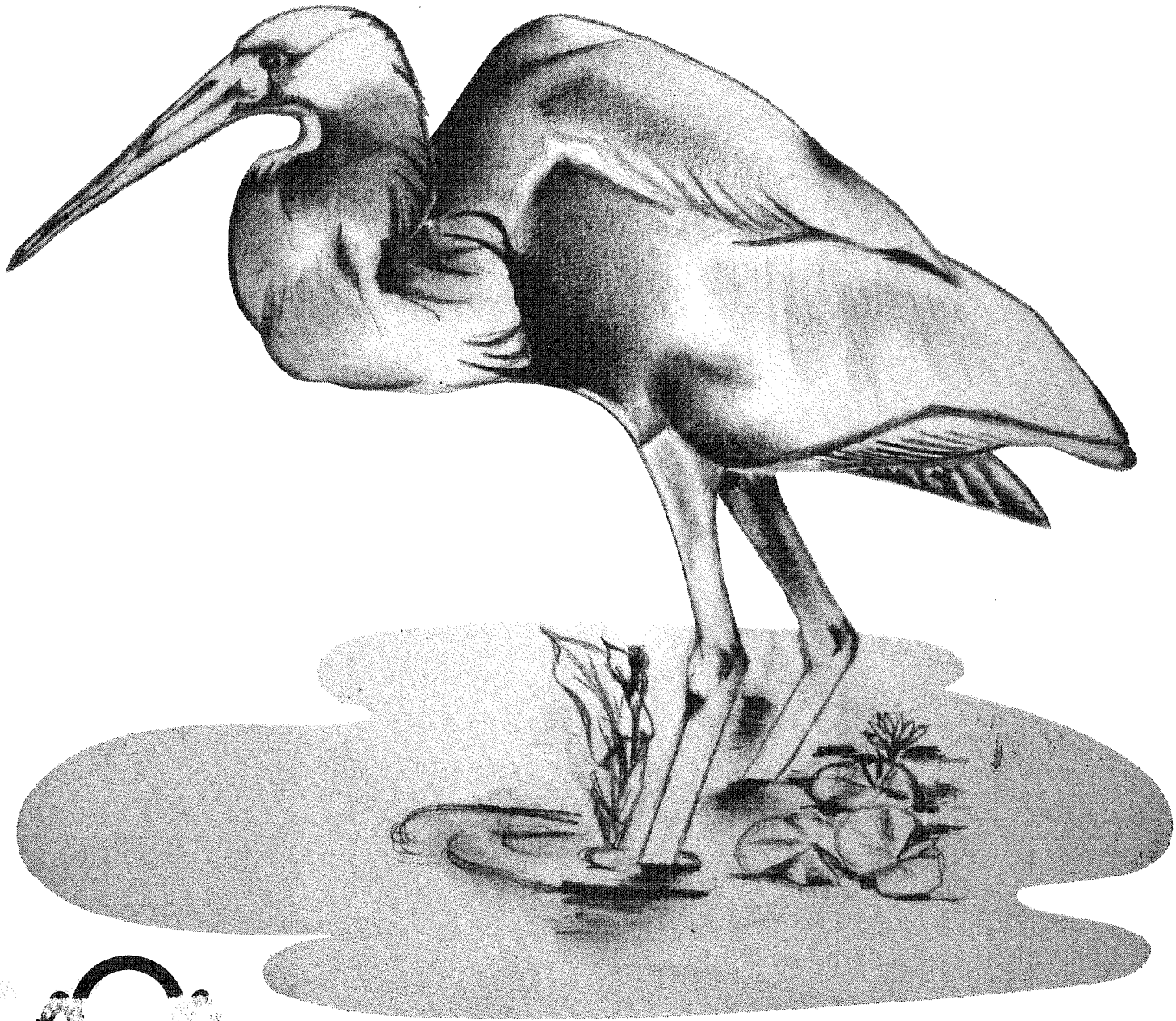
ens' Guide to Minnesota's Water Quality Management Plan



a Pollution Control Agency
of Water Quality

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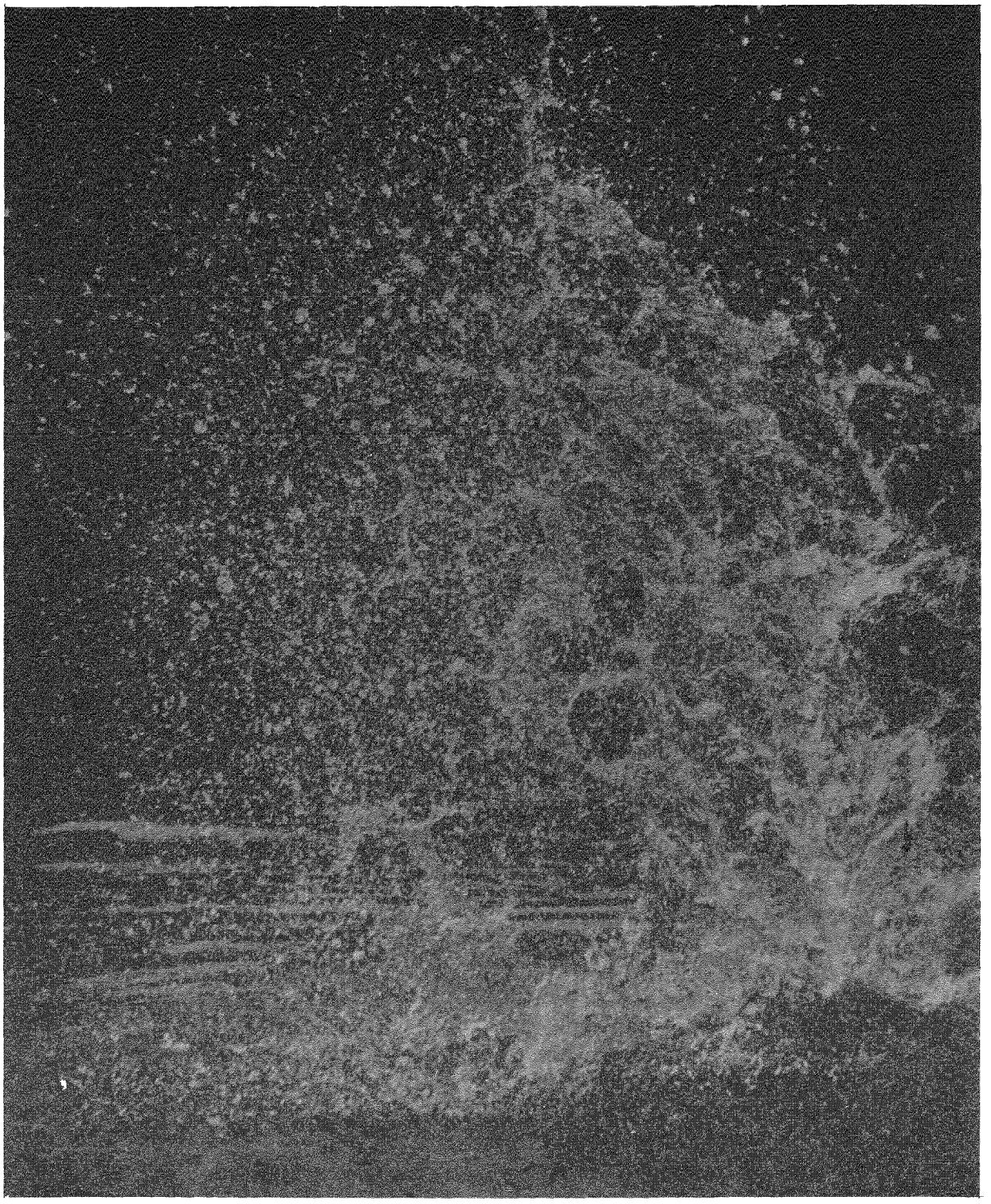

"Man is a complex being: he makes deserts bloom — and lakes die." — Gil Stern

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A Little Knowledge Is A Handy Thing

"Only within the moment of time represented by the present century has one species — man — acquired significant power to alter the nature of his world."

— Rachel Carson

Minnesota's Water Quality Management Plan concentrates on non-point sources of water pollution. Before looking at the anatomy of the Plan, itself, perhaps it would be useful to answer some basic questions about these pollution sources that are so difficult to pin down, yet so threatening to our water quality.

Non-point source pollution has always been with us, expanding as civilization expanded. Only the term non-point source is new. The following questions and answers are designed to assist concerned citizens in understanding, and coping with, the diverse nature of non-point sources of water pollution and the programs that have been developed to control them:

What is this thing called Non-Point Source Pollution?

Non-point source pollution comes from wastes that enter water indirectly by washing off the land or seeping into the groundwater. This kind of pollution comes from a variety of sources. Some of these sources are agricultural erosion, stormwater runoff, and pesticides application.

Because non-point pollution cannot be seen coming from the end of a pipe, it is difficult to identify. Some estimates, however, say that as much as one half of all water pollution comes from such sources.

Though some pollution is the result of natural occurances, for the most part non-point pollution is the result of human activities like construction, highway de-icing and forestry.

Where does Non-Point Source Pollution come from and how does it get into the water?

The key words in the answer to this question are erosion and runoff. Erosion occurs when soil is detached by the action of wind, gravity, ice, or water in the form of rainfall and surface flow. Raindrops not only dislodge the soil; but when rain falls faster than the rate at which moisture is absorbed into the ground, the water runs downslope, carrying eroded soil with it. This process is called geologic erosion. Several factors influence erosion. Vegetation, climate, soils, and topography all contribute to erosion potential. In general, it can said that the most serious erosion occurs where there is little natural groundcover; where large quantities of rain and snowfall occur at a time of year when the ground is already saturated; where the soil has fine particles or a low infiltration rate; and where the slopes are either long, or steep, or both.

Under natural conditions the sediment (eroded soil) reaching water bodies would not be considered a water pollution problem. However, this natural process is influenced by human activities. We remove natural ground

cover, exposing the soil to erosion; or we cover the surface with paving so that the ground cannot absorb moisture. We also litter the environment with pollutants that attach themselves to the soil particles and thus reach water bodies in runoff.

Groundwater movement can also transport pollutants. Pollutants such as chemicals and oil wastes can seep into the soil and thereby into the groundwater. This not only contaminates the groundwater which is consumed by both humans and animals, but it often surfaces again to be carried into lakes and streams.

What pollutants enter our waters from Non-Point Sources?

Some of the water pollutants which come from primarily urban areas include: wastes like paint, asbestos, metals, and sediment from construction sites; carbon monoxide, grease, antifreeze, rubber, and gasoline from automobiles; de-icing chemicals and heavy metals like copper, lead, and mercury from streets; human litter like paper, garbage, and cigarettes; animal droppings; and clippings, leaves, fertilizers, and pesticides from lawns and gardens.

In rural areas the common pollutants are fertilizers, pesticides, animal wastes, and sediment as well as many of the pollutants identified as predominantly urban.

How do Non-Point Source Pollutants effect water quality?

The effects of non-point source pollutants on water quality are still under investigation. However, a great deal of information has already been gathered. The effects of several major pollutants are given here as examples:

Sediment: Suspended sediment interfers with municipal water supplies for domestic use; it clouds water, making it unappealing for recreation; it reduces the amount of plant growth and the number of aquatic animals; and it interfers with irrigation of crops.

Organic materials: When organic materials reach receiving waters they decompose. The amount of oxygen necessary for decomposition is measured as "biochemical oxygen demand" or BOD. When BOD levels are high, it means that a great deal of the available dissolved oxygen in the water is being used up. When the level of oxygen is low, aquatic animals cannot survive.

Fecal coliforms: Fecal coliforms are bacteria present in the wastes of warm blooded animals. The presence of fecal coliform bacteria in water indicates possible contamination from human or animal wastes. Though fecal coliforms are not, themselves, harmful, their presence may indicate the possible presence of organisims that cause disease — dysentary, typhoid fever, and others.

Fertilizers: Fertilizers contain phosphorus, nitrogen, and potassium. Excessive phosphorus stimulates the growth of algae and other plants; it interfers with water treatment operations; and in the drinking water it can cause vomiting and diarrhea in humans. Nitrogen is a nutrient for aquatic plants and algae. Potassium acts as a laxative on humans and increases algal growth and the growth rate of rooted plants in rapidly aging lakes.

Pesticides: Depending on the properties of a particular pesticide, pesticides can be toxic to humans and fish. In regular small doses pesticides make aquatic organisms susceptible to disease and reduce reproductive potential. Some pesticides bio-accumulate in aquatic animals and, therefore, affect the higher animals that eat them.

What can be done to control Non-Point Sources of pollution?

Non-point sources of water pollution cannot be controlled by traditional end-of-the-pipe treatment. Non-point sources can be controlled by better management of the human activities that produce them. For this reason a national effort is underway to study non-point sources and to develop management practices and programs for protecting the quality of the nation's water resources.

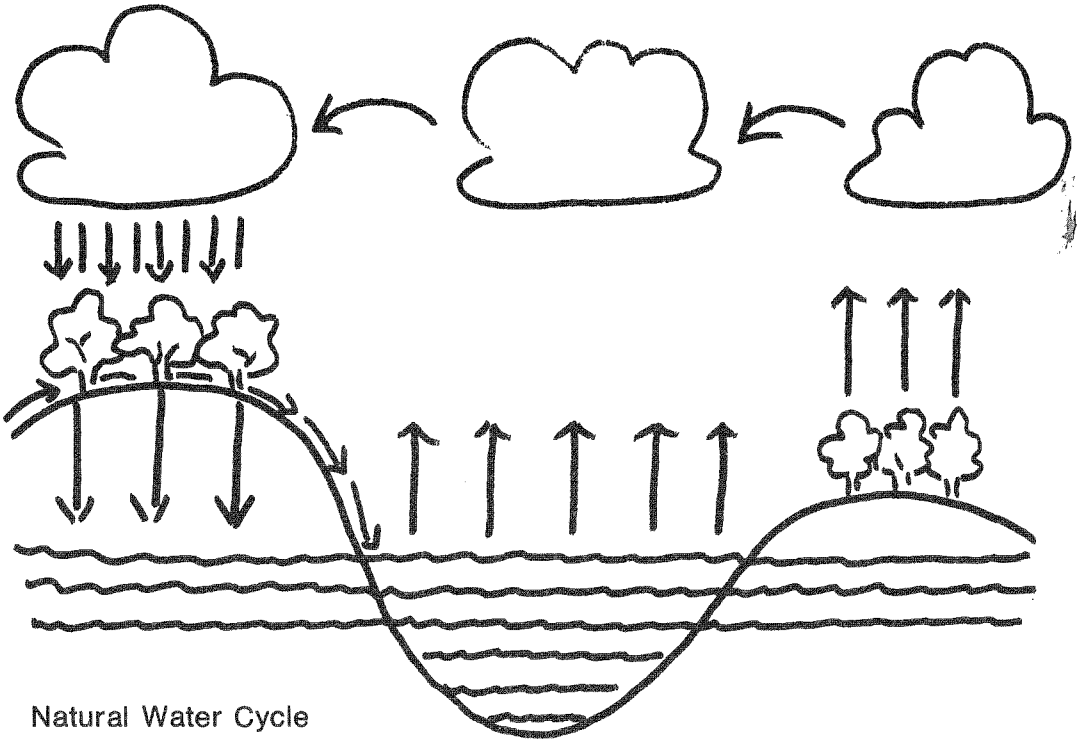
Minnesota's Water Quality Management Plan was developed as part ot the national effort. The following sections of this document will explain Minnesota's Plan — its history of development, its strategies, and its programs.

What can citizens who are concerned about Non-Point Source water pollution do to help?

Every citizen can actively participate in protecting water quality by carefully conducting his or her activities with the preservation of water quality in mind. "Good housekeeping" practices can be employed to remove pollutants from the environment before they can be transported to water bodies. Some examples of these practices are: properly storing and disposing of paint and chemical containers, using pesticides only according to the directions printed on the label, and being responsible for cleaning up after Fido.

Be alert to signs of water pollution like oil slicks or fish kills and report them to the Pollution Control Agency (call 612/296-7373, a 24 hour emergency answering service).

Participate in the continuing water quality management planning program. The Pollution Control Agency newsletter will let you know when and how you may become involved. If you do not already receive the newsletter and would like to be on the mailing list, call 612/296-7373 or write Public Information Office, Minnesota Pollution Control Agency, 1935 W. County Road B2, Roseville, MN. 55113.



Natural Water Cycle

"Our ideals, laws and customs should be based on the proposition that each generation in turn becomes the custodian rather than the absolute owner of our resources — and each generation has the obligation to pass this inheritance on to the future."

— Alden Whitman

Water Quality Management: Minnesota's 208 Plan

Introduction

A major national effort to combat water pollution began with the passage of the Federal Clean Water Act in 1972 (amended in 1977). The goal of the Clean Water Act was to "restore and maintain the chemical, physical, and biological integrity of the nation's waters".

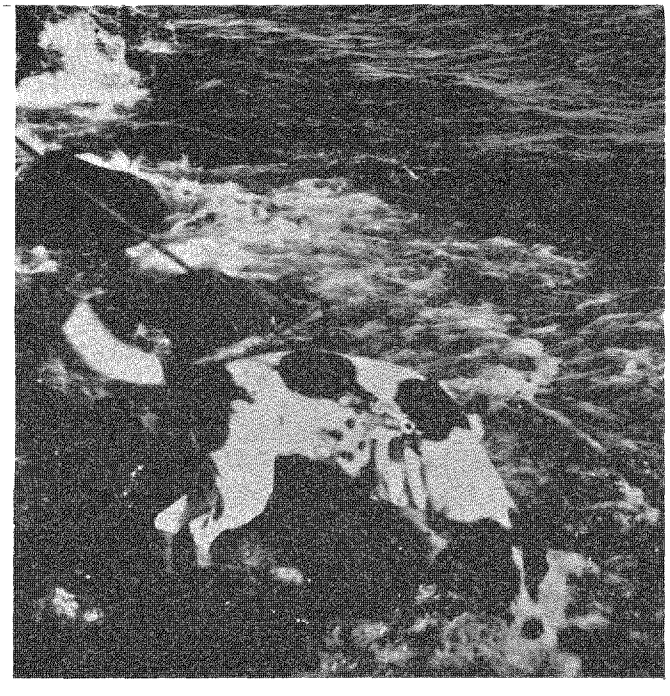
The Clean Water Act created a variety of programs to study and regulate sources of water pollution. Most of the responsibility for carrying out these programs was assigned to state governments under the supervision of the federal Environmental Protection Agency. In Minnesota, the governor assigned responsibility to the Pollution Control Agency.

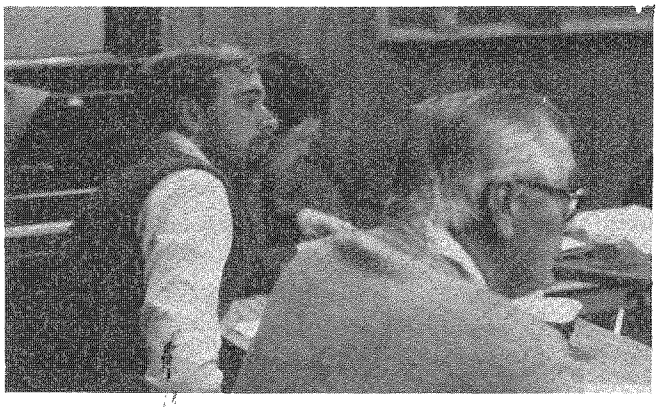
Since passage of the Clean Water Act, water clean-up efforts have focused on so-called "point sources" of pollution: discharges of wastewater, usually through pipes, from municipal sewage systems and from industrial and commercial operations. The emphasis of these efforts was on a permit program for all point sources and a grant program using federal and state dollars to cover most of the cost of building municipal sewage treatment facilities. Great progress has been made in controlling water pollution from point sources.

All water pollution is not caused by point sources. Many human activities combine with natural events to unintentionally contribute to pollution. Polluting materials can be washed into surface water and can seep into ground waters with runoff from rain or snowmelt. These causes of water pollution are called "non-point sources."

Unlike the uniform federal permit and grant program used to control point sources, a decentralized program was set up to give the states, and some regional authorities, responsibility for developing solutions to non-point source problems. This program is commonly called 208 planning, because it was created by Section 208 of the Clean Water Act. The Environmental Protection Agency provided funds to each designated state or regional agency for identifying non-point sources and procedures for controlling them. These procedures were to be developed in a Water Quality Management Plan — or 208 Plan — and submitted by each governor to the Environmental Protection Agency for review and approval.

The Pollution Control Agency was designated by the governor to do 208 planning for Minnesota, except for the seven-county, Twin Cities Metropolitan Area. 208 planning for the Twin Cities Metro Area was assigned to the Metropolitan Council. Though the programs identified in the State Plan are applicable statewide, it should be noted that the Metropolitan Council is developing a separate plan for the Twin Cities Metro area.





Development of the Plan

"A problem well stated is a problem half solved."

— Charles F. Kettering

The Scope

Since the Pollution Control Agency permit system adequately regulates point sources of water pollution in the State, the scope of Minnesota's 208 planning program was limited to non-point source issues.

To determine what non-point source issues might need investigation, the Pollution Control Agency staff consulted with other state and federal agencies and local officials. The general public was consulted through a series of public meetings. Ten potential non-point sources of water pollution were selected for study: agriculture, construction, feedlots, forestry, highway de-icing chemicals, mining, pesticides, residual wastes, roadside erosion, and urban runoff. Non-point sources not included in the initial planning process may be addressed by future 208 planning.

Federal regulations require that the effects of dams, channel changes, and other hydrologic modifications on water quality be addressed by 208 plans. The Pollution Control Agency's initial 208 planning efforts did not include studies of hydrologic modifications. A study of the water quality effects of dredge and fill activities is underway. Management programs will be developed to abate any water quality problems identified by this study.

The Pollution Control Agency will continue to review hydrologic modification projects that require federal permits or licenses. This review will include a study of the potential water quality effects of these projects. The Pollution Control Agency also requires State Disposal System permits for dredging disposal sites.

The Studies and the Reports

To determine the need for additional programs to manage each non-point source, three questions had to be answered: 1) Is there evidence that the source is causing, or could cause, water pollution in Minnesota? 2) Are there effective and affordable ways to correct the problems? and 3) Are existing or proposed government management programs adequate to deal with the problems?

To answer these questions three reports — or packages — were developed for each non-point source topic:

Package I identified possible water quality problems and described available management practices for solving the problems;

Package II described existing agencies and programs; and

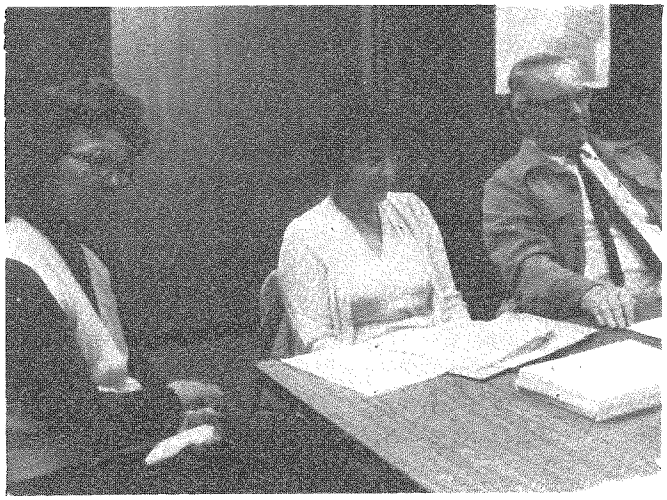
Package III evaluated the need for additional regulations, presented alternative courses of action, and sketched the environmental, social, and economic implications of each alternative.

For several topics additional reports, supplements, and special documents were prepared (see Appendix A).

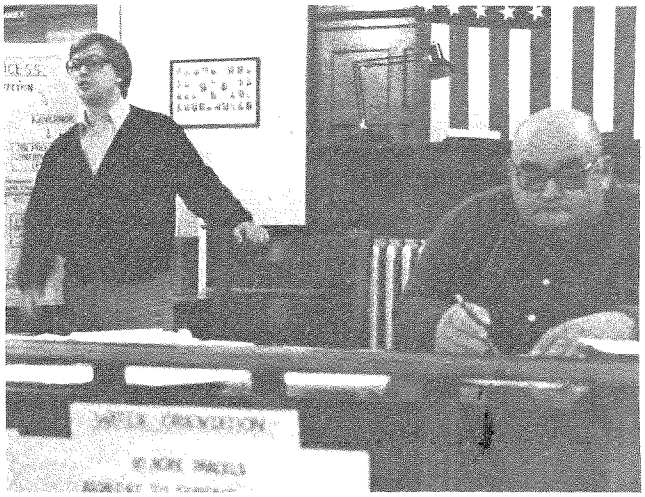
Public Participation

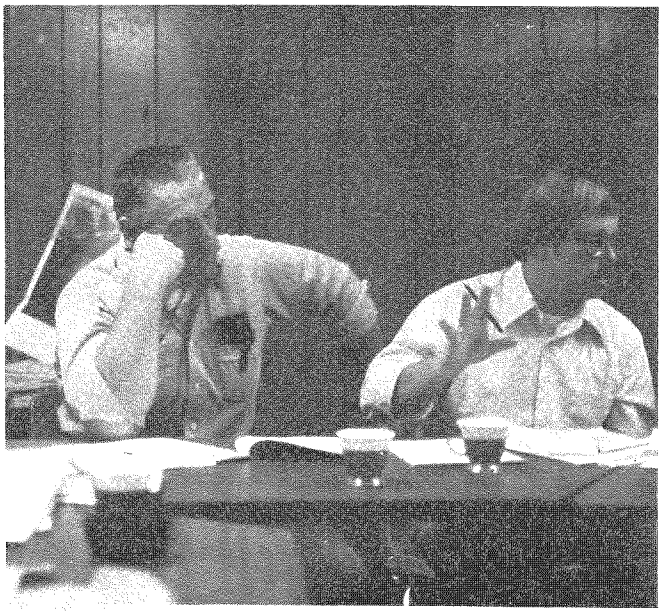
"The health of a democratic society may be measured by the quality of functions performed by private citizens."

— Alexis de Tocqueville



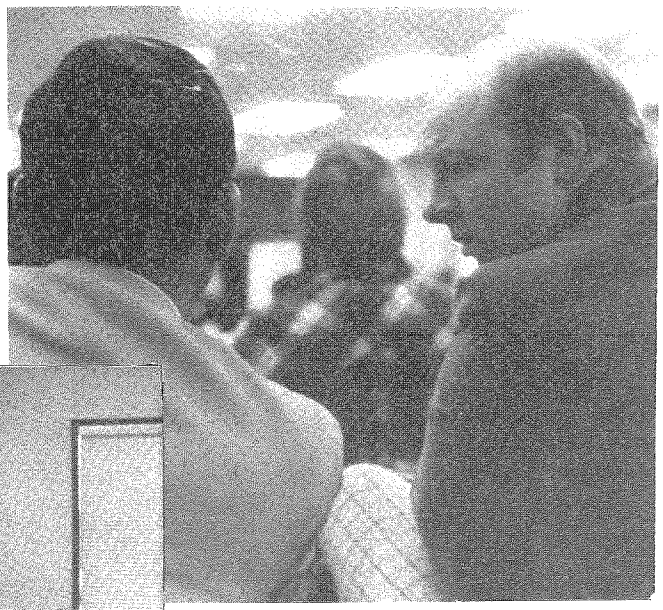
The Clean Water Act mandates that a public participation program be a part of water quality management planning and programs. In Minnesota this public participation was provided by the citizens of the State and by local units of government.

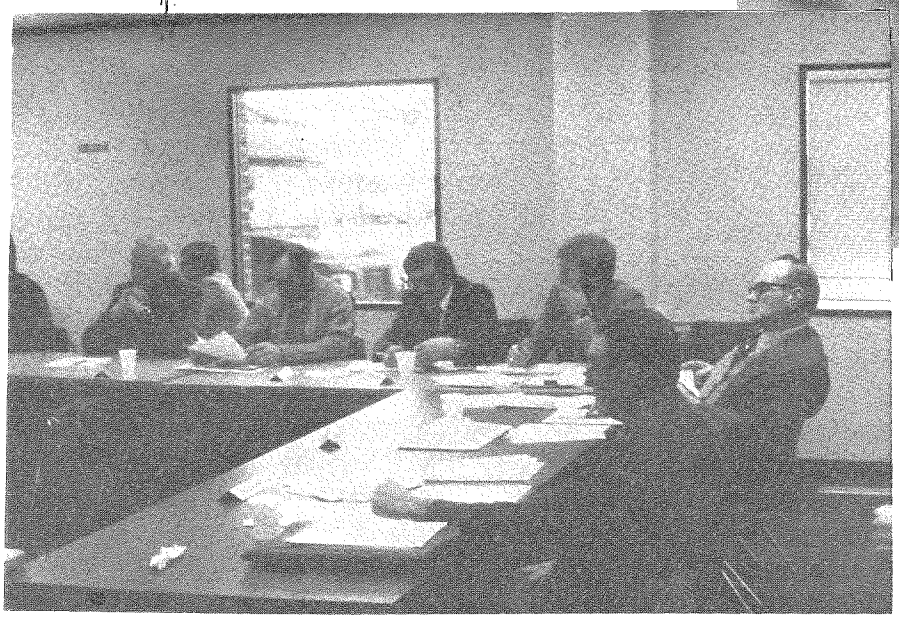




Regional Advisory Committees — Citizen Advisory Committees were organized in each state development region. Membership in these Committees was carefully selected to meet federal public participation requirements. Staff support for the Regional Committees was supplied by the Regional Development Commissions under grant agreements with the Pollution Control Agency, by regional Pollution Control Agency personnel, and by field representatives of those agencies participating in the Technical Advisory Groups.

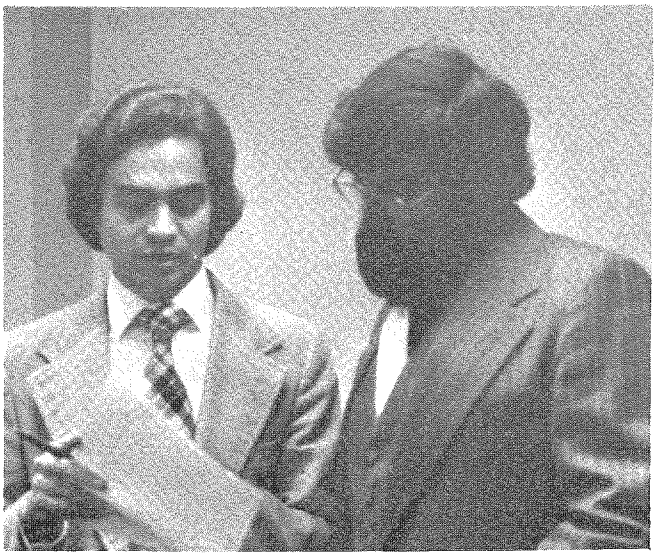
State Task Force — The State Plan Development Task Force was composed of a delegate from each Regional Advisory Committee and a representative of each of eleven state agencies: State Planning, Transportation, Natural Resources, Water Resources Board, Agriculture, Health, Water Planning Board, Economic Development, Soil and Water Conservation Board, Energy, and Pollution Control.



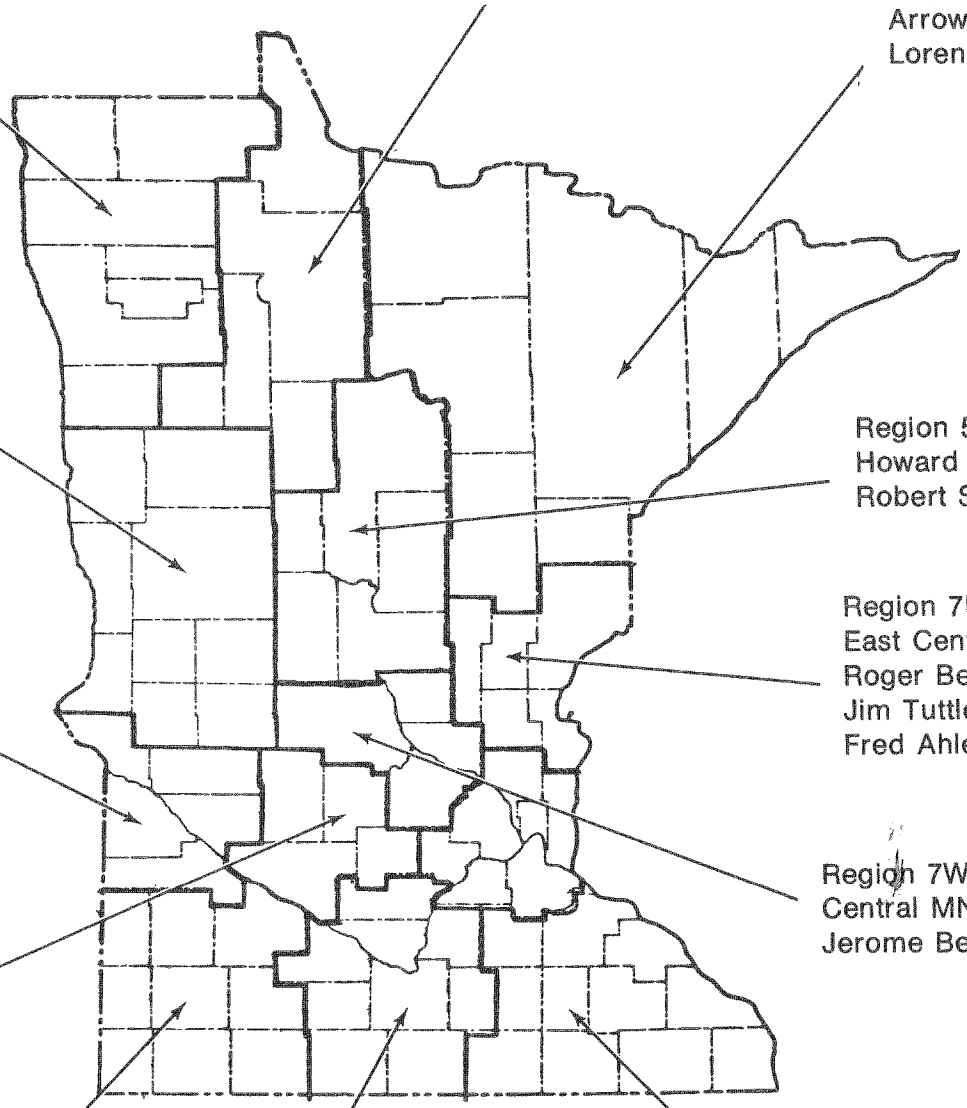


Technical Advisory Group — This group had expertise in the topics being studied. Membership in this group changed with each topic to insure that each topic was reviewed by qualified experts.

Mailing List — An extensive list of groups and individuals who had indicated a desire to review 208 planning documents was maintained. This list included environmental groups, business groups, legislators, educators, concerned citizens, and others. All informational materials and notices of State Task Force meetings were mailed to this group.



Regional Advisory Committees and Chairmen



Region 1
Northwest
Irving Beyer

Region 2
Headwaters
Leonard Kellerhuis
Lyman Schmidt
Vernon Scott

Region 3
Arrowhead
Loren Rutter

Region 4
West Central
James Q. Nelson

Region 5
Howard Tyrrell
Robert Siegel

Region 6W
Upper MN Valley
Harold Heinecke
Wally Larson

Region 7E
East Central
Roger Bergman
Jim Tuttle
Fred Ahlegren

Region 6E
Six East
Dean Aarvig
Leonard Pikal

Region 7W
Central MN
Jerome Bechtold

Region 8
Southwest
Gordon Ellefson

Region 9
Region Nine
Neil Saxton

Region 10
Southeastern
Lincoln Paulson
Arnold Onstad

State Task Force Membership

Chairmen

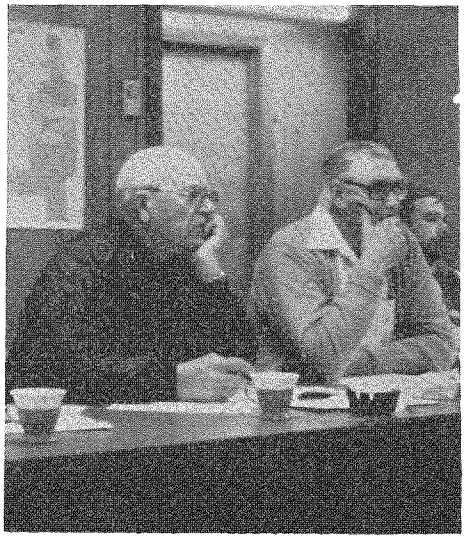
Clarence Johannes
Robert Hamilton
Minnesota Pollution Control Agency

Regional Delegates

Region	Delegate	Alternate
Region 1	Irving Beyer	
Region 2	Leonard Kellerhuis	Vernon Scott
Region 3	Loren Rutter	Darlene Vobejda
Region 4	James Nelson	Gerald Lacy
Region 5	Robert Siegel	Howard Tyrell
Region 6E	Leonard Pikal	
Region 6W	Willard Pearson	
Region 7E	Roger Bergman	Ronald Drude
Region 7W	Jerome Bechtold	Donald Talbert-Philip Behr
Region 8	Jim Vickerman	Gordon Ellefson
Region 9	Neil Saxton	
Region 10	Lincoln Paulson	Arnold Onstad
Metro	William Dilks	

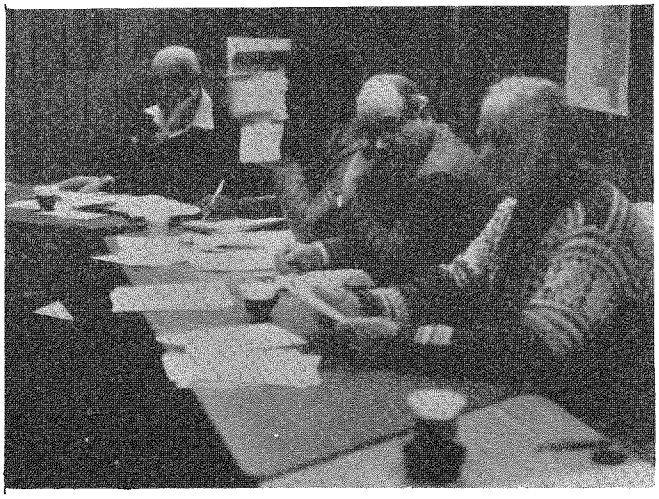
State Agency Representatives

Department of Agriculture	David McGinnis
Department of Economic Development	Francis Geisenhoff
Minnesota Energy Agency	Karen Cole
Department of Health	Gary Englund
Department of Natural Resources	Gene Hollenstein David Zappetillo, alt.
State Planning Agency	Rand Kluegel Mary Louise Dudding, alt.
Department of Transportation	David Pederson
Soil & Water Conservation Board	Vern Reinert Dennis Pond, alt. Greg Larson, alt. Ron Nargang, alt.
Water Planning Board	Jack Ditmore Linda Bruemmer, alt.
Water Resources Board	Erling Weiberg Benjamin Harriman, alt.



The Participation Process: A draft of each Package I was submitted to Technical Advisors for review. Corrections and amendments to the Package were based on comments and suggestions made by the technical advisors.

Package I was then sent to the Regional Advisory Committees for review and comment. The committees often invited local experts to their meetings to provide information on their specific areas. The Regional Committee meetings were publicized locally and the public was encouraged to attend and participate. Each Region maintained a library of information for interested citizens.



At the same time that it was being reviewed by the Regional Committees, Package I was also reviewed by the groups and individuals on the mailing list. When the reviewers of Package I had submitted their comments to the Pollution Control Agency, a Supplement to Package I was prepared. The Supplement contained the reviewers' comments and Pollution Control Agency responses. The Supplement was sent to all Package I reviewers.

Review of Package II drafts was similar to the review of Package I drafts. After corrections based on the technical reviewers' comments were made, Package II was sent to the Regional Advisory Committees and to the public. Accompanying each Package II was an Institutional Rating Sheet to assist reviewers in rating the programs and agencies described in that particular Package. The Pollution Control Agency analyzed these ratings and used the results in preparing Packages III.

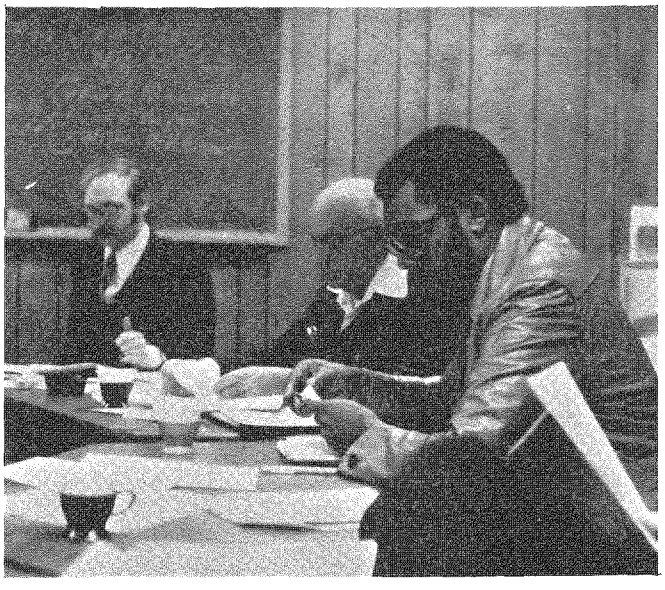
The Advisory Committees met to consider the alternative courses of action presented in Package III. Pollution Control Agency staff members attended many of these meetings as resource persons. Each Regional Committee acted on the alternatives and instructed its State Task Force delegate to present this position to the State Task Force. The public was invited to participate in these meetings.

At this point the work of the State Task Force began. State Task Force meetings were chaired by the Pollution Control Agency. Regional delegates and state agency representatives presented their positions, experts were invited as resource persons, and members of the public who attended were encouraged to participate in the discussions. The Task Force then adopted one of the management alternatives for recommendation to the Pollution Control Agency Board. Some of the alternatives were amended or expanded. The Task Force also registered additional concerns and recommended their inclusion in the 208 Plan.

After the State Task Force had met and reached decisions on all ten non-point source topics, a first draft of the 208 Water Quality Management Plan was compiled by the Pollution Control Agency staff. Public meetings on this draft plan were held in each Region by the Citizens' Advisory Committees. Pollution Control Agency staff members attended all of these public meetings to assist in presenting the draft plan to the public. Taking into account comments recorded at the public meetings, the Regional Advisory Committees once again instructed their State Task Force delegates and the Task Force was convened. When the Task Force met to consider the draft plan the public was invited to participate.

The recommendations and programs proposed by the State Task Force were presented to the Pollution Control Agency Citizen Board at two public meetings. After hearing the public concerns expressed at those meetings, the Board accepted the Plan and sent it to the Governor. On March 10, 1980 Governor Quie certified Minnesota's Water Quality Management Plan and submitted it to the Environmental Protection Agency. EPA gave provisional approval in May, 1980.

At each step of the planning process the public was kept informed. They were given the opportunity to respond, and their concerns were incorporated in the development of the Plan.

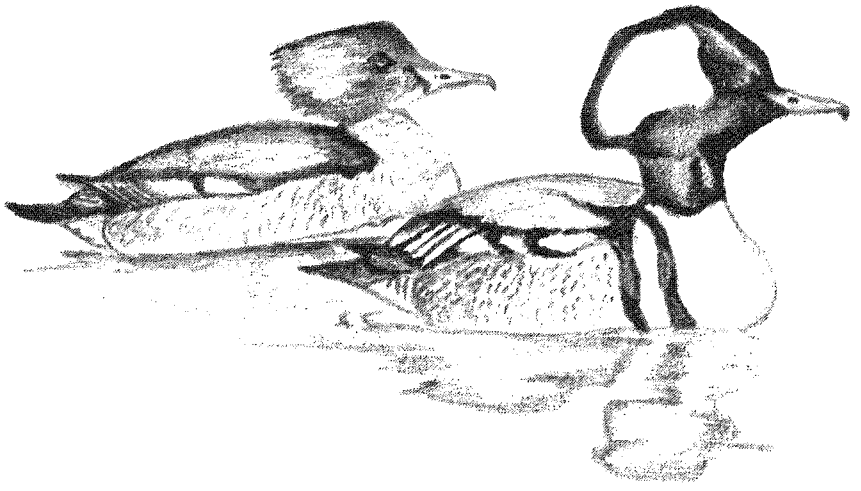


The Non-Point Sources and The Management Programs

"Man shapes himself through decisions that shape his environment."

— Rene Dubos

Water Quality Management: Minnesota's 208 Plan was published by the Minnesota Pollution Control Agency in February, 1980. That document outlined the programs and strategies which the State Task Force recommended for dealing with water pollution from non-point sources. The following section presents the ten non-point source topics that were addressed by the Plan. They are arranged according to the priority assigned to each topic by the State Task Force. Brief background information and summaries of the recommended management programs, policies, and future study needs are provided. Those who are interested in a more in-depth look at the study topics and management alternatives may wish to refer to the documents listed in Appendix A.



Agriculture

Agriculture provides us with food and clothing; and, depending on future technology, may provide energy as well. The economic welfare of Minnesota is, to a large extent, based on agriculture, and a major portion of the State's landscape is devoted to this activity. Yet by its very nature, the production of food and fiber has the potential to harm water quality.

There are several management agencies and programs at the federal, state, and local levels that deal with water pollution related to agriculture. These programs provide financial and technical assistance to farmers who install conservation practices designed to prevent soil erosion and protect water quality.

Currently, there are no regulatory programs at any level of government which require farmers to install conservation measures.

A variety of management programs to deal with agricultural water pollution are available. The major existing programs have traditionally emphasized soil erosion control. Only recently have they begun to emphasize concern for water quality. For these reasons and because agricultural pollution is so complex, additional management efforts are needed. Existing agencies, using their present authorities, can meet these needs with additional resources.

The Minnesota Pollution Control Agency's study of agriculture investigated the role of agriculture in producing five kinds of water pollution: sediment, algae-stimulating nutrients, nitrogen compounds, oxygen-consuming substances, and microbiological contaminants. Effects upon aquatic habitat were also considered. The following conclusions were reached:

- Overall, cropland erosion is the most significant source of sediment in Minnesota; though in some areas streambank and lakeshore erosion is also significant.
- Lake eutrophication is a major water quality concern in the State;
- Improper manure storage and handling, improper storage and use of nitrogen fertilizers, and allowing livestock direct access to streams and lakes can contribute to surface water pollution;
- Serious damage to the habitats of aquatic life can result from straightening or channelizing streams to promote drainage;
- In specific waters and watersheds, agricultural activities other than those indicated above may contribute to water pollution; and
- Existing knowledge about the relationship of many agricultural activities to water quality is severely limited.

Recommended Policies and Programs

The existing voluntary management programs will be continued with additional funding and effort. The legislature and congress will be asked to double the funding of cost-share programs. Educational, research, monitoring, and technical assistance programs will be strengthened. Greater incentives for participation in conservation activities will be made available.

The Soil and Water Conservation Board and the Soil and Water Conservation Districts will provide major leadership for implementation of this program.

Best management practices which should be implemented through the programs are described in *Agriculture, Package I, Supplement; Management* Practices, MPCA, August 1979.

The State of Minnesota will support the "Green Ticket" Program proposed by the National Association of Conservation Districts. This program would provide economic incentives to farmers who voluntarily apply conservation practices to their land. A farmer would agree with his local Soil and Water Conserva-

tion District on conservation practices to be installed, a schedule for implementation, and harmful practices to be avoided. On the basis of the agreement, a conservation certificate, or "Green Ticket," would be issued. The economic incentives available under this program might include higher price supports, additional crop insurance, and lower interest rates on farm loans.

Further Study

- The effectiveness of management practices will be evaluated.
- Techniques will be developed for pinpointing areas that are major sources of pollutants that will actually be transported to water.
- The actual effects of non-point source pollutants on water quality will be studied.
- The effect that reduced upland sediment loads will have on streams will be investigated.
- Agriculturally generated sediment loads will be studied to identify what proportion of these loads are: available to aquatic plants, transported along watercourses, and effectively reduced by erosion control and management of manure and fertilizer use.
- The role of wetlands as sinks for pollutants and the effects of draining them will studied.
- A study will be made of the effects of feedlots and irrigation on groundwater quality, particularily in the southwestern and southeastern areas of the State.
- Quantitative analysis will be made of the effect of runoff containing organic matter from agricultural sources on oxygen and ammonia levels in streams.
- Quantitative analysis will be made of the effects of conservation,reduced tillage, residue management, cover crops, and terracing practices on the runoff of nutrients.
- The net water quality effects of drainage systems will be studied.
- The effects of accelerated nutrient runoff into streams will be studied.
- The relative contributions of streambank, lakeshore, and upland erosion to sediment problems in watersheds in different parts of the State will be identified.

While a voluntary program based on incentives was adopted for the Minnesota 208 Plan, this voluntary approach may not get the job done. In such case, mandatory state controls will be enacted by the State and implemented by the local Soil and Water Conservation Districts.

Feedlots

Minnesota ranks sixth in the Nation in livestock production. As many as 90,000 of the State's 116,000 farms include feedlots, ranging in size from a few animals to a few thousand head of cattle.

A feedlot is legally defined as "a lot, or building, or combination of lots and buildings intended for the confined feeding, breeding, raising, or holding of animals and specifically designed as a confinement area in which manure may accumulate, or where the concentration of animals in such that a vegetative cover cannot be maintained within the enclosure." The term includes open lots used for the feeding and rearing of poultry; it does not include pastures.

Pollution occurs when water crossing a feedlot washes off or dissolves pollutants from the manure and runs off carrying those pollutants into ground or surface waters.

Feedlot runoff carries a variety of pollutants. Pathogenic organisms present on or around animals and in their excretions can cause disease in humans and other animals. Compoands of phosphorus and nitrogen can accelerate the natural aging of lakes and contain ammonia which is toxic to fish and nitrates which may cause disease in humans, especially infants. Feedlot runoff also carries organic materials whose decay requires oxygen; oxygen depletion in receiving waters can cause fish kills and odors.

Feedlots are regulated by Pollution Control Agency rules and regulations. By law, all feedlots in excess of ten animal units (animal unit is a standard measurement of an animal's waste capacity. . . i.e., 5 hogs = 1 cow) must meet the Pollution Control Agency's animal feedlot pollution control requirement. Administration of the regulatory program is divided between the Pollution Control Agency and delegated local counties.

Many technologies for the control of feedlot pollution have been tested and proven and are widely available. Feedlot operators are eligible for financial assistance in constructing pollution controls. This assistance is provided by the State Cost-Share Program, administered by the Soil and Water Conservation Board and/or the Agricultural Conservation Program, administered by the U.S. Department of Agriculture's (USDA) Agricultural Stabilization and Conservation Service. The USDA's Soil Conservation Service provides technical assistance in designing cost-share practices, executing the design, or approving designs produced by others.

Recommended Policies and Programs

Feedlots located in shorelands and environmentally sensitive areas like the karst region of southeastern Minnesota pose serious hazards to local water quality. To prevent water pollution in these areas, there is a need to intensify enforcement and, cooresponding, financial assistance in these areas.

An intensified feedlots program will be applied to target areas around the State. Target areas are watersheds where the abatement of feedlot pollution is necessary to protect groundwater or surface waters of high resource value. The number and size of target areas selected will depend on available funds.

The following factors will be considered when selecting feedlot target areas:

- The pollution hazard posed by specific feedlots as analyzed and ranked (priority ranking may be a factor in approving cost-share assistance);
- Feedlots in areas having high resource value waters and vital groundwater aquifers;
- Likelihood that feedlot pollution in the target area can be controlled successfully with the available resources and time;
- A Clean Lakes Program or equivalent lake restoration project; and

— Designation of a project under the Rural Clean Water Program.

Under the proposed target area program, the effort devoted to program administration, enforcement, information, and education will be increased; the level of cost-sharing and technical assistance will also be increased. Outside the target areas, the regular feedlot program will remain in effect.

Funds available for feedlot cost-sharing from the Agricultural Conservation Program and the Soil and Water Conservation Board State Cost-Share Programs will be restricted to a specific percentage of the funds available for these programs statewide. Any feedlot cost-share money above this amount will have to come from increased federal and state appropriations. If increased funding is not available, cost-sharing for the target area concept will be dropped.

Further Study

— Ninty-six percent of feedlot operators expect to use open feedlots for the forseeable future. The effect of open feedlots on groundwater quality will be studied.
— Methods will be developed for determining the maximum rate at which manure can be spread on land without causing surface or groundwater pollution.
— As residential development and feedlot operations come into closer proximity, conflicts over odor arise. Measures for protecting air quality as well as water quality will be identified.
— Spring snowmelt may transport large quantities of pollutants from frozen ground to lakes and streams. This problem will be studied and, if necessary, remedial measures will be devised.

Pesticides

More than 35,000 different pesticide products are sold and used in the United States. They are used almost everywhere—farmlands, forests, lakes, drainage canals, lawns, roadsides, storage buildings, and homes.

There is no question that pesticides do a great deal of good. They control disease, increase agriculture productivity, and control weeds in our lawn and mosquitoes in our air. Pestic des have become an integral, perhaps indespensible, part of our lives.

However, in certain cases of use, or misuse, pesticides have the potential to harm plants and animals living in, or using, water. Their ill effects may range from death, to lesser long-term disabilities, to subtle disruption of the whole ecosystem. Sometimes damage occurs even with careful application if the pesticide is persistent enough, and mobile enough, to get to water. In some situations, climatic conditions contribute to these problems.

Pesticides remaining in "empty" containers may cause the same problems if not disposed of properly. Such pesticides are only a small part of the total amount used, but they may be present in great concentrations.

Finally, there is this overiding fact: there is a lot that is not known about pesticides. In spite of a great deal of research, gaps remain in such information as the direct and long-term effects of pesticides on non-target organisms. In Minnesota there is not even adequate knowledge of how much pesticide is being applied for certain uses. Less is known about how much pesticide gets into the water; and even less about what effect it has when it gets there.

A host of programs and a variety of management practices deal with pesticide use. While all of the problems have not been solved, these programs have been responsible for remedying many of the pesticide abuses and problems of the past. All pesticide use is already regulated by government agencies on both the federal and state level.

On the issue of pesticide container disposal, the Environntal Protection Agency has published recommended procedures for disposal. There are, however, no laws specifically regulating disposal.

Recommended Policies and Programs

Existing pesticide management programs will continue. Agricultural runoff management and erosion control programs will also reduce pesticide runoff.

The Pollution Control Agency will participate in an educational program on proper disposal of pesticide containers. The Pollution Control Agency has adopted the position that empty pesticide containers are not hazardous after triple-rinsing and may be reconditioned, crushed and sold for scrap, or disposed of in sanitary landfills.

The need for monitoring pesticides has been identified. The Pollution Control Agency will establish an inter-agency task force to assess the present pesticide monitoring structure, to determine future monitoring needs of the State, and to recommend a comprehensive, coordinated pesticides monitoring program for Minnesota.

Urban runoff is caused by precipitation falling in urban areas. This precipitation picks up pollutants from the air. It also pickes up chemicals, oils, metals, paper, and other debris from littered and dirty streets and sidewalks.

Urban runoff can contain substantial amounts of organic materials, inorganic solids, coliform bacteria, nutrients, pesticides, and heavy metals. These pollutants can degrade the quality of receiving waters. Poorly designed runoff facilities can increase the erosion of streambanks and pond areas and cause sediment to be deposited in waterways.

The quality of runoff can be controlled by both source controls and treatment. Source controls are preventive measures that reduce the amount of pollution entering water bodies by reducing both the quantity of pollutants available and the amount of runoff. Treatment reduces or removes pollutants from runoff before it enters water bodies. Treatment of runoff is expensive and there is no evidence that there is a need to treat runoff in Minnesota urban areas.

A number of state and local agencies have some sort of management responsibioity for urban runoff. This responsibility is, however, neither coordinated among the various agencies nor directed toward the protection of water quality.

A comprehensive management approach to urban runoff is needed. This approach should clearly identify management agency responsibilities, authorities, and relationships. Water quality control, air pollution control, land use, environmental protection, recreation, water supply, water conservation, flood control, and erosion control are all programs which will have to be integrated in an overall management scheme.

Recommended Policies and Programs

The Pollution Control Agency study of urban runoff gives strong indication that Minnesota's waters are polluted by urban runoff. However, the current state of technical knowledge is insufficient to justify large scale management programs.

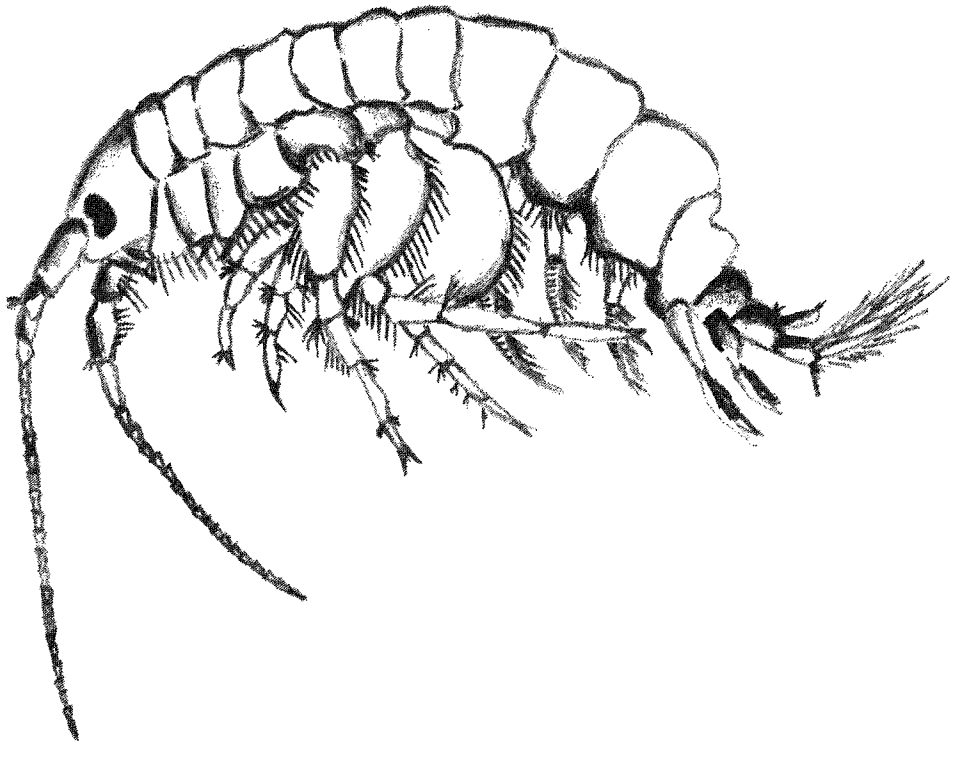
Before an urban runoff management plan can be developed, answers must be found to questions about pollutant sources, pollutant accumulation patterns, washoff and transport mechanisms, instream behavior of the pollutants, impacts on water quality and aquatic ecosystems, and control effectiveness. The following programs are designed to answer these questions:

- The Pollution Control Agency will select several urban watersheds and develop a monitoring program to establish the effects of pollutant sources, loading, and concentrations on water quality. This program will also determine the impacts of land use on water quality.
- The Pollution Control Agency will use an appropriate urban runoff simulation model to estimate pollutant loadings and the impacts of urban runoff on lakes and streams.
- The Pollution Control Agency will use a model to estimate the impact on receiving waters of urban runoff pollutant loads under various management practices and land-use conditions. This program will identify the cost of management practices, evaluate the cost of achieving different levels of pollutant reduction, and evaluate ways to achieve these levels of reduction.

On completion of the problem assessment, the Pollution Control Agency will recommend the implementation of a management program to reduce the impact of urban runoff on receiving waters. This program will identify effective management practices and the conditions under which they should be used. A task force of

local, regional, and state government officials will advise the Pollution Control Agency on local issues and concerns.

Urban planning, protection of environmentally sensitive areas, and on-site management of runoff are all good general planning tools which can be used to protect water quality; they are recommended to regional and local planning agencies. Communities that wish to implement management programs for controlling the amount of pollutants entering urban runoff may refer to the management practices described in *Urban Runoff,* Package I, MPCA, May 78 (pp 54-91).



Of all water pollutants, sediment is the one present in the highest volume. Nearly five billion tons of sediment reach surface waters in the contiguous 48 states annually. Construction has higher sediment loading rate-per-acre than any other activity.

The study of construction activities in Minnesota identified two areas of concern: general construction and road construction. Construction activities effect water quality in three ways: 1) natural land cover is disturbed, resulting in increased erosion and sedimentation; 2) materials such as spilled paint and fertilizers are absorbed into sediment and washed into surface waters; and 3) completed construction projects have many surfaces like buildings and paved areas which alter runoff characteristics.

A review of current information and data collected nationally indicates that the problem of construction site erosion has been found in all areas of the country. The extent of the problem varies according to local characteristics.

A variety of government agencies and programs are attempting to regulate and control erosion and sedimentation from construction activities. There are, however, great differences in the type and effectiveness of these programs. Many local units of government lack financial resources and manpower for erosion control programs. No overall guidance for erosion and sediment control exists among state agencies.

A fairly comprehensive system controls erosion and sediment from road construction. All federal-aid and state-aid highways must be built to specific Department of Transportation standards. Two concerns relate to road construction: the general lack of controls for construction of township roads and the need for a more comprehensive and consistant approach to erosion and sediment control by local road authorities.

Management practices are available to control construction-related water pollution. These practices are relatively low-cost, effective, and tested through experience.

Recommended Policies and Programs

The legislature will be requested to enact an erosion and sediment control law regulating construction activities. A special task force of state agencies, representatives of local government, and private developers will draft the proposed legislation and identify the administrative and financial needs of local units of government.

Selection and use of management practices for construction projects will be based on the following general principles:

- Prevent erosion wherever possible;
- Apply "good housekeeping" practices to prevent materials used on construction sites from being carried away by runoff;
- Maintain the infiltration and runoff characteristics of the site as much like pre-development conditions as possible; and
- Use detention structures where necessary to prevent sediment and other pollutants from leaving the site and reaching lakes and streams.

General Construction

The law will require the use of erosion control measures on all construction projects with the following exemptions: 1) single family residences on lots of one acre or more when not part of a larqer development; 2) projects of five acres or less in areas outside shorelands, municipalities, and urban townships; and 3) construction activities directly related to mining. (These activities are regulated by the Department of Natural Resources.)

Under the proposed legislation, certain basic procedures will be followed. Before construction on a project begins, the developer will submit an erosion and sediment control plan to the local erosion control authority. The plan will be reviewed and a permit will be issued. The project will be inspected during construction to see that the plan is carried out. If the approved plan is not being followed, measures such as fines and work stop orders would be used to insure compliance. Performance bonds will be required of developers so that the erosion control authority can carry out needed measures if the developer fails to do so.

As the lead state agency, the Pollution Control Agency will develop program guidelines and model ordinances, provide training, and review program progress. The Pollution Control Agency will cooperate with the Soil and Water Conservation Board to provide assistance in developing guidelines. The Pollution control Agency will handle review and approval of major public utility projects and will review erosion control measures for construction activities carried out by state agencies. The Pollution Control Agency will also have authority to inspect projects to see that agreements are being honored.

Most management activities will be carried out at the local level. Counties and municipalities will enact erosion control ordinances, review plans, issue permits, inspect projects, and enforce programs. Townships will perform these functions or will work out shared responsibilities with the county or neighboring municipality. Municipalities under 2,500 in population can choose to arrange with the county to administer the program. Soil and Water Conservation Districts will provide technical assistance to local units of government if requested.

Road Construction

Projects will be required to use appropriate erosion and sedimentation control measures. The program will apply to all areas within the authority of the unit of government having program responsibility. Permits will not be required for each project. Instead, memoranda of agreement between erosion control authorities and road building agencies will establish control measures to be used.

The Department of Transportation has already specified erosion control measures for all federal-aid and state-aid road construction. Local erosion authorities can enter into agreements with local road building agencies and can require compliance.

The State will provide financial assistance to local units of government for meeting administrative needs of the program.

Roadside Erosion

Society demands transportation that is quick, safe, and convenient. These demands have led to a tremendous surge in road construction over the past few decades. The resulting system of roads and highways is second to none in terms of technologically and sheer milage. Though construction of new roads has slacked off somewhat, existing roads represent a maintenance obligation of truly formidable dimensions.

By its very nature, road and highway construction seriously disturbs the natural environment. Vegetation is removed, top-soil displaced, and natural slopes and drainage patterns altered. Unless the proper measures are taken to control erosion during road construction and on already existing roads, serious erosion and sedimentation problems can result.

Because the control of erosion caused by road construction is included in the construction topic, programs developed for roadside erosion deal only with erosion from existing roads.

The Pollution Control Agency's study of erosion from existing roads revealed that roadside erosion is of serious porportions in some areas of the State.

The most serious roadside erosion problems generally occur in areas that have high concentrations of lakes and streams. Therefore, it is likely that erosion sites in those areas contribute sediment to lakes and streams. Sediment can damage aquatic life, carry toxic substances to waters, and negatively affect the uses that can be made of lakes and streams. Roadside erosion is caused by:

- Inadequate design for drainage from land adjacent to roadsides (parking lots, county and judicial ditches, agricultural drainage, open ditches, etc.);
- Inadequate design and construction practices relating to establishing vegetation, drainage, and roadway location and design;
- Inadequate maintenance practices;
- Use of roadsides for recreation vehicles, four-wheel drive vehicles, dirt bikes, snowmobiles, and other all-terrain and off-the-road vehicles; and
- Use of roadsides to construct utilities, move livestock, or plant crops.

The full extent of the roadside erosion problem is difficult to assess at any one time, because new sites are continually developing and previously identified sites are being corrected. It is estimated, however, that it would cost $25,000,000 to correct all roadside erosion problems in Minnesota.

A number of autonomous road authorities exist in Minnesota—the Department of Transportation, counties, municipalities, and townships. Each is responsible for setting maintenance policies for roads under its authority.

Of all the road authorities examined, the Department of Transportation was found to have the most comprehensive erosion control program. It was also found that, generally, the more populous the county or municipality, the more difinitive its program for roadside erosion control. Though townships have the greatest number of erosion sites, their programs were found to be the least comprehensive.

Several identified programs provide either technical or financial assistance to local units of government for erosion control. The Soil Conservation Service's Resource Conservation and Development (RC&D) Program appears to be the most effective. This federally funded program provides both planning and financial assistance in erosion control areas. Unfortunately, due to recent funding cuts, the assistance provided by the RC&D Program will be reduced significantly. The Soil and Water Conservation Board has a cost-share grant program for streambank, lakeshore, and roadside erosion control projects for areas located outside RC&D project areas. This program is funded by the state legislature.

Recommended Policies and Programs

Strong support will given to recommendations that the administration and Congress appropriate sufficient funds to the RC&D Program to continue its planning and financial assistance for controlling roadside erosion.

The legislature will be requested to establish a cost-share program for assisting Minnesota's road maintenance authorities in correcting and preventing roadside erosion.

The proposed program has two elements: 1) a periodic survey of the location, extent, and impact of roadside erosion in each county, and 2) funding of erosion control projects. All public roads in Minnesota will be included in the program.

The cost-share element of the program will require local Soil and Water Conservation Districts to develop needs lists and countywide erosion control programs for all roads in each county. The Soil and Water Conservation Board will review these programs for compliance with adopted regulations and award the cost-share funds. Priority will be given to erosion control plans that identify erosion problems affecting water quality.

Financial assistance will be provided to road maintenance authorities for program implementation and for training and education in roadside erosion control. Data on the location and extent of erosion sites will be provided.

A special task force comprised of representatives of the Soil and Water Conservation Districts, the Association of County Engineers, the Association of Municipal Engineers, the Township Officers Association, the Department of Transportation, and the Pollution Control Agency will be formed to assist the Soil and Water Conservation Board in defining eligible projects and specific program details.

The Pollution Control Agency will monitor and evaluate local government compliance with the program and will issue an annual report to the Environment Protection Agency and to the public.

Residual Wastes

Residual wastes are solid, liquid, and sludge substances remaininq after the collection and treatment of waste materials from man's activities in urban, agricultural, industrial, and mining environments. These wastes include: industrial wastes, substances remaining after combustion and air pollution control, wastewater treatment sludge, water treatment sludge, septage, municipal refuse, mining wastes, feedlot wastes, and dredge spoils. The quantity and quality of residual wastes fluctuate with changes in technology and economics.

The Minnesota Pollution Control Agency's study of residual wastes concentrated on residuals generated by industrial air and water pollution control devices. A survey was made of approximately 1,000 of these residual waste sources. Details and results of that survey can be found in *Residual Waste,* MPCA, July 1978.

One important issue revealed by the survey is that many residual wastes are not disposed of according to Pollution Control Agency rules (described in *Water Quality Management: Minnesota's 208 Plan, MPCA,* February 1980). One reason for this problem was found to be an inadequate exchange of information and lack of coordination among the three Pollution Control Agency divisions—air, water, and solid waste.

Recommended Policies and Programs

To better coordinate Pollution Control Agency programs and thus encourage compliance with already existing residual waste disposal rules, each Pollution Control Agency division, on initiating a permit or renewal process, will inform other divisions and ask for comments.

A special task force of state and local officials will be established by the Pollution Control Agency. This task force will develop procedures and policies to better involve local authorities in residual waste management.

Highway De-Icing Chemicals

The demands of modern transportation have resulted in a need to keep roads open and relatively safe all year. Road authorities in Minnesota and other snow belt states rely heavily on chemicals to speed the melting of snow and ice.

The principal de-icing chemicals used are sodium chloride (rock salt) and calcium chloride. Though sodium chloride is most widely used because of its low cost, small amounts of calcium chloride are used because it is more effective. These salts are often mixed with sand or other gritty materiale in varying proportions.

A growing public concern over the possibility of water pollution from road salts became apparent at public meetings. This concern resulted in the inclusion of highway de-icing activities in the 208 study. Two de-icing activities are sources of water pollution: the storage of salt and salt/sand mixtures and the spreading of salt and salt/sand mixtures on roadways.

Salt and salt/sand stockpiles can generate high concentrations of dissolved salt if water is allowed to wash through them. These concentrations seep into the groundwater increasing the levels of sodium and chlorides and endangering drinking water supplies. Since almost any location in Minnesota lies over underground waters which may be used by humans or animals for drinking water, all unprotected stockpiles are potential sources of groundwater pollution.

Salt applied to roads can run off into water bodies. Evidence shows that when large amounts of salt are applied in a concentrated area, this runoff can cause water quality problems, especially in lakes and small streams.

The Minnesota Department of Transportation, as well as each county, municipality, and township, is responsible for setting policies for the use of road salts on roads under its authority. Highway de-icing policies vary widely among these road authorities. The Department of Transportation has policies for both storage and application, but it lacks funds to implement these policies. Few local governments have adopted formal policies for storing or applying de-icing chemicals.

Recommended Policies and Programs

Storage

The Minnesota Department of Transportation and local road authorities will implement a voluntary program to control runoff from salt and salt/sand stockpiles. The main elements of this program are:

- Wherever possible, stockpiles will not be located near existing water wells, lakes, rivers, streams, groundwater recharge areas, or flood prone areas.
- Stockpiles will be placed on impervious pads, built to hold all stored material and drain runoff into a holding tank or basin. Impervious pads will also be built for enclosed stockpiles to prevent water from running through the base of the stockpiles.
- Where possible, all salt/sand mixtures will be moved to salt sheds as soon as load restrictions are lifted in the spring. They will remain in these sheds until at least October 1. Mixtures remaining on the site through the warm months will be enclosed or covered from no later than May 1 until at least October 1.
- The Department of Transportation and the Pollution Control Agency will provide information, education, and technical assistance to local road authorities.

The legislature will be asked to make a one-shot appropriation to fund this program. Any road authority not taking advantage of the funding during the designated funding years

will assume total costs. The Department of Transportation will administer the funds through the State Aid Highway fund. Each road authority will be responsible for selecting stockpile sites to be upgraded, for designing appropriate facilities, and for applying for funds. The Pollution Control Agency will track the progress of the program and issue annual reports to the Environmental Protection Agency and the public.

Application

Under a voluntary program for application of road salts, the Department of Transportation, counties, municipalities, and urban townships having populations of 5,000 or more will implement the following management practices:

— Spreading equipment will be calibrated each fall and after breakdown to control the amount of salt/sand mixture applied to roads.

— Equipment drivers will be trained in application techniques. Records of milage and the amount and location of salt applied will be kept.

Further Study

Further study will identify those measures needed to protect water quality from road salt application and will determine whether other sites also need to be managed.

Study will determine if the practice of dumping snow removed from city streets into or near lakes and streams is harmful to water quality.

Sometimes an acid salt called ferrocyanide is added to sand/salt mixtures to prevent caking. Further study is needed to see if the cyanide released from the ferrocyanide by sunlight can threaten aquatic life under Minnesota conditions.

The effect of abrasive substances on aquatic life and habitat will be studied.

Forestry

Forests cover 37 percent of Minnesota's total land area. Forest land is one of the State's most valuable renewable resources. The forest industry ranks third after agriculture and mining in state income. Not only does forestry provide thousands of jobs, it also provides timber, wildlife habitat, recreation, water, and forage. Experts predict that the demand for timber and timber products will increase by 80 percent by the year 2000.

The study of forestry activities in Minnesota identified several areas of concern: road construction in forest lands, recreational activities, the grazing of farm animals on forest land, and clearing for firebreaks. These activities contribute to pollution by disturbing the forest site. Three kinds of site disturbance are of concern to water quality: exposure of mineral soil, compaction of mineral soil, and removal of growing material. These disturbances increase the likelihood of runoff and erosion.

Water pollution is not usually severe in Minnesota's forested areas. However, a large portion of the State's most valued waters are located in these areas. Therefore, whenever pollution does occur in forested areas, it is likely to harm a high-quality environment.

The application of pesticides in forests is another area of concern. The Pesticide topic recommends study of all pesticide monitoring needs and development of a statewide coordinated monitoring program.

Forestry activities in Minnesota are managed by the United States Forest Service (responsible for the Chippewa and Superior national forests), the Minnesota Department of Natural Resources (responsible for state forests), and the counties (responsible for all county and private forests).

There are effective management practices for controlling and preventing pollution from forestry activities. Management agencies have the necessary authority to regulate the activities occurring on federal, state, and county lands. The Department of Natural Resources, however, lacks adequate staff expertise to establish and carry out policies for soil erosion prevention and water quality protection.

Recommended Policies and Programs

The required implementation of best management practices for the State's forest lands will be improved by establishing staff expertise in the areas of soil science and forest hydrology in the Department of Natural Resources, Division of Forestry.

An experimental forestry practices cost-share program has been established in southeastern Minnesota. The program is cost-shared by the Soil and Water Conservation Board, through the Soil and Water Conservation Districts, to private woodland owners for forestry practices. The effectiveness of this program will be assessed. If the program is successful, the legislature will be asked to implement the program statewide.

The grazing of farm animals on forest areas is recognized as an agricultural activity. As such, the costs of implementing management practices are eligible for agricultural cost-share programs.

Mining

Mining is a major industry in Minnesota. A variety of minerals and other substances including natural iron ore, taconite, sand and gravel, building stone, copper-nickel ore, peat, and uranium are, or have the potential to be, mined. Mining includes all, or any part of, the process of removing, stockpilling, processing, storing, transporting, and reclaiming material in connection with the commercial production or extraction of minerals.

Most present and future mining in Minnesota comes under the jurisdiction of present and proposed Department of Natural Resources and existing Pollution Control Agency rules. The 208 study of mining dealt only with mining activities that are not covered by state and federal rules and regulations.

Sand and Gravel and Building Stone: Sand and gravel and building stone excavation is Minnesota's most widely occurring mining activity. These operations may generate significant amounts of suspended solids which may adversely effect water quality. This industry can be adequately regulated by current permitting programs, local ordinances, and Pollution Control Agency inspections. Local units of government, however, have no standard procedures for regulating mining activities.

Copper-Nickel and Peat: Cooper-nickel deposits of commercial significance extend across the northern part of the State. If these areas are mined, the sulfides and toxic substances may pose a threat to water quality.

Minnesota contains an estimated 7.5 million acres of peatland, the nation's largest peat area except for Alaska. Little is known about the basic characteristics of the peat resource, but it is reasonable to suspect that materials released by peat mining will alter the character of receiving waters.

For the past several years, the State has been studying the possible environmental, social, and economic impacts of potential copper-nickel and peat mining in Minnesota. When these studies are completed, management programs will be developed to control any water quality problems.

Inactive Iron Ore Mines: Many abandoned waste piles and trailings ponds were left behind by past mining operations in northeastern Minnesota. These piles and ponds contain waste soil, overburden rock, lean ore, and tailings. Should they become operative again, these sites would be subject to Department of Natural Resources and Pollution Control Agency regulations. Sites that remain abandoned could be sources of suspended solids and dissolved metals; currently, no programs regulate abandoned waste piles or tailings ponds.

A Pollution Control Agency field investigation determined that mining wastes are not a significant source of suspended solids in mining area waters. However, the possibility exists that ground or surface waters may be in danger of contamination by dissolved metals leached from abandoned waste piles and tailings ponds.

Recommended Policies and Programs

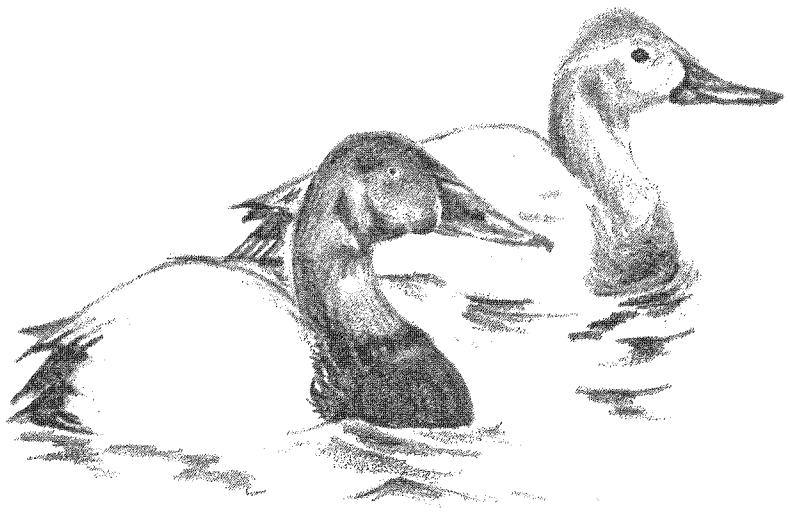
To meet the need of local governments for technical assistance in regulating sand and gravel operations, an interagency Task Force will develop guidelines for existing and abandoned sand and gravel operations. These guidelines will be voluntarily incorporated in county and local ordinances. The guidelines will include, but not be limited to, runoff and

sedimentation control and reclaimation procedures. The Soil and Water Conservation Board will lead the task force and will provide assistance in the use of the guidelines.

The Pollution Control Agency will undertake a field study to investigate the leaching of heavy metals out of wastes.

The cooper-nickel and peat studies have provided information on which to evaluate the potential for water pollution from copper-nickel and peat mining. The Pollution Control Agency will evaluate the results of these studies and take appropriate action to protect water quality if necessary. In estalbishing future rules for copper-nickel and peat mining, the Department of Natural Resources will cooperate with the Pollution Control Agency in developing the water quality provisions of the rules.

The Pollution Control Agency will investigate potential water quality problems associated with uranium mining and initiate any required controls.



What's Next: Future 208 Water Quality Management Planning

Minnesota's Water Quality Management (208) planning will continue until all significant non-point sources of pollution are being addressed by effective management programs and all provisions of the federal regulations have been met. At present, some non-point sources are being adequately managed; some require new or modified management programs; and so little is known about others, or certain aspects of them, that it is impossible to tell if they cause water quality problems. Thus, continuation of the Water Quality Management program will involve three functions: actual implementation of management programs, pre-implementation activities which will lead to putting these recommended programs into operation, and continued study of non-point source issues. Implementation of an identified management program is the responsibility of the management agencies designated by the State Water Quality Management Plan. The Pollution Control Agency will cooperate with affected state and local agencies in monitoring the effectiveness of the management programs, performing necessary pre-implementation work, and carrying out necessary further studies.

Annual (fiscal year) Work Programs, which are prepared by the Pollution Control Agency when making application to the U.S. Environmental Protection Agency (EPA) for supporting funds, will describe the Water Quality Management planning work to be done during the year. A Five-Year Strategy document will also be updated annually and submitted to the EPA with the work program. The Five-Year Strategy establishes a framework and sets priorities for implementing the programs and carrying out pre-implementation and study activities established by the State Water Quality Management Plan or required by federal regulation. It provides a long range outline of future work upon which the yearly activities in the annual work program are based.

A Continuing Planning Process document establishes the overall decision-making procedure for developing the Water Quality Management Plan, the Five-Year Strategy, and the Annual Work Program. The Continuing Planning Process document is updated annually as needed. It assigns planning responsibilities, defines how decisions will be made, and sets the overall framework for the planning process. These documents are prepared to assist the Pollution Control Agency in effective management of water quality planning activities and to report on those activities to the EPA.

All of these documents will be made available annually for public review and comment through the public participation process.

Because resources available for studies and pre-implementation work will be limited, the Pollution Control Agency must select the recommended activities which will be carried out each year. The non-point sources identified in the Plan have been given overall priority based on State Task Force action. The Pollution Control Agency will use these priorities as a quide in developing the annual work program. However, other factors must also be considered. The most important of these is guidance from the EPA. The EPA directs the nationwide 208 Water Quality Management program through control of funding. The EPA prepares and updates guidelines for priority uses of available federal 208 funds. Because the Pollution Control Agency is largely dependent on EPA funds to carry out non-point source planning and pre-implementation activities, the Continuing Planning Process, Five-Year Strategy, and annual work programs must comply with EPA guidelines. Though the EPA allows considerable latitude to the states, it is

likely that national priorities and EPA decisions will influence the rate at which studies and programs recommended by the Plan will be carried out. In addition, as the results of 208 studies across the nation are analyzed and coordinated, the EPA may modify the regulations under which states are conducting water quality management planning. These modifications may require changes in the programs and studies recommended in Minnesota's 208 Plan. Such changes will be made through an annual update of the Plan, the Five-Year Strategy, and the Continuing Planning Process.

During the initial planning phase, questions arose which require further study before recommendations for management programs can made. These further study needs will be scheduled for future study based on the priority of the topic, EPA guidance, the cost of the study, available funds, and other factors.

"In the fight for survival, a tie or split decision simply will not do."

— Merle L. Meacham

APPENDIX A

Information documents on non-point sources available from the Minnesota Pollution Control Agency, 1935 County Road B2, Roseville, MN 55113; phone: 612/296-7294

Information Packages Addressing Non-Point Sources of Water Pollution — Prepared by the Minnesota Pollution Control Agency, Division of Water Quality.

Water Quality Management: Minnesota's 208 Plan
- Highway De-Icing Chemicals, Package I and Supplement
- Highway De-Icing Chemicals, Package II
- Highway De-Icing Chemicals, Package III
- Feedlots, Package I
- Feedlots, Package II (also titled: Description of Existing Institutions and Programs Related to Water Quality Management Planning Study Topics)
- Feedlots, Package III
- Agriculture, Package I and Supplement
- Agriculture, Package I Supplement: Management Practices
- Agriculture, Package I Supplement: Economic Considerations
- Agriculture, Package II
- Agriculture, Package III
- Irrigation and Drainage, Package II
- Roadside Erosion, Package I and Supplement
- Roadside Erosion, Package I Supplement: Management Practices
- Roadside Erosion, Package II
- Roadside Erosion, Package III
- Pesticides, Package I and Supplement
- Pesticides, Package II
- Pesticides, Package III
- Urban Runoff, Package I and Supplement
- Urban Runoff, Package II
- Urban Runoff, Package III
- Forestry, Package I
- Forestry, Package II
- Forestry, Package III
- Construction, Package I and Supplement
- Construction, Package II
- Construction, Package III
- Residual Wastes and Supplement
- Mining and Revised Mining
- Wild Rice
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Appendix B

Glossary

ABATEMENT — the reduction in degree or intensity of pollution

ABSORPTION —the penetration of a substance into or through another.

ALGAE — a class of plants, one or many-celled, capable of producing food through photosynthesis.

AMMONIA — a compound of nitrogen and hydrogen (NH_3) which, when present in water, indicates that human or animal wastes have been recently introduced. It is also a source of nitrogen which can cause nutrient enrichment and eutrophy. Ammonia can be toxic to aquatic animals when present in sufficient quantity.

AQUATIC PLANTS — plants that grow and live in water; they may be floating, submerged, or emergent.

BIOCHEMICAL OXYGEN DEMAND (BOD) — a measure of the amount of oxygen consumed in the biological process that breaks down organic matter in water. Large amounts of organic waste use up large amounts of dissolved oxygen; thus, the greater the degree of pollution, the greater the BOD.

COLIFORM — any of a number of bacteria common to the intestinal tract of man and animals. Their presence in water is an indication of pollution, though coliform bacteria do not themselves iause disease.

ECOSYSTEM — a system made up of a community of animals, plants, and bacteria and its interrelated physical and chemical environment.

ENVIRONMENT — the sum of all external conditions affecting the life development, and survival of an organism.

EROSION — the wearing away of land by wind or water; occurs naturally from weather or runoff, but is often intensified by human activities.

EUTROPHIC — 'well nourished'; describes waters high in nutrients and high in photosynthetic productivity.

FEEDLOT — an area where animals are confined in such density that a cover of vegetation is not maintained.

GOUNDWATER — water in the porous rocks and soil of the earth's crust.

HABITAT — the place where a plant or animal naturally grows or lives (native environment); the sum total of the environmental conditions at a specific place that is occupied by an organism, a population, or a community.

IMPERVIOUS SURFACE — ground cover which does not allow for infiltration of water (e.g., roofs, parking lots, and roads); increases the volume and speed of runoff after a rainfall.

IMPLEMENTATION PLAN — a document of the steps to be taken to ensure attainment of environmental quality standards within a specified time period.

LEACHING — the process by which water passing through soil washes soluble materials in the soil such as nutrients, pesticide chemicals, or contaminants into lower layers of the soil.

LOADING — the amount of a pollutant that enters a lake or stream.

MANAGEMENT AGENCY — the government agency, or combination of agencies, which is responsible for carrying out each of the management programs included in the Water Quality Management Plan.

MANAGEMENT PRACTICE — a combination of management practices, programs, and agencies which are a means of mitigating particular water pollution problems, or portions thereof.

NITROGEN — a chemical element which makes up about 80% of the atmosphere and is essential for life.

NON-POINT SOURCE (NPS) — those sources of pollution which are generally not controllable through traditional, end-of-the-pipe technology (i.e., effluent guidelines) and which, conversely, are generally best controlled through land use practices or best management practices (BMPs). For the most part, they are man-made. Natural or background sources of pollution, through often signifncant in their own right, are not covered under this definition.

NUTRIENT — a chemical substance (e.g., nitrogen and phosphorus) absorbed by green plants and used for growth.

ORGANIC — referring to, or derived from, living organisms; in chemistry, any compound containing carbon.

PHOSPHORUS — an element that, while essential to life, contributes to the eutrophication of lakes and other bodies of water.

POINT SOURCE — any pipe, ditch, channel, tunnel, conduit, well operation, or vessel or other floating craft from which pollutants are, or may be, discharged.

POLLUTION (natural) — soil, mineral, or bacterial impurities picked up by water from the earth's surface, apart from any human activity.

POLLUTION (water) — contamination or other alteration of the physical, chemical, or biological properties of water or the discharge into the water of any substance that may create a nuisance or render such water detrimental or injurious to public health, safety, or welfare.

REGULATORY PROGRAM — the government program or combination of programs necessary to ensure implementation of management practices or other measures needed to correct identified water pollution problems and to implement the Water Quality Management Plan.

RESIDUAL WASTES — wastes resulting from the collection and/or treatment of materials for purposes of air and water pollution control.

RUNOFF — see surface runoff.

SEDIMENTATION — deposits in rivers, lakes, and streams of materials transported to them by water.

SPECIES — a closely related group of organisms that are able to interbreed with one another.

SURFACE RUNOFF — the portion of rainfall, melted snow, or irrigation water that flows across land surfaces and eventually discharges into a water body.

SUSPENDED SOLIDS — small particles of solid pollutants that contribute to turbidity.

TOXIC — describes a material which, upon exposure, ingestion, inhalation, or assimilation into any organism either directly or indirectly may cause death, disease, cancer, genetic mutations, physiological malfunctions, or physical deformations.

TURBIDITY — a cloudy condition in water due to the suspension of silt or finely divided organic matter.

URBAN RUNOFF — stormwater from city streets and gutters that usually contains a

great deal of litter and organic and bacterial wastes.

U.S. EPA (Also EPA) — the United States Environmental Protection Agency.

WATER POLLUTION — alteration of the chemical, physical, or biological condition of the water, making it less desirable for recreation, industry, and wildlife.

WATER QUALITY MANAGEMENT PLAN — the final product of the initial 208 Water Quality Management Planning process, as mandated by Section 208 of the Federal Water Pollution Control Act of 1972.

WATER QUALITY STANDARD — a plan for water quality and its management containing four major elements: the use to be made of water, criteria to protect those uses, implementation and enforcement plans, and an anti-degradation statement to protect existing high-quality waters.

WATERSHED — the area drained by a given stream or lake.