Upper National Wild and Scenic River. The Board administers	Cutting of vegetation, grading and filling.	Areas immediately adjacent to the headwaters area of the Mississippi River in eight counties.	Slight	Slight	The geographic area covered is small. The effect of the ordinances in controlling forest erosion will depend largely on the interest and level of knowledge of zoning officers in the	Motivate county zoning officials to reduce forest erosion, and provide technical assistance.

a comprehensive plan for the Mississippi River headwaters area, with provisions similar to those in the Minnesota Wild and Scenic Rivers rules and regulations, but somewhat more permissive.

eight counties.

Six County Minnesota River Management Plan (Project River Bend)	MN Stat. 471.59	Joint powers agreement among six counties established to forestall designation of part of the Minnesota River as a state Wild and Scenic River. The legislature approved the proposed management plan. The plan is similar to State Wild and Scenic Rivers rules but less restrictive and covers a smaller geographical area.	Cutting of vegetation, grading and filling.	Areas immediately adjacent to the Minnesota River in six counties.	Slight	Slight	Geographic area covered is small and contains very little forested land.	N.A.
Lake Improvement Districts (1973)	MN Stat. 378.41 et. seq., 378.51, 378.31	Can be delegated authority by the counties to regulate construction and operation of dams, beaches and docks, require permits for changes in the course, current or cross-section of public waters, implement comprehensive plans to eliminate water	Potentially any	Only two districts have been formed.	Slight	Slight	Districts tend to be formed to address specific problems. They must be delegated authority by the counties and cannot assume zoning authority.	N.A.

pollution. Cannot
assume land use
zoning authority.

Lake Conservation Districts (1971, 1969)	1971 MN Laws, Ch. 355 1969 MN Laws, Ch. 907	Created by special legislation to regulate boating, beaches and docks, remove aquatic weeds, etc.	None	White Bear Lake Lake Minnetonka	Slight	Slight	Districts do not regulate forest activities.	N.A.
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Watershed Districts (1955)	MN Stat. 112.34 et. seq.	Districts under- take works of improvement for flood control, streamflow regu- lation, control of erosion and siltation, and so on can assess benefitted property for the cost of improve- ments of the beds, banks and shores of waters. They can adopt flood- plain or green belt ordinances in the absence of county or municipal ordinances.	None	Thirty-seven districts, about one-quarter of the state. Most are in agricultural or urban areas.	Slight	Slight	Districts are usually established in response to a specific problem, and thus far none have organized in response to forest erosion problems. They can only be established in response to a petition, and their primary power is to under- take works of improvement.	N.A.
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Drainage and Conservancy Districts (1919)	MN Stat. 111.02 et. seq.	Districts can undertake works of improvement such as regulating streams, reclaiming land by drainage and filling, providing irrigation, etc. and can recover the costs by sale of district or county bonds or by	None	Only three districts remain: Wilkin County, Aitkin County, and Rushford area D&CD's. Most were reorganized as watershed districts.	Slight	Slight	Existing districts serve primarily as local cooperating agencies for Corps of Engineers projects. The districts have no direct influence on forest activities.	N.A.
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assessments on benefitted properties.

Soil and Water Conservation Districts (1937)	MN Stat. 40.04	Each district develops a comprehensive plan specifying practices to be used to implement the state policy of conservation of soil and water resources. Federal, state and county funds available to each district for aid to landowners are allocated on the basis of this plan.	Potentially any that affect soil and water resources.	Districts cover the entire state.	Slight	Moderate	To date, district plans have focused on agricultural and urban lands. However, a successful pilot program of cost-sharing for forest management was implemented in the southeastern part of the state.	Work with the Soil and Water Conservation Board and with districts in key areas to ensure that forest management is addressed in the district plans, and that administration of funds at the state and district level provides specifically for certain forest practices to be eligible for assistance.
Regional Development Commissions (1969)	MN Stat. 462.381 et. seq.	Prepare comprehensive development plans covering issues of areawide concern within the RDC boundaries. Can review, but have no authority over, city, town, county, watershed district and soil and watershed district plans.	None	The entire state except the area covered by the Metro Council and the area formerly covered by a recently disbanded RDC in southeastern Minnesota.	Slight	Slight	Commissions have no regulatory authority. They vary in how much influence they have and what issues they work on.	N.A.
Metropolitan Council	MN Stat. 473.122 et. seq.	Regional planning for the growth of the urban service	None	Minneapolis-St. Paul metropolitan area.	Slight	Slight	See Column 3	N.A.

area (sewer, roads, public transit, etc.). The Council specifically avoids getting involved in local zoning.

Southern Minnesota Rivers Basin Board (1971)	MN Stat. 114A.01 et. seq.	Created to guide the creation and implementation of a comprehensive environmental conservation and development plan for the Southern Minnesota Rivers Basin.	All	Approximately 1/3 of the state: the Minnesota River watershed and watersheds of rivers tributary to the Mississippi River south of its confluence with the Minnesota River.	Moderate	Moderate	The Board has actively supported educational and incentive programs to improve forest management. It supported the pilot forestry cost-share program in the area. Although forest lands cover a small part of the area, steep slopes make erosion a significant problem, and the Board has had a positive affect on forestry in the area.	N.A.
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Appendix A

A Note About Laws and Regulations

Public laws enacted by the United States Congress are published annually in the "United States Statutes at Large." The laws are identified as they are passed by a number such as P.L. 91-559, meaning the 559th public law passed by the ninety-first congress, and many laws continue to be known popularly by this number. Within the Statutes at Large, any law can be referenced by volume and page number, viz. 84 Stat. 1468. The volume number is not the same as the congress number because at one time the laws of more than one congress were published in a single volume. Each Act is headed by a long description, e.g., "An Act to provide for conserving surface waters; to preserve and improve habitat for migratory waterfowl and other wildlife resources; to reduce runoff, soil and wind erosion, and contribute to flood control; and for other purposes." In addition, many have a short title, e.g., "...this Act may be cited as the Water Bank Act."

Laws are later codified according to subject matter and published in the United States Code. For instance, the Water Bank Act became 16 USC 1301-1311, meaning sections 1301 to 1311 of Title 16, Conservation. (Typically the end section is not cited and the reference is given as 16 USC 1301 et. seq., meaning section 1301 and following sections.) Some laws may be broken up, with different sections being codified under different titles. (Note: Do not confuse the "titles" of the USC with "titles" which are a term for subchapters within an Act.) The advantage in working with the codified laws is that they are updated, so that all amendments are incorporated into the text, whereas working with the Statutes at Large may involve several volumes if the law has been repeatedly amended. The Code has both a table in which one can look up the public law number and find the USC citation, and an index by popular names. The United States Code Annotated, published by West Publishing Company, and the United States Code Service, published by the Lawyers Cooperative Publishing Company, also contain notes of decision in court cases and various valuable cross-references.

If an Act delegates responsibility to an agency of the executive branch to promulgate rules, the rules are initially published in the Federal Register, which is issued every weekday. The proper citation for the Federal Register is

by volume and beginning page number (47 Federal Register 11886), though many people give only the date. Rules are also codified into the Code of Federal Regulations, which is cited by title and section, e.g., 40 CFR 52 (section 52 of title 40, Protection of Environment). The future location in the CFR is usually given in the Federal Register when the rules are first published. Any regulations that have been passed pursuant to a particular Act can be found quickly by looking up cross-references in the USCA or USCS. A "List of CFR Sections Affected" (LSA) is published monthly so that any revisions in the regulations can be found easily.

Public laws enacted by the Minnesota Legislature are published annually in the Session Laws of the State of Minnesota. They are given sequential chapter numbers as they are passed, e.g., 1947 Minn. Laws Ch. 142. Each Act has a heading, e.g., "An Act relating to water resources declaring a policy of water conservation, defining the powers of the commissioner of conservation in relation thereto, establishing procedure for administration of the law..." but few are given a short title.

The laws are compiled into the Minnesota Statutes by subject matter. For example, Chapter 105 deals with the Division of Waters, Soils and Minerals, and Section 105.42 (MN Stat. § 105.42) is headed "Permits; Work in Public Waters." Once again, the codified laws have the advantage of incorporating all amendments in one place. The session law references are given in the statutes and usually the statute reference is given in the session laws. The statutes also have an index, though it is not as easy to use as the federal index.

Agency rules are published weekly in the State Register, which should be cited by volume and page number (e.g., 4 S.R. 1085). The rules are also codified into the Minnesota Code of Agency Rules. The system for codifying state rules is undergoing revision and is currently very confusing. Formerly, rules were classified by agency, e.g., Minn. Reg. NR43 would be Section 43 of the rules issued by the Department of Natural Resources. Some rules are still cited in this manner. The new system groups rules by subject matter rather than agency, e.g., title 6 deals with the environment and may contain rules of the DNR, PCA and other agencies. These rules are cited thus: 6 MCAR § 1.043. There is no systematic method for finding rules which have been promulgated pursuant to a

particular Act. Partial lists of MCAR Amendments and Additions are published in the State Register periodically, and a cumulative list is published annually, so that revision in the rules can be found easily without skimming every issue.

APPENDIX B

The agencies and people listed below were useful in our research:

- Corps of Engineers, Regulatory Functions Branch, St. Paul
- Corps of Engineers, District Council, St. Paul
- County Zoning Offices
- Department of Natural Resources, Division of Forestry
- Department of Natural Resources, Division of Waters
- Metropolitan Council, Comprehensive Planning
- Office of Community Development, Energy, Planning and Development
- Pollution Control Agency, Division of Water Quality
- Siegel, William, Attorney Forest Resources Law, USDA Forest Service, New Orleans, LA
- Soil and Water Conservation Board
- Southern Minnesota Rivers Basin Board
- Water Planning Board, Research Director
- Water Resources Board

APPENDIX C

Useful references for this topic in Minnesota include:

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- Ayer, John D. 1973. Public regulation of private forestry: A survey and a proposal. Harvard J. Legislation 10(3):407-429.
- Beck, Robert E. 1977. Forestry, non-point sources of pollution, and 208 planning: Legal considerations. In Proceedings, Non-point Sources of Pollution From Forested Land. Southern Ill. Univ., October 19-20.
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- Cox, Paul. 1977. Have state forest practice acts proved restrictive to the practice of sound silviculture? -- NO! In Proceedings, 1976 National Convention Society of American Foresters. pp.137-142. Washington, D.C.
- Dana, Samuel Trask, John H. Allison, and Russell N. Cunningham. 1960. Minnesota Lands. The American Forestry Association. Washington, D.C.
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Division of Forestry Training and Expertise Needs

DIVISION OF FORESTRY TRAINING AND EXPERTISE NEEDS

A crucial part of implementation is having all the people involved aware of the program. This includes background knowledge about the problem and a thorough understanding of the system to be implemented. As mentioned in Chapter IV, a bill passed during the 1982 legislative session authorized the Division of Forestry to request three forest soil and hydrologist specialist positions. Currently in Minnesota the Division does have three people serving as forest soil and hydrologist specialists on temporary funding, and the people in this capacity are highly beneficial to the 208 plan implementation. The funding is provided by the Legislative Commission on Minnesota Resources. These people are in an advocate position for long and short term considerations about the impacts of forest practices on water and soil productivity. They do both informal and formal training about the implications of various practices. On a day to day basis they provide technical information to field staff including district foresters, private forest management foresters, silviculturists and forest pest specialists. This information pertains to timber sale, planning and design, skid and haul road planning, design and construction, site preparation impacts, chemical and soil and water reactions, and other site prescriptions.

Formal training input from these people can occur through tours, workshops and manuals. In their first year Minnesota's specialists have begun to write a state forestry soils manual, helped coordinate a workshop on road building and maintenance for the Division of Forestry, helped coordinate a soils tour for the Minnesota Forestry Employees Association, and gave presentations at an in-house weeklong Forest Management Training Session. They are also working on a special site index project in coordination with the Soil Conservation Service, University of Minnesota, and USDA Forest Service.

Division of Forestry staff have requested more area tours and the management section supervisor would like these specialists to prepare a logging road design and construction manual for Minnesota indicating that demand for their services will be high.

Their expertise also can be shared outside the Division of Forestry. Road and timber harvesting workshops for loggers, roadbuilders, other woods workers and private landowners will help create community awareness and involvement.

Having people in this position was recommended in the Water Quality Management, Minnesota's 208 Plan. Since these people are part of the state's forestry organization they are able to have direct input on policy decisions concerning soils and water, and can help shape the direction of protection. Because they are stationed in the field they will develop close working relationships with the field staff adding to a team approach for management. Being in the field will also help them be familiar with potential problem sites in order to avert unwanted conditions or be available to do the necessary followup work.

People in these types of specialist positions need to know the history of water and soil management policies, current laws and regulations, the environmental effects of forest practices, and the appropriate "best management practices" to use. These people also need periodic training to keep current.

Having resource people and up to date training available are important implementation tools. Using specialists within the organization is one way to accomplish this. Other methods include providing outside training either by inviting expertise in, sending personnel to workshops and seminars sponsored by Universities or other agencies, or purchasing training materials (books, slide shows, films). No matter how this training is accomplished it must be in place in order to have smooth thorough 208 plan implementation.

Best Management Practice Analysis

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BEST MANAGEMENT PRACTICE ANALYSIS

Introduction

Section 208 of the 1977 Clean Water Act has become a focus for developing measures to control silvicultural, non-point sources of water pollution. This section requires states to develop an assessment of water quality problems resulting from forestry activities. Once the problem areas are identified, priorities need to be set and then management alternatives developed which will address the problems.

The Act called these alternatives Best Management Practices or BMP's and defined them as "A practice or combination of practices determined by a state to be the most effective means, including technological, economic and institutional considerations of preventing or reducing the amount of pollution by non-point sources to a level compatible with water quality goals."

A strength of Section 208 is that it gives to each state primary responsibility for developing forest management strategies and BMP's, thus recognizing regional differences and avoiding the specter of national regulation. Understanding the concept of Best Management Practices (BMP's) is crucial if 208 Forestry Water Quality Plans are to be thoroughly implemented.

The Need for BMP's

Minnesota, like many other states, presently does not have a set of statewide BMP's. Land managers have very few recognized restrictions or specific recommendations regarding their forest management activities. Land managers need to be more aware of the water quality goals and the concept of land management prescriptions as a useful tool for controlling non-point sources of pollution. Managers need to look upon "best management practices" as a guideline to help them to use practices which will improve or maintain water quality and will ensure appropriate stand management. The Division of Forestry needs to examine the problem areas that have been identified via the Minnesota Water Quality Management planning process and the MFRP process and proceed to recommend BMP's. Because of regional variations in soils, topography, and climate in Minnesota regional BMP's may be appropriate.

Specifically, site conditions or characteristics of a watershed which influence the quality of the associated waters are as follows:

- Soil erodibility which is a function of characteristics such as texture, structure and depth
- Watershed slope and length of slope
- Channel slope and stability
- Vegetation type and extent
- Geologic strata, type of parent material, interactions between groundwater and surface waters
- Precipitation characteristics such as type and intensities of rainfall commonly observed as well as chemistry (pH for example) or rainfall as affected by geographic setting

Sediment is the most common and most important forestry generated pollutant. It is eroded and transported to surface waters by the action of rainwater runoff. It erodes as surface erosion, mass soil movement or channel erosion. Excessive quantities of sediment degrade the water quality physically, chemically and biologically. Sediments fill channels and can carry pesticide residues and nutrient elements from fertilizer and fire retardants.

Thermal pollution is an elevation of water temperature above its norm. It is the result of vegetation removal which allows an increase in solar radiation.

Organic matter is vegetative and animal in origin and ranges from freshly cut trees to well-decomposed humus. It can fall directly into streams and lakes during harvesting or be transported in runoff. Organic matter can physically clog channels and interfere with the natural aquatic ecology. Organic matter originating from soil, plant and tree debris, and animal (grazing) and human wastes (sanitary facilities in recreation areas) can cause bacteriological pollution.

Pesticides used in forest management include insecticides, fungicides, herbicides and rodenticides. Pesticides can enter the water by direct deposit, surface runoff and in sediments.

Fertilizers and fire retardants contribute nutrient elements (primarily nitrogen and phosphorous) to the forest environment. These can interrupt the natural nutrient cycling of aquatic ecosystems by artificially enriching downstream waters. This can cause pristine waters to become overproductive.

Forest Management Activities Contributing to Non-point Source Water Pollution

Forests in Minnesota are often managed for multiple uses. In addition to timber management, recreation, wildlife and grazing are common uses. Which activity(s) is applied to a particular parcel is of course dependent on a host of environmental and economic factors.

Forestry activities in Minnesota identified as potential causes for water degradation include:

- construction of roads in forest land
- recreational activities
- grazing
- clearing for fire breaks
- timber harvesting operations including skidding of logs and development of landing areas
- mechanical site preparation for planting--rock raking, scarification, discing and chopping
- prescribed burning for site preparation
- application of herbicides and pesticides for site preparation or stand release
- regeneration activities

As discussed in the previous section, Division of Forestry Staff and Expertise Needs, the Minnesota 208 Water Quality Management Plan recommended that the Division of Forestry establish "staff expertise in the areas of forest hydrology, soil science and/or logging engineering... These staff members could also develop educational material and training programs to inform counties and private landowners, and assist them in implementing correct forest management practices."

It is important to use information as specific to Minnesota as possible when establishing or suggesting site specific BMP's. It should be emphasized that while some general statewide guidelines can be established such (e.g., stream crossings should be made at right angles; road grades should be less than seven percent slope), for the most part, land managers will need to be aware of current research and use trained specialists as advisors.

The Division of Forestry's three soil scientists are specialists who as part of the job advise state land managers about the effects of various forest practices on water quality. By combining their field experience and other information available they could begin to list region specific BMP's. A road manual specific for Minnesota has been requested by Division of Forestry staff members.

BMP Development

Two of the most important references concerned with defining BMP's for Minnesota are:

Project 208

Minnesota Forest Management
Non-Point Source Pollution Assessment

Submitted to the Minnesota Pollution Control
Agency by the Division of Forestry, Minnesota
Department of Natural Resources.

March 30, 1979

Non-Point Pollution Related To Forest Management
Practices -- Focus on Northeastern Minnesota

Report to:
Division of Water Quality
Minnesota Pollution Control Agency

Ross A. Wolford
Dale A. Higgins
Kenneth N. Brooks

Department of Forest Resources
College of Forestry
University of Minnesota

May 1978

Both of these documents provided background information to the Minnesota Pollution Control Agency for the State Water Quality Management Plan. Both discuss the pollution potential of various management practices and management techniques useful in controlling unwanted ecosystem disturbance.

The first document provides the bases of defining best management practices for Minnesota. It gives an overview of the factors and activities that are related to forest management and the associated potential to impact water quality. Various methodologies are detailed which can be used to estimate the probability of non-point source pollution. The particular methodology used by the DNR to assess the potential for forest management to affect water quality in Minnesota is outlined and discussed. The forest activities most used in Minnesota were identified through a landowner survey. These activities were rated in terms of their potential to disturb a site's natural condition and thereby allow increased erosion. The erosion potential associated with broad geographic regions is estimated on the basis of slope and soil erodibility characteristics. Each identified "high erosion potential" region is discussed in terms of resource characteristics and forest management activity within that region.

Rating of specific practices are illustrated below:

Table 11. Subjective Relative Rating: Based on Site Disturbance Potentials as Indicated Below.

Source: Minnesota Forest Management Non-Point Source Pollution Assessment, DNR, 1979.

	Major Environmental Factors		
	Secondary	Secondary	Primary
	Degree of Growing Material Removed	Degree of Soil Compaction	Degree of Mineral Soil Exposed
<u>Felling & Logging Systems</u>			
Clearcut & Tree Length & Skidder	H	M	L
Clearcut & Shortwood & Wheel	H	L	L
Clearcut & Full Tree & Skidder	H	H	L
Selective & Tree Length & Skidder	M	H	L
Clearcut & Shortwood & Crawler	H	L	L
Clearcut & Shortwood & Skidder	H	M	L
Clearcut & Tree Length & Wheel	H	M	L
Thinning & Full Tree & Wheel	L	M	L
Selective & Shortwood & Wheel	M	L	L

Selective & Shortwood & Crawler	M	L	L
Selective & Tree Length & Crawler	M	M	L
Selective & Full Tree & Skidder	M	H	L
Clearcut & Tree Length & Crawler	H	L	L
<u>Miscellaneous Systems</u>			
Timber Stand Improvement (TSI)	L	L	L
Clearing for Firebreaks	H	H	H
Clearing for Rights-of-Way	M	H	L
<u>Hauling & Transport Systems</u>			
Permanent Access Roads	H	H	H
Temporary Access Roads	H	H	H
<u>Site Preparation Methods</u>			
Prescribed Burning	M	L	L
Chopping & Scattering	H	M	L
Scarification	M	M	H
Windrowing	H	H	L
Root & Rock Raking	H	H	H
Clearing	H	M	L
Plowing	H	H	H
Chemical & Mechanical Combination	H	H	L
<u>Artificial Regeneration Methods</u>			
Machine Planting	L	M	L
Hand Planting	L	L	L
Seeding	L	L	L
<u>Recreation</u>			
Campgrounds	M	H	H
Picnic Grounds	M	H	H
Train Construction & Use	H	H	H
Hunting Trails	H	H	H
ORV Trails	H	H	H
<u>Grazing</u>			
Grazing	H	H	M-H

*Only practices which involved actual felling or removal of vegetation as their primary purpose were rated on degree of growing material removed.

The second document, like the first, identifies types of pollutants originating from forest lands. The authors did an extensive literature review and data survey to identify watershed characteristics and management activities which can lead to water quality problems. They also established criteria to evaluate existing and potential water quality problems associated with forest management activities in northeastern Minnesota and proposed methods of controlling this non-point pollution. The document contains an extensive bibliography.

This information is background for, and partly a result of, a research project conducted by staff at the University of Minnesota in cooperation with the USDA Forest Service, Superior National Forest. The principal investigator is Kenneth Brooks and research assistants are Jeanette Stiegler*, Susan Rutherford, Dale Higgins and Ross Wolford from the College of Forestry, University of Minnesota. The project objective was to monitor a timber sale harvest on relatively steep topography in northeastern Minnesota in order to 1) quantify the water quality impacts of timber harvesting from which management recommendations can be made, and 2) evaluate compliance with State and Federal water quality standards. In 1976 the project expanded to a paired watershed approach. One watershed served as the control and the other was partially clearcut during the winter of 1980. The preharvest data and calibration relationships established between control and treatment watersheds is presented in a report submitted to the North Central Forest Experiment Station in 1980. The post harvest report is to be available in late 1982.

This is an important piece of work for Minnesota because of the limited water quality data available for streams and lakes in forested watersheds. There are also very few watersheds that have been characterized for existing undisturbed and managed conditions and there are even fewer paired watershed studies in the north central region.

Conclusions

With the background information and suggested general BMP's from these two documents more specific BMP's can be developed. An appropriate place to identify these would be as part of the unit plans in Minnesota. The Division of Forestry's soil scientist specialists should be involved in describing these BMP's and should have the responsibility for training and educating Division of Forestry staff.

*Jeanette Stiegler is currently completing her PhD using data from this project and is intimately familiar with most aspects. She currently works for the MDNR Division of Waters.

Summary

To comply with the Clean Water Act (P.L. 92-500) states must complete a water quality management plan which identifies the non-point source control needs for the pollution-causing activity. Best Management Practices can then be developed in order to mitigate adverse effects on water quality caused by these forest management activities.

Water Quality Management, Minnesota's 208 Plan concludes that water pollution is generally not severe in forested areas. However, when water pollution does occur from forestry activities it is likely to harm a high-quality environment. The most common source of pollution is sediment.

Road construction in forest land, recreational activities, grazing, clearing for firebreaks, road and rock raking and plowing for site preparation have a high potential for causing exposure of mineral soil which leads to erosion.

This report has described several ways to implement the concept of best management practices (BMP's). The concept of best management practices is to use the management techniques that will prevent or reduce the amount of pollution generated by non-point sources.

Minnesota does not have statewide best management practices because according to the Minnesota Water Quality Management Plan water quality problems due to forest activities are generally site specific and not statewide. Still there is the opportunity to develop more explicit and site specific guidelines for individual activities such as road construction, site preparation, and pesticide application.

Programs for implementation of best management practices can be grouped in three categories: 1) educational, 2) subsidy, and 3) regulatory. Using a combination of these will help insure a successful and complete implementation. This report has discussed the three categories and suggested ways that each can be used to implement the best management practice concept. In Minnesota educational and subsidy programs are mostly used. With a commitment to vigorously support these programs Minnesota will be able to comply with the Federal Clean Water Act and maintain or improve forest productivity.

In Minnesota the State Forest Resource Planning process is underway. A vital part of BMP implementation is to integrate water quality considerations throughout the MFRP at both the state and unit planning levels. It is a systematic way to improve the ability of state land managers to appropriately recommend and use the BMP concept. A staff person closely associated with planning should be available throughout the process in order to ensure adequate inclusion. In Minnesota the staff person was an environmental review specialist and worked closely with the planners through the beginning stages of the planning process. During this time resource materials were provided to the planners to help them better understand how water quality issues related to forestry and I was able to review documents. Water quality considerations are successfully integrated in the first two volumes of the plan. At this time the MFRP is still in process.

The forest industry is an important component of Minnesota's economy. It is our third largest industry and contributes almost two billion dollars annually to the state's economy. Private lands constitute 46% of the total commercial forest land base and account for 49% of the commercial timber removed.

In order to continue to meet our timber demands land managers need to know management techniques that will ensure continued or increased forest productivity while maintaining high environmental quality. A well managed forest is better able to resist erosion and will usually not contribute to water quality degradation.

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