



Minnesota Board of Water and Soil Resources.
Minutes.

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Southbridge Office Building
155 South Wabasha Ave., Suite 104
St. Paul, Minnesota 55107

(612) 296-3767

February 14, 1989

TO: Board of Water and Soil Resources Members, Staff,
and Advisors
FROM: *Jim Birkholz* for
Jim Birkholz, Executive Director
SUBJECT: February 22, 1989 BWSR Meeting

Attached is the agenda and the informational material for the February 22nd Board meeting. As usual, the meeting will start at 9:00 a.m. in Conference Room A of the Department of Agriculture Building, 90 W. Plato Blvd., St. Paul, Minnesota.

Regional Offices

Northwest Region
1819 Bemidji Ave.
Bemidji, MN 56601
218-755-3963

Northeast Region
Government Service Center
320 W. 2nd Street
Room 603
Duluth, MN 55802
218-723-4752

West Central Region
611 Iowa Avenue
Staples, MN 56479
218-894-1692

South Central Region
Box 756
New Ulm, MN 56073
507-354-2196

Southeast Region
Friedell Bldg., Room 100
1200 S. Broadway
Rochester, MN 55904
507-285-7458

Southwest Region
Box 111
1400 E. Lyon Street
Marshall, MN 56258
507-537-7260

East Central Region
Southbridge Office Building
155 South Wabasha Ave., Suite 104
St. Paul, MN 55107
612-296-3767

This meeting, as is typically the case in February, is one of the few months in which we do not have an agenda heavy-laden with policy and program decisions. It offers us an opportunity to hear input from several of the agencies which have significant roles in the Comprehensive Water Bills currently before the legislature. As you recall, we started these discussions at the January Board meeting. I draw your attention to the enclosed information from the Extension Service. It describes some of the current activities the Extension Service has underway. Of foremost importance is the work Extension is currently conducting with the U.S. Department of Agriculture, Soil Conservation Service, to update conservation planning criteria to also include water quality planning criteria. These activities have far reaching consequences for all the local governments and landowners which the Board serves. Dr. Jim Anderson, Chair of the University of Minnesota Center for Agricultural Impacts on Water Quality will be at the meeting to update the Board on current activities. This is a perfect opportunity to resolve questions about how current research activities dovetail with planned water quality protection provisions of the Comprehensive Water Bills.

Current hot topics from the big water bills will dominate the remainder of the agenda also. The sustainable agriculture program and the pesticide program provisions of the bills will be reviewed by Department of Agriculture staff. The Education component as it relates to the responsibilities of the Minnesota Environmental Education Board will be reviewed by Jackie Lind, the Director of MEEB. State Planning Agency staff will cover the proposed Legislative Commission on Water.

February 14, 1989

This month, Lance Yohe, President of The International Water Coalition will describe the status and progress of the Comprehensive Local Water Planning Process in the fifteen counties of the Red River Valley of the North.

As you can see, the February meeting agenda affords alot of opportunity for questions and discussion on issues related to the Comprehensive Water Bills in the legislature. Please come prepared for an active session of questions and discussion. Other legislative initiatives will be covered in my Executive Director's report. If you have questions, comments, or additions to the agenda, please contact Chairman Ogaard or myself. Please travel safely. I look forward to seeing you on February 22nd.

JB:mja
Enc.

P.S. The May 24th BWSR meeting will be scheduled at the Detroit Lakes Holiday Inn. On Tuesday, May 23rd, the BWSR will tour water management and soil conservation practices, problems, and opportunities in the Red River Valley. A full day bus tour is planned. Please bring the enclosed sign-up sheet to the February 22nd meeting with you so that we may obtain a count of total numbers planning to attend. Thank you for your attention to this item.

BOARD OF WATER AND SOIL RESOURCES
DEPARTMENT OF AGRICULTURE BUILDING
CONFERENCE ROOM A
90 WEST PLATO BOULEVARD
ST. PAUL, MINNESOTA 55107
FEBRUARY 22, 1989

PRELIMINARY AGENDA

- | | |
|------------|---|
| 9:00 a.m. | 1. Call to Order |
| | 2. Adopt Agenda |
| | 3. Approve Minutes of January 25, 1989 |
| | 4. Chairman's Report - Donald Ogaard |
| | 5. Executive Director's Report - Jim Birkholz |
| | 6. EQB/Water Resources Committee Report - Loni Kemp and Pat Bloomgren |
| | 7. National Association of Conservation Districts Convention Report - Hal Anderson |
| 10:00 a.m. | 8. Comprehensive Water Legislation March Workshops - Pat Bloomgren |
| | 9. Current Water Quality Research - What's the connection to the Big Water Bills? - Dr. Jim Anderson, Chair, Center for Agricultural Impacts on Water Quality |
| | 10. Sustainable Agriculture Program - Minnesota Department of Agriculture - Jerry Heil, Director, Planning Division |
| Noon | Lunch |
| 1:00 p.m. | 11. Continuation of Comprehensive Water Legislation Pesticide Program - Minnesota Department of Agriculture, Greg Buzicky
- Education - Minnesota Environmental Education Board, Jackie Lind, Director
- Legislative Commission on Water, State Planning Agency, Marilyn Lundberg |
| 2:30 p.m. | 12. Comprehensive Local Water Planning in the 15 County Red River Basin - Lance Yohe, President, The International Water Coalition |
| 3:00 p.m. | 13. R.I.M. Reserve Allocations - Wayne Edgerton |
| | 14. Morrison SWCD Nomination Districts Boundary Change - Jim Birkholz |
| | 15. Northeast Region Issues Report - Chris Hofstede |
| 3:45 p.m. | Adjourn |

ATTENDANCE SHEET

BOARD OF WATER AND SOIL RESOURCES MEETING AND TOUR
MAY 23 - 24, 1989
HOLIDAY INN
DETROIT LAKES, MINNESOTA

Name: _____

	<u>YES</u>	<u>NO</u>
May 22 Lodging	_____	_____
May 23 Tour	_____	_____
May 23 Lodging	_____	_____
May 24 BWSR Meeting	_____	_____
May 24 Lodging	_____	_____
Will your spouse be attending?	_____	_____

Minnesota Department of Agriculture

90 West Plato Blvd.
St. Paul, Minn. 55107
(612) 297-1551

FEB 10 1989

For release: February 10, 1989
Contact: Tony Anderson
Planning Division
(612) 296-1277

News Release

LOW INTEREST LOANS FOR SUSTAINABLE AGRICULTURE PROJECTS NOW AVAILABLE

St. Paul — Growers wanting to finance profitable and environmentally-sound farm innovations may now apply for a low-interest loan through a new sustainable agriculture program, Minnesota Commissioner of Agriculture Jim Nichols said today.

Loans will be made to farmers to purchase new or used machinery or equipment and make improvements to reduce input costs while showing profitability and environmental benefits for the farm. The new \$1 million revolving loan fund was established by the Minnesota Legislature last year.

Examples of some eligible projects include conservation tillage and planting equipment, energy efficient grain drying systems, equipment to reduce herbicide use, energy production equipment or improvements such as conversion to energy saving devices in dairy farms or irrigating, efficient composting systems and fencing or rotational grazing. Operating expenses are not eligible for the loan program.

Loan limits are \$15,000 per individual, or a maximum of \$75,000 to five or more individuals on joint projects. Interest rates are set at 6 percent, and applicants must demonstrate an ability to repay.

—more—



LOANS
ADD-1

Applications will be accepted at any time, and loans will be issued quarterly. A panel comprised of farmers, lenders and agriculture specialists will review applications and make recommendations on the loans to the Commissioner of Agriculture.

To receive an application for the program contact the Sustainable Agriculture Loan Program, Minnesota Department of Agriculture, 90 West Plato Blvd., St. Paul, MN 55107, or call (612) 296-3820.

-MDA-

Minnesota Department of Agriculture

90 West Plato Blvd.
St. Paul, Minn. 55107
(612) 297-1551

For release: February 10, 1989
Contact: Tony Anderson
Planning Division
(612) 296-1277

News Release

SEVENTEEN SUSTAINABLE AGRICULTURE GRANTS ANNOUNCED

St. Paul — Minnesota Commissioner of Agriculture Jim Nichols today announced 17 projects will receive \$284,454 in funding under the new Sustainable Agriculture Demonstration Grants Program.

The program was designed by the Minnesota Legislature in 1988 to help demonstrate and promote alternative agricultural practices that are energy efficient, environmentally sound, profitable and will enhance the self-sufficiency of Minnesota farmers.

"All the funded projects will be run by farmers with varying degrees of assistance from researchers, consultants and extension agents," Nichols said. "Each project will include on-farm demonstrations to provide hands-on experience with low-input sustainable agriculture techniques and to allow other farmers to benefit from the project."

While the demonstrations will involve a variety of enterprises in several areas of the state, many will show methods of reducing pesticide and fertilizer use. For example, Nichols said, a group of farmers in east-central Minnesota will work with extension agents researching a field nitrate test kit so that farmers can do "on the spot" analysis to help increase the efficiency of nitrogen fertilizer use.

—more—



GRANTS
ADD-1

Several projects will demonstrate various alternatives to herbicides using crop rotation, cover crops, mulches or intercropping legumes. Minnesota apple growers are setting up an early detection system to reduce fungicide applications for apple scab. Pasture and livestock management is the other major area of demonstrations to receive grants. One farmer will demonstrate intensive rotational grazing on a dairy farm in southeastern Minnesota. The farmer will try to show that the pasture management technique, along with forages grown without chemicals, can improve herd health and productivity, build a stronger pasture and add to the farm's profitability.

The amount of the funding for the demonstrations also varies. Some \$2,800 was awarded to a tree seedling mulching project in Fillmore County and three projects received \$25,000, including a Norman County demonstration of conservation tillage and reduced inputs for sugar beets, spring wheat and soybeans. Projects will run up to three years.

In awarding the grants, Nichols adopted the recommendations of a panel of reviewers comprised of farmers and crop and livestock specialists. The panelists looked for several features in the demonstrations. Projects recommended included input reduction or use of on-farm resources, environmental benefits, profitability of the demonstrated practice for the farm, the widespread transferability to other farms, the plan for informing the public about the demonstration and the ability of the applicant to accomplish the project goals.

For further information regarding the grant program contact the Energy and Sustainable Agriculture Project, Minnesota Department of Agriculture, 90 West Plato Blvd., St. Paul, Minn., 55107, or call (612) 296-7673.

MINNESOTA DEPARTMENT OF AGRICULTURE
SUSTAINABLE AGRICULTURE GRANT PROGRAM
1988/1989 GRANT RECIPIENTS

TITLE: Herbicide Ban? Could you Adapt on a Budget?
COUNTY: Lac Qui Parle APPLICANT: David Michaelson FUNDS: \$16,000
DESCRIPTION: Show other farmers that they can raise soybeans and corn while reducing external inputs (fertilizer & herbicides). Demonstrate that many farmers already own the equipment they need to reduce these inputs.

TITLE: A Demonstration of An Intensive Rotational Grazing System for Dairy Cattle
COUNTY: Houston APPLICANT: Ken Tschumper FUNDS: \$12,800
DESCRIPTION: This project will demonstrate the intensive rotational grazing system for dairy cattle feeding. The project will show: 1. New fencing technology, 2. improved productivity, 3. high quality forages without chemicals, 4. reduced fertilizer inputs.

TITLE: Improving groundwater quality and agricultural profitability in EC MN
COUNTY: Isanti APPLICANT: Rod Elmstrand FUNDS: \$21,075
DESCRIPTION: Research a field nitrate testing kit for farmers to do "on the spot" analysis which will eliminate excessive nitrogen use and maximize economic inputs.

TITLE: Modified Ridge Till System for Sugarbeet Production
COUNTY: Grant APPLICANT: Alan Brutlag FUNDS: \$24,900
DESCRIPTION: This project will modify ridge till systems and make it adaptable to sugarbeet production. Should reduce soil erosion and fertilizer and herbicide use. De-ridging and planting into a moist well drained, warm seed environment should net higher yields.

TITLE: Alternative Mulch Systems for Intensive Specialty Crop Production
COUNTY: Ottertail APPLICANT: Ron Roller FUNDS: \$12,618
DESCRIPTION: This project is designed to look at a number of alternative mulching systems in comparison to standard plastic mulch and no mulch systems. Advantages will include decrease soil and moisture loss, increase soil organic matter, and higher grade crops.

TITLE: Intensive Rotational Grazing in Sheep Production
COUNTY: Wadena APPLICANT: James Robertson FUNDS: \$14,457
DESCRIPTION: This project will demonstrate how to implement an intensive rotational grazing system on a farm which has used a conventional cool season low-intensity grazing system. Project will evaluate environmental benefits, and production costs and levels.

TITLE: Demonstration of tillage effects on utilization of dairy and hog manure
COUNTY: Goodhue APPLICANT: James Swan FUNDS: \$25,000
DESCRIPTION: This project will evaluate farming systems which emphasize more efficient utilization of manure as a source of nitrogen, and the relationship between manure and N fertilizer in groundwater contamination.

TITLE: Demonstration of land stewardship techniques in the Red River Valley
COUNTY: Norman APPLICANT: Donald Ogaard FUNDS: \$25,000
DESCRIPTION: Conservation tillage and reduced chemical inputs for sugar beet, spring wheat, and soybean production will be demonstrated on 80 to 160 acres in the Red River Valley.

TITLE: Transition-Soil Building and Maintenance
COUNTY: Yellow Medic. APPLICANT: Larry Olson FUNDS: \$20,543
DESCRIPTION: Will show advantages and disadvantages of using raw manure, compost, and legumes to build and maintain soil fertility. Farm profitability and environment effects will be monitored.

TITLE: Hairy Vetch and Winter Rye as Cover Crops
COUNTY: Freeborn APPLICANT: Mark Ackland FUNDS: \$ 3,700
DESCRIPTION: This study would test the usefulness of hairy vetch, hairy vetch plus winter rye, or winter rye alone as cover crops after oats and preceding corn. A randomized replicated experiment will include the cover crops plus a no cover crop control.

TITLE: Minnesota Integrated Pest Management Apple Project
COUNTY: Dakota APPLICANT: Apple Growers FUNDS: \$22,600
DESCRIPTION: Establishment of baseline information on scab sporulation and infection. Information on the conditions which are ideal for infection will be made available biweekly to apple growers participating in the project to help reduce fungicide applications.

TITLE: Alternative Methods of Weed Control in Corn
COUNTY: Jackson APPLICANT: Esther Nickel FUNDS: \$20,810
DESCRIPTION: This demonstration will evaluate alternative methods of weed control for row cropped corn. Treatment would be banded herbicide, no herbicide and an intercropped legume.

TITLE: Mechanical Mulching of Tree Seedlings
COUNTY: Fillmore APPLICANT: Tim Gossman FUNDS: \$ 2,800
DESCRIPTION: This project will demonstrate a method of improving the survival rate of tree seedlings and through statistical and financial analysis that mulching is a viable alternative in economic terms to the conventional chemical control of weeds.

TITLE: Benefits of Crop Rotation in Reducing Chemical Inputs and Increasing Profit
COUNTY: Aitkin APPLICANT: George Shetka FUNDS: \$18,222
DESCRIPTION: The normal practices of applying a fungicide and a herbicide on continuously cropped wild rice will be compared to alternately rotating wild rice with winter rye or sweet clover/buckwheat without applying these chemicals on wild rice years.

TITLE: Strip-cropping legumes with specialty crops
COUNTY: Hennepin APPLICANT: Mark Zumwinkle FUNDS: \$25,000
DESCRIPTION: A living mulch system will be strip cropped between ridges of pepper and broccoli. The reduction in fertilizer and pesticide inputs will be compared to the conventional chemically intensive methods of producing these crops.

TITLE: Using Sheep and Goats for Brush Control in a Pasture Management System
COUNTY: St. Louis APPLICANT: Alan Ringer FUNDS: \$11,638
DESCRIPTION: This proposed project will demonstrate that sheep and goats can be used as biological controls to suppress woody brush growth so that a permanent pasture can be established.

TITLE: Benefits of Weeder Geese and Composted Manures in Commercial Strawberries
COUNTY: St. Louis APPLICANT: Joan Weyandt-Fulton FUNDS: \$ 7,291
DESCRIPTION: This project will demonstrate that geese are an economical and practical alternative to pre-emergent herbicides for keeping a PYO strawberry field clean of weeds. Will also demonstrate benefits of using composted manures for a well balanced fertility program.



FEB 21 1989

February 15, 1989

Mr. Jim Burkholz
Executive Director
Water and Soil Resources Board
90 W. Plato Boulevard
St. Paul, Minnesota 55107

Dear Mr. Burkholz,

The Board of Water and Soil Resources is having an Out State meeting and tour of Southeast Minnesota on September 27 and 28, 1989.

On behalf of The Board of Water and Soil Resources and Pickwick Mill Incorporated Board, we would like to invite you to the dedication ceremony of Pickwick Mill Pond at 3 P.M. on September 28th, followed by a tour of Apple Drive at La Crescent and supper on the Wilkee, Levee Park on the Mississippi River in Winona.

This dedication marks a tremendous accomplishment of cooperation between local, county, and state government agencies in conjunction with a grass roots effort by private citizens.

Pickwick Pond, as you know, is a restoration of a 13 acre lake which was devastated by a flood in 1980. The construction of this project was spearheaded by a local group, Pickwick Mill Incorporated, who banded together to appropriate funds for the reconstruction of this scenic and valuable resource. Through the coordination of this local group and the cooperation of local, county and state agencies the project has been accomplished.

Over \$450,000 has been spent to restore the pond which provides not only beauty to the scenic valley but recreation as well. It is therefore with great pride that we ask you to join us in the dedication of Pickwick Pond.

We thank you for your consideration of this request and would appreciate a reply as soon as possible so we can finalize our plans.

Sincerely,

Eugene Kalmes

Eugene Kalmes

Member of Board of Water and Soil Resources

Opal Fitch

Opal Fitch

President, Pickwick Mill Incorporated

Pickwick Mill, Incorporated, Box 645, Winona, Minnesota 55987

A non-profit Corporation dedicated to the preservation and restoration of the Historic Pickwick Mill Site.

BOARD OF WATER AND SOIL RESOURCES
DEPARTMENT OF AGRICULTURE BUILDING
CONFERENCE ROOM A
90 WEST PLATO BOULEVARD
ST. PAUL, MINNESOTA 55107
FEBRUARY 22, 1989

AGENDA

- 9:00 a.m. 1. Call to Order
2. Adopt Agenda
3. Approve Minutes of January 25, 1989
4. Chairman's Report - Donald Ogaard
5. Executive Director's Report - Jim Birkholz
6. EQB/Water Resources Committee Report - Loni Kemp and
 Pat Bloomgren
7. National Association of Conservation Districts
 Convention Report - Hal Anderson
- 10:00 a.m. 8. Comprehensive Water Legislation
 March Workshops - Pat Bloomgren
9. Current Water Quality Research - What's the connection
 to the Big Water Bills? - Dr. Jim Anderson, Chair,
 Center for Agricultural Impacts on Water Quality
10. Sustainable Agriculture Program - Minnesota Department
 of Agriculture - Jerry Heil, Director, Planning Division
11. Advisor Comments
- Noon Lunch
- 1:00 p.m. 12. Continuation of Comprehensive Water Legislation
 - Pesticide Program - Minnesota Department of Agriculture,
 Greg Buzicky
 - Education - Minnesota Environmental Education Board,
 Jackie Lind, Director
 - Legislative Commission on Water, State Planning Agency,
 Marilyn Lundberg
- 2:30 p.m. 13. Comprehensive Local Water Planning in the 15 County Red
 River Basin - Lance Yohe, President, The International
 Water Coalition
- 3:00 p.m. 14. R.I.M. Reserve Allocations - Wayne Edgerton
15. Morrison SWCD Nomination Districts Boundary Change - Jim Birkholz
16. Northeast Region Issues Report - Chris Hofstede
17. Additional Agenda Items
- 3:45 p.m. Adjourn

MINUTES OF FEBRUARY 22, 1989
OF THE
BOARD OF WATER AND SOIL RESOURCES

Appointed Members in Attendance

Donald Ogaard
John Williamson
John Boulton
Don Warner
Loni Kemp
Eugene Kalmes
John Brooks, Jr.
Howard Peterson
William Cofell
Jack Graba
Ken Schellack
James Hoese
Loren Harste
Doug Bade

Appointed Members Absent

Lowell Moen
Natalie Haas-Steffen

Others in Attendance

Paul Burns, Minnesota Department of Agriculture
Ron Nargang, Minnesota Department of Natural Resources
Wayne Anderson, Minnesota Pollution Control Agency
Valentine O'Malley, Minnesota Department of Health
Bill Larson and Jim Anderson, University of Minnesota/Extension Service
Al Dornfeld, Minnesota Association of Watershed Districts
Franklin Denn, Minnesota Association of Townships
Dwain Otte, Mary Peterson, and Ken Pedersen, Minnesota Association of Soil
and Water Conservation Districts
Paul Kalass, Minnesota Association of Conservation District Employees
Nels Nelson, Baar Engineering
Marilyn Lundberg, State Planning Agency
Jackie Lind, Minnesota Environmental Education Board
Lance Yohe, The International Water Coalition
Jerry Heil and Rick Gauger, MDA/Planning Division
Greg Buzicky and Kim Benson, MDA/Agronomy Division

Staff Present

Jim Birkholz
Pat Bloomgren
Chris Hofstede
Hal Anderson
Wayne Edgerton
Greg Larson
Denice DeFrates
Mary Jo Anderson

Meeting Called to Order - Chairman Ogaard called the meeting to order at 9:00 a.m. in Conference Room A of the Minnesota Department of Agriculture Building, 90 W. Plato Boulevard, St. Paul, Minnesota.

- 89-06 **Adopt Agenda** - Moved by Hoese, seconded by Kalmes, to adopt the agenda as presented. Affirmative: Ogaard, Williamson, Boulton, Warner, Kalmes, Bade, Schellack, Hoese, Harste, Peterson, Graba, Kemp, and Cofell. Opposed: None. Carried.

- 89-07 **Approval of Minutes of January 25, 1989** - Howard Peterson stated that on page two, #89-02, Howard Peterson should be listed in the opposition rather than in the affirmative. Moved by Peterson, seconded by Bade, to approve the minutes of January 25, 1989, as corrected. Affirmative: Ogaard, Williamson, Boulton, Warner, Kalmes, Bade, Schellack, Hoese, Harste, Peterson, Graba, Kemp, and Cofell. Opposed: None. Carried.

Chairman's Report - Chairman Ogaard reported that the U.S. Army Corps of Engineers had withdrawn their notice to change certain permitting activities and instead scheduled meetings to inform interested parties of the Corps responsibilities. Chairman Ogaard stated that he attended the New Supervisors Orientation sponsored by the Board on January 26-27, 1989, at Cragun's in Brainerd. Chairman Ogaard reported that it was a very good session. Chairman Ogaard reported that a proposal has been drafted for the BWSR to organize a metro local water management task force. He and staff have met with Senator Dahl regarding legislative participation. The task force would invite participation from parties interested in recommending ways to ensure successful water management implementation in the metro area. Chairman Ogaard reported on the EQB meeting. Chairman Ogaard asked that BWSR members return their attendance sheets for the May BWSR meeting in Detroit Lakes. He then requested BWSR member comments on local responses to the comprehensive groundwater bill and related issues.

Loni Kemp reported that she is chairing the Fillmore County planning meetings and groundwater protection and ag chemicals are their highest priorities. She stated that they have many good ideas, the only constraint is a lack of faith in the funding resources available. Loni reported that she made a presentation at a joint meeting of the Minnesota Corngrowers Association and Irrigators Association at Canterbury Inn in Shakopee. The topic was farm chemicals and pesticides. She felt that the attendees at the meeting were very receptive. Loni has a handbook published by the Minnesota Project that is for sale and available to the general public on groundwater protection. The price of the handbook is \$2.50, if anyone is interested in purchasing this handbook you may contact Loni.

Howard Peterson reported that western Hennepin County is dealing with water issues. His watershed board is actively involved in solutions.

the rest are in various stages of development.
Doug Bade reported that one watershed management plan in Carver County is complete, ~~and one is underway~~. There is a lot of interest in sediment control as one solution to water management problems.

assisting in the establishment of environmental education during the school year.
Don Warner reported that he ~~has been invited to speak at local schools for two OK days on groundwater and pollution.~~ Education is what is needed.

James Hoese reported that a lot of discussion is taking place. Education is the key to make farmers aware of chemical management.

John Brooks, Jr., reported that the Clearwater County water plan is a unique situation in his area. He is impressed with the cooperation and working relationships. Good awareness in his area.

Gene Kalmes reported that he's on the technical committee on underground storage tanks. He feels that the issue of beach sanitation needs to be addressed, as Winona County has much recreational and residential boat use along the Mississippi River.

Ken Schellack reported that many people in the Red River Valley have strong reactions to the Big Water Bill. Where funding will come from is a concern. Good education programs for the farm industry is drastically needed. There is a need to get the word out that farmers are trying to protect water and be careful not to condemn the farmer. Ken reported that he worked at the Red River Valley Winter Show with Dick Ness.

John Boulton reported that the water plans are going great. He attended the NACD National Convention in Salt Lake City, Utah, along with Lowell Moen. He reported that Bob Wetherbee, from Minnesota, is now President of NACD. He suggested using more volunteers and retired professionals, to work on environmental issues. John reported that the U.S. Army Corps of Engineers section 404 violation is coming to a head. John stated that he is hearing that people are aware of the BWSR and support it.

Loren Harste reported that his area has a groundwater monitoring program. It will take time, but they hope to gather good information. He worked at the booth at the regional environmental education display. There is much interest in sealing of abandoned wells. The time is right for education, he stated that there is a receptive attitude towards these issues.

Jack Graba reported that his county hasn't started the comprehensive water planning. He doesn't hear much in Wadena County about the water bill, but people are concerned about water wells.

Bill Cofell reported that he has been attending some water related meetings. A change of fees, as contained in the big water bill is a concern of people in his area. 20 citations have been issued in Stearns County for feedlots. There is an interest in sustainable ag in his area. Educational efforts are needed with funds allocated for education. He stated that he attended the SWCD Annual banquet in Stearns County. The recipient of the Outstanding Conservation Farmer award in the county is using no-till technology, which he feels is very good. The farmer made an outstanding presentation which would be valuable for more people to see.

John Williamson reported that a well capping demonstration will be held in his area for awareness and publicity. The Diamond Lake Association requested the Kandiyohi SWCD to run AgNIPS for the watershed. Water planning hasn't been started in Kandiyohi County. John reported that talk is negative on water planning, and more education is needed. There is a concern that this would be just another plan to sit on the shelf.

Wayne Anderson, PCA, stated that PCA will be assisting in all plans that are being developed for local water planning. PCA foresees a short review and comment period,

they haven't determined how this will be addressed. They would like to invest more time in the development of plans rather than the final comment period. Hopefully, this will be a meaningful process.

Ron Nargang, DNR, reported that he just returned from three days in Washington, D.C., discussing initiatives in the groundwater area. There is a commitment to move a groundwater bill in congress this year. Ron stated that a counter-proposal to S203, which focuses heavily on groundwater research, (S206) is gathering momentum. He stated that the Board should be aware of the development of the no net-loss wetlands policy on the federal level. Ron reported on the drought issue. Only three of sixteen rivers have come back to their base level. There is a need for more snow. Irrigation is an issue with farmers losing their irrigation base, for federal commodity programs if their rigs are shut down for a season due to drought.

Dr. Valentine O'Malley, Department of Health, reported that they have increased their staff effort in local water planning. There is an increased public interest on water quality, mostly from the rural areas. There is an interest for increased monitoring; with a need for deep aquifers to be tested.

Paul Burns, Department of Agriculture, reported that the Big Water Bill is a challenge; trying to get it all done at one time while also assisting with the local water planning process. Paul stated that he's looking forward to hearing the report on sustainable ag today. He stated that an upcoming issue of concern is microbiobiochemicals.

Executive Director's Report - Jim Birkholz reported that staff has been working on an agreement with FmHA on easements. Jim reported that a Business Manager position reclassification request has been sent to Employee Relations. This person would work on personnel, accounting and budgeting responsibilities. The deadline for submitting applications for the Hydrologist vacancies is February 24th. This is for the 110B and metro water planning positions. A six-month temporary position has been created to get caught up on 110B and 509 plans. Jim reported that he, Jack Ditmore, and Bob Dunn met with the editors of newspapers in Rochester and Mankato to promote the Governor's Environmental Package including RIM and the water legislation. They had good meetings with the editors. Jim reported that he has been meeting with legislators on the Board and local government role in the Big Water Bill. He reported that the language is set for RIM. The RIM Coalition is meeting tonight. Jim reported that certain drought relief legislation which includes the BWSR needs to also include DNR and Health with respect to drinking water supplies. Legislators are looking to the BWSR. The BWSR budget was heard in the Senate last week and went well. It will be heard in the House tomorrow.

EQB/Water Resources Committee Report - Loni Kemp reported that she didn't attend the meeting due to inclement weather. The EQB is awaiting comments on their proposed surface water monitoring study. The EQB distributed a work plan for the Water Resources Committee. The WRC formed an "Outreach Committee", Pat Bloomgren as Chair, to work on dissemination information on the Big Water Bill. Loni reported that the Center for Urban and Regional Affairs (CURA) shows strong citizen support for groundwater protection.

National Association of Conservation Districts Convention Report - Hal Anderson reported that he attended the annual convention in Salt Lake City, Utah. He reported that nearly 2,000 people were in attendance. A new song was introduced, "Ugly Farming" regarding the concern for conservation, which Hal played for the BWSR. He attended a training session on how to conduct effective meetings. Neil Sampson was the keynote speaker at the general session. He heard a very good speaker on no-till farming. Hal thanked the BWSR for sending him to the national convention, and recommended the BWSR continue to send board representatives as it is very educational.

Comprehensive Water Legislation - Pat Bloomgren reported that the following meetings will be held on the comprehensive water legislation:

- March 6 - Fergus Falls
- March 7 - Rochester
- March 8 - North Mankato
- March 9 - Marshall
- March 13 - Crookston
- March 23 - Grand Rapids
- March 31 - Brooklyn Center

Pat encouraged the BWSR members to attend. A sign-up sheet was distributed to BWSR members, and they were asked to assist in leading the discussion. Pat reported that the project managers are enthusiastic about these meetings and will be part of the program. Meeting invitations will be mailed today.

Current Water Quality Research - What's the Connection to the Big Water Bills?

- Jim Anderson, Chair, Center for Agricultural Impacts on Water Quality. Dr. Anderson distributed the following handouts for the BWSR's information: "Clean Water Everybody's Concern", "Water Quality Research Program", "Nitrogen and Pesticides in Tile Drainage", "Summary, Developing Standards and Specifications for Nutrient and Pesticide Management", "The Role of The Minnesota Extension Service and the Minnesota Agricultural Experiment Station in the Water Quality Issue". Dr. Anderson stated that research and education are important. The Big Water Bill legislation gives us the opportunity to use both of those. He gave a slide presentation on nitrate concentrations in the soil water as influenced by nitrate application and tillage treatment in Olmsted County, showing the relationship between profitability and nitrate leaching. The Center for Agricultural Impacts on Water Quality has been working with the Soil Conservation Service on nutrient and pesticide management planning standards for use by all farmers. Minnesota is one of five states that is doing this. He discussed the development of best management practices in addition to planning standards. This is a significant project. Dr. Bill Larson stated that there is a proposed name change for the Soils Science Department, that being "Soil, Water and Climate". Ken Schellack stressed, along with Jim Anderson, that putting efforts together on education rather than strictly relying on enforcement would help alleviate problems in landowner acceptance both in rural and urban areas.. Publicity/education is so important and needed.

Sustainable Agriculture Program - Jerry Heil and Rick Gauger, Minnesota Department of Agriculture/Planning Division, gave a slide presentation on the Energy and Sustainable Ag Project. The social definition of this is "A sustainable agriculture is one which depletes neither the people nor the land." There are four programs

with the energy and sustainable ag project: 1) on farm demonstration program; 2) energy audit program; 3) sustainable ag grant program; and 4) sustainable ag loan program. It was reported that there is a good working relationship and interaction with the U of M/Extension Service. All of the demonstration projects are done in conjunction with the Extension Service. Mr. Gauger reported that they are in the process of strengthening that relationship as Extension is hiring a person to work on the sustainable ag program. Mr. Gauger distributed the following handouts for the BWSR's information: "Sustainable Agriculture Program 1988/89 Grant Recipients", "Energy and Sustainable Agriculture Project Overview", and "Sustainable Agriculture Loan Program". Mr. Gauger reported that agents will be distributing the results of this program in the near future. All of the demonstration projects are farmer initiated with guidance from their staff and the Extension Service. Chairman Ogaard thanked Jerry Heil and Rick Gauger for coming before the BWSR today with this information material.

Chairman Ogaard adjourned the meeting for lunch at 12:30 p.m. The meeting reconvened at 1:30 p.m.

Continuation of Comprehensive Water Legislation

- Jackie Lind, Director, Minnesota Environmental Education Board (MEEB), distributed "A Grassroots Approach" for the BWSR's information. Ms. Lind explained that MEEB's legislative mandate is to encourage development of life values and a style of living which fosters the constructive use, rather than exploitation of natural resources and the environment. MEEB Promotes coordination among various groups and institutions developing and distributing environmental education materials. Included are formal and nonformal education, prekindergarten, kindergarten through grade twelve, post-secondary, vocational, college and adult education. MEEB is a state agency established in 1973 as a grassroots driven volunteer organization to help address the needs for environmental education in our state. There are thirteen Regional Environmental Education Councils whose 200 volunteers, assisted by a staff of five regional coordinators, actively plan and conduct environmental education programs. Ms. Lind explained that Senate File 262 moves the MEEB out of the Department of Natural Resources and into the Environmental Quality Board. The MEEB is not in favor of this move, they feel they have a good administrative link where they presently are. MEEB was appropriated \$550,000 for the biennium, much less than what was requested, but they will study their priorities and work with what they have. Chairman Ogaard thanked Ms. Lind for coming before the BWSR today.

- Pesticide Program - Greg Buzicky, Minnesota Department of Agriculture/Agronomy Services, explained the Pesticide section of the Big Water Bills. S.F. 262 deals with the problem of spills such as accidents that need to be cleaned up. The spill sites are causes of contamination. Mr. Buzicky gave a slide presentation on Minnesota's Pesticide Management Plan which is called for in the legislation. The purpose of the plan is prevention and a reaction plan for dealing with water resources contamination. The Department of Agriculture would designate pesticide sensitive groundwater protection areas. Upon initial detection of pesticides in groundwater, MDA would evaluate; and increased monitoring and use of BMPs. Common detection would result in developing specific management plan, trend analysis and implementation of mandatory BMPs or banning if needed. Chairman Ogaard thanked Mr. Buzicky for coming before the Board.

- Legislative Commission on Water, Marilyn Lundberg, State Planning Agency, explained education, research and Legislative Commission on Water portions of the bill. Chairman Ogaard thanked Marilyn for coming before the BWSR today.

Comprehensive Local Water Planning in the 15 County Red River Basin - Lance Yohe, President, The International Water Coalition, stated that the fifteen targeted counties are: Kittson, Roseau, Marshall, Pennington, Red Lake, Traverse, Stevens, Clay, Ottertail, Morman, Mahnomen, Pope, Wilkin, and Grant. There is a joint powers board made up of the fifteen counties. The local county task force is the heart of the board, they meet monthly and are responsible for the plan development. He discussed with the BWSR members the general outline of the plan. The objectives are designed to address the problems or opportunities consistent with long-term county goals. A county task force meeting has been held in every county, with the final draft deadline March 31. The plans will be mailed in April to county commissioners, county task force, soil and water conservation districts, watershed districts. A two-day meeting will be held May 16-17 (which is the beginning of the state review period), and plans will be mailed to the agencies in May. June begins the 60-day local review period. Public meetings will be held in mid-June for townships and cities. In July there will be a one-day county commissioners meeting to go over the plan. The county commissioners will have a public hearing in July or August, and they will vote to submit the plan. Mr. Yohe explained that information is now in a digital data base and will be available in each county of the state. Chairman Ogaard thanked Mr. Yohe for coming in before the BWSR with this information.

89-08 **RIM Reserve Allocations** - Wayne Edgerton distributed copies of the 1989 RIM "LegisReport" that he received from the printer today. Wayne distributed a listing of easement allotment requests from the 1989 sign-up for the BWSR's review and action. Moved by Boulton, seconded by Kalmes, to approved the RIM Reserve Allocations totaling \$2,429,289.30 as presented. Affirmative: Ogaard, Williamson, Boulton, Warner, Kalmes, Bade, Schellack, Brooks, Jr., Peterson, Graba, Kemp, and Cofell. Opposed: None. Carried.

Eugene Kalmes brought up the RC&D resolution on drought and the loss of trees. Jim Birkholz said that staff have discussed this issue with the Department of Natural Resources. Staff will continue working on this and update the BWSR as it progresses.

89-09 **Morrison SWCD Nomination Districts Boundary Change** - Jim Birkholz summarized for the BWSR, Morrison SWCD's request to change nomination district boundaries because it would be better geographically disbursed, and close to the same boundaries as the county commissioners. Discussion followed. Moved by Schellack, seconded by Cofell, to approve the Morrison SWCD's Nomination Districts Boundary Change. Affirmative: Ogaard, Williamson, Boulton, Warner, Kalmes, Bade, Schellack, Brooks, Jr., Peterson, Graba, Kemp, and Cofell. Opposed: Warner. Carried.

Northeast Region Issues Report - Chris Hofstede distributed the following summary for the BWSR's information. The northeast half of Minnesota is somewhat unique in the types and size of its water and soil projects. Many of our BWSR programs are not adapted to northeast Minnesota. There are also several water and soil concerns that are in need of any programmatic assistance: the following are my recommendations of issues the BWSR should address. Lakeshore Erosion - I believe that the billion dollar price tag has been the greatest hinderance to agency

programs addressing this issue (see Appendix A and B). The two basic programs SWCD's and counties have in addressing lakeshore erosion are high project costs (rarely in less than the five digit range) and available engineering. Lake Superior being part of the Great Lakes is offered some unique opportunities for federal funding. As you might expect, competition for federal dollars in the eight state region is quite intense. It appears that the best way to get Great Lakes federal funds is to be represented on the appropriate committees. Recommendations: increase cost-share rate to 75%; increase SLR fund to \$3 million annually; establish engineering standards either through an in-house engineering staff or contract agreement; establish Great Lakes representation (preferably on the Great Lakes Governor's Association); continue support for special projects that address lake erosion. Forestry - Depending on who compiles the statistics, forestry is rated the second, third, and fourth largest industry in Minnesota. Over 20% of Minnesota's timber resource is on privately owned lands. Based on producer/user surveys, landowners want and need more assistance in managing our forest resource and industry would expand if they knew more accurately what product to expect from the private sector. Recommendations: financial support for the Non Industrial Private Forest Inventory (NIPF) and subsequent resource management; open cost-share rules to allow forestry assistance/fold in an increased PFM fund; establish a financial assistance program on a temporary basis for SWCDs, or county to hire forestry technicians; continue to support projects that address forestry issues. Regional Office - The northeast board representative is functioning at less than maximum efficiency. At least the majority of this problem could be solved with the employment of a full-time assistant.

Chairman Ogaard stated that he will be meeting with the Lower Red Board on March 2 regarding a part-time position that could work with and tie into the regional board representative position. He will keep the BWSR informed on this.

Bill Cofell suggested that a letter of commendation be sent to Jackie Lind, Director, Minnesota Environmental Education Board, complimenting her on her efforts of educational thrust to the BWSR.

89-10

Bill Cofell suggested that the BWSR send a citation letter to KTCA, Channel 2, commending them on their educational programs. Moved by Cofell, seconded by Warner, to send a letter of commendation to KTCA, Channel 2, complimenting them on their educational programs. Affirmative: Ogaard, Williamson, Boulton, Warner, Kalmes, Bade, Schellack, Brooks, Jr., Peterson, Graba, Kemp, and Cofell. Opposed: None. Carried. Bill Cofell stated that this would bring the visibility of the BWSR to their attention. Chris Hofstede suggested sending a survey to all public television channels thanking them for their support on our issues of concern.

Advisors' Comments - Dwain Otte, MASWCD, stated that he also attended the NACD Annual Convention in Salt Lake City, Utah. He and Danny Potter, Vice-President of MASWCD, will be going to Washington, D.C., April 1-5, to meet with legislators. He would be happy to work together with the BWSR and coordinate any efforts before he goes to Washington.

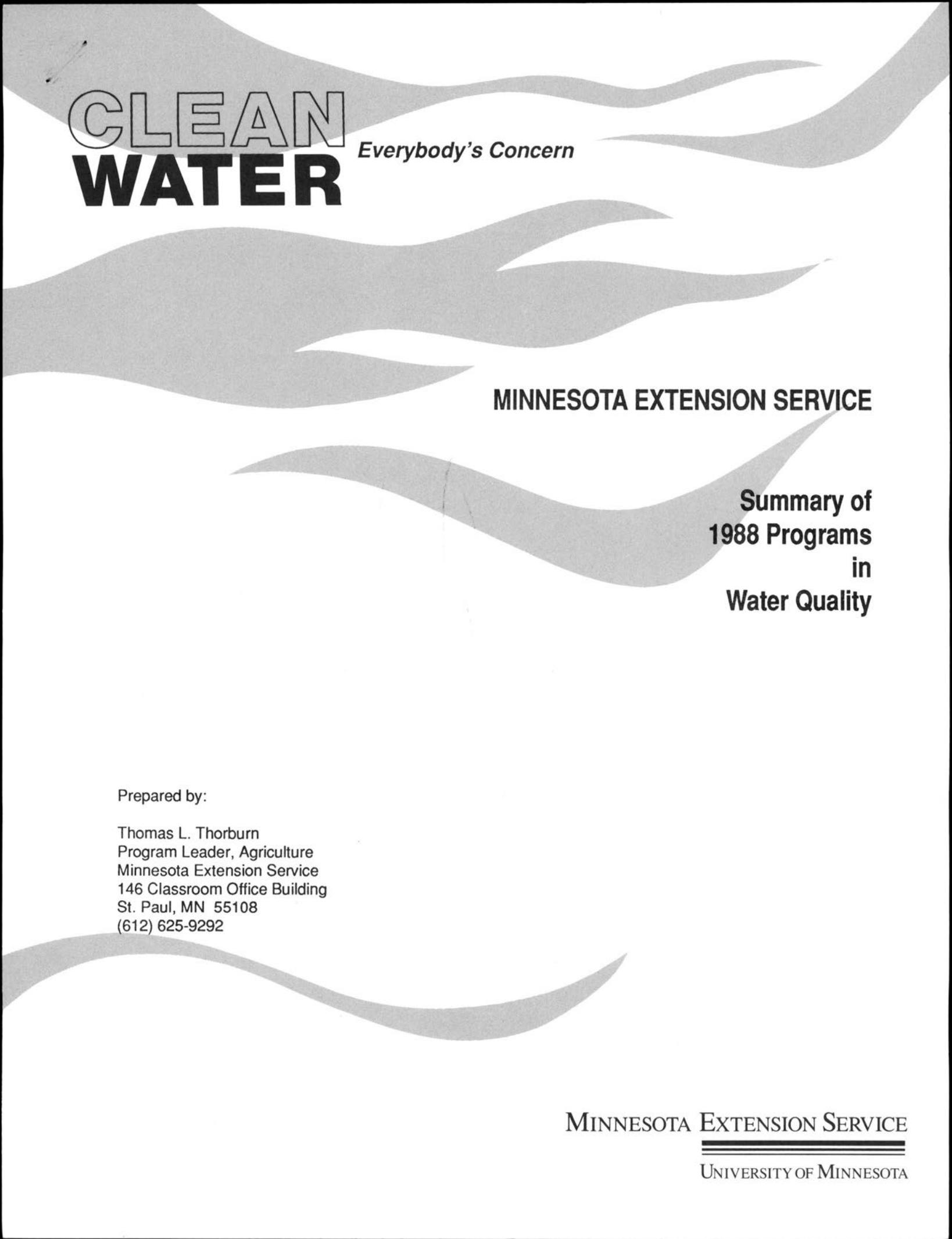
Paul Kalass, MACDE, reported that he also attended the NACD National Convention. He stated that the MACDE is working on the national level of the Association of Conservation District Employees. He stated that the MACDE is an advisory member on the NACD District Operations Committee. Mr. Kalass stated that the MACDE is aware of what's happening in the legislature and they will accept any challenge presented to them.

89-11 Moved by Brooks, Jr., seconded by Warner, to adjourn the meeting at 4:28 p.m.
Affirmative: Ogaard, Williamson, Boulton, Warner, Kalmes, Bade, Schellack, Brooks,
Jr., Peterson, Graba, Kemp, and Cofell.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Donald Ogaard", written in dark ink. The signature is fluid and extends to the right.

Donald Ogaard
Chairman



CLEAN WATER

Everybody's Concern

MINNESOTA EXTENSION SERVICE

Summary of 1988 Programs in Water Quality

Prepared by:

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MINNESOTA EXTENSION SERVICE

UNIVERSITY OF MINNESOTA

The Minnesota Extension Service (MES) has made a major commitment to developing educational programs in water quality. Some of its long-established educational programs in agriculture have incorporated significant water quality components. MES is committed to examining all areas of its educational programs and deliberately incorporating information about the potential effects of certain production practices on water quality.

MES publishes many bulletins, brochures, fact sheets, and other resource materials. During 1988, faculty and staff incorporated water quality considerations into many of these educational materials. Private pesticide applicator training materials were completely revised in 1988. Water quality considerations in the use of pesticides were an important part of these revisions.

The following pages summarize some of the many programs that Extension conducted during the past year. These programs were accomplished with existing resources. The Minnesota Extension Service is committed to assisting Minnesotans, individually and collectively, to address water quality concerns and problems with the latest research-based information, educational programs, demonstrations, and printed materials. Extension agents are serving on many of the county task forces to help write and develop the county water plans. This involvement has helped many leaders understand the importance of a well informed and educated public. Extension has brought important factual data and information to the county water planning efforts.

MES provided Extension agent training programs during 1988 at its Annual Conference and at specialized training for agriculture and home economics agents. In addition, all county Extension offices received a comprehensive water quality resource notebook. These training programs and materials helped Extension agents and specialists plan the programs described on the following pages. Additional training will be provided in 1989.

The Water Quality Assessment Report, completed in March 1988, identified three priority sub-issue areas in water quality to which MES would devote staff time and resources. The following summary outlines programs in the sub-issue areas of:

- waste management and utilization
- safe drinking water for families and communities
- agricultural practices affecting water quality.

WATER QUALITY EDUCATION PROGRAMS

Waste Management and Utilization

1. On-site sewage treatment workshops: cooperative efforts between the Minnesota Extension Service and the Minnesota Pollution Control Agency (MPCA).

Since 1980, more than 1,500 persons have been trained and have passed an examination in these workshops. Resource people from MPCA and MES present in-depth training for individuals who install sewage treatment systems, inspectors, site evaluators, designers, and pumpers. Extensive educational materials have been developed to assist these people. Intensive three-day basic workshops are held each year in several different locations, and three-day recertification workshops are held in two locations. In 1989, 825 people have participated or are enrolled in basic and recertification workshops. (Jim Anderson)

2. Animal manure management programs

Extension agents and specialists have held many educational programs on building new and/or remodelled manure handling systems. They have also advised individual farmers on alternative designs that minimize the negative impact of animal manure on water quality. This Extension effort is aimed at helping producers make maximum use of animal manure for plant and crop production systems. (Fred Bergsrud)

3. "Waste Management News"

This monthly newsletter provides background information for agents, specialists, and researchers. Utilizing existing money, Extension transferred an experienced agent to campus to give leadership to waste management programs. This person is located in the Soil Science Department. Valuable assistance is being provided to local county government units with waste management information.

4. Research on waste management

Extension is taking the lead to seek out research on waste management from departments throughout the University of Minnesota. This research information will then be provided to individuals, governmental units, and others concerned with waste management problems. (Tom Halbach)

Safe Drinking Water for Families and Communities

1. Brown County 4-H'ers are participating in the county-wide well testing project by calling to remind neighbors in their township to have their water tested. The young people tell their neighbors the requirements, location, date, and time of the testing.
2. The Faribault, Martin, and Watonwan Water Quality Program is being formulated for 1989. The

thrust of the plan evolved into three areas:

- a. Water well monitoring program. Each county identifies 10 to 20 wells. Samples will be taken from these wells 3 to 4 times per year. (After spring planting, around July 1, later in the season, and before ground freeze-up.) The intent is to identify any changes found in the water.
 - b. Water well testing program (repeat of last year's program). Families depending on wells for drinking water are encouraged to have their water tested regularly.
 - c. Drainage wells. Education emphasis through media sources and incorporation into other education programs.
3. The Freeborn-Steele-Rice-Mower County Cluster has received an Extension Service innovative grant to help defray expenses of proper well abandonment demonstrations scheduled for 1989. Similar demonstrations were held in Martin, Jackson, and Blue Earth Counties in 1988, with several hundred people attending.
 4. Blue Earth County Extension is in the process of editing an educational video on proper well abandonment, featuring actual footage from the demonstrations sponsored by the Blue Earth County Board of Commissioners. An innovative Extension grant was awarded to pay the expenses related to the video production. After completion, it will be available within the 13-county area upon request. (Mary Lou Ihrke)
 5. Extension agents were offered training on health issues related to water, including water treatment devices and water conservation at Annual Conference and Home Economics specialization training. Extension homemaker lessons on this topic will be offered in many counties in the near future. The program in Sibley County was one of the first in the area.
 6. Watonwan, Nicollet, and Faribault County Extension Agents helped publicize the hazardous waste pick-ups offered in their counties. Blue Earth County continues as an information center for this topic, which is incorporated into on-going lessons for homeowners.
 7. Through Educational Development System (EDS), MES is developing a series of three radio public service announcements entitled "The Water Quality Minute." The series will be broadcast by nearly 100 radio stations in Minnesota. The series of PSA's will address citizen concerns about water quality and refer them to specific sources of help. (Marty Moen)

Agricultural Practices Affecting Water Quality

1. The water quality issue will continue to be included in crop production and management programs, such as "Groundwater and Ag Chemicals: Impacts On My Farming Practices." Through a memorandum of agreement, the Soil Conservation Service and MES will seek consistency in technical recommendations regarding agricultural practices.

Implications of chemical use, including safety, will continue to be incorporated into the Pesticide Certification Training Program. Extension home economists from Nicollet, Cottonwood, Martin, and Jackson Counties attended a special training session in "Protective Clothing Worn While Applying Pesticides." (Wanda Olson)

2. Safe use of yard and garden chemicals was discussed on a video by Steve Poncin, Horticulture Specialized Agent, and Dawn Mattson, Horticulture Assistant. The video was broadcast for an urban audience. This information will also be part of the Master Gardener training to be held in February and March 1989 and the Blue Earth County Spring Gardening Workshop.

3. A video entitled "Groundwater and Agriculture Chemicals" is available in each county Extension office in Minnesota. Rod Hamer, Jackson County, and other agents have used it as an awareness tool with service clubs, including rural and urban citizens.

4. "Catch a Raindrop" will be the 1989 theme of the LeSueur-Waseca Conservation Day, reaching 650 4th and 5th graders. This will be the second year that the issue of water quality will be included in the day's program. This topic is also being taught through local club meetings, 4-H Federation programs, and camp programs. Youth also have helped promote recycling projects. Teaching materials, videos, teacher guides, and student handouts suitable for grades K-8 will soon be available from the Minnesota Extension Service. These include "Waste Water," "Surface Water," and "Ground Water." Available now is the slide-tape set "Water, We Can't Live Without It." (Mike Liepold)

5. The Water Resources III Conference in March focused specifically on pesticides--how they affect our water supplies, contamination prevention, and clean-up activities. This program was held at the University of Minnesota-Morris for community and agriculture leaders in west central Minnesota. (Jerry Wright)

6. The Environmental Education Resources Conference was held in November. It created an opportunity for persons working with environmental issues to share educational programs and ideas. It also identified environmental education resources and ways to use them to enhance public understanding and adoption. (Jerry Wright)

7. The Minnesota Extension Service, through the Private Pesticide Applicator Training Program, has certified 35,000 private applicators. This training has focused on the safe use and handling of pesticides and appropriate uses. (Dean Herzfeld)

8. The 1989 MES publications on weed, disease, and insect controls include considerations on the use of pesticides related to water quality. Also, descriptions and techniques are included that provide alternatives to pesticides. (Ken Ostlie)

9. Field days are an effective tool for reaching several thousand Minnesotans each year. In 1988, field days held at branch research stations provided findings relative to water quality and the use of pesticides and nutrients. This research is tracing the path of nutrients and pesticides in our soils. Information and conclusions from this research are being incorporated into current Extension programs.

10. A correspondence course is being made available to people in Watonwan County. This is a pilot water quality correspondence course. If deemed successful, it will be offered in other areas of the state. (Gary Wyatt)

11. Soil testing and other diagnostic services offered by MES are helpful to farmers making decisions about the proper use of plant nutrients and pesticides. These services are available to farmers in Minnesota.

12. The Minnesota Department of Agriculture, with the cooperation of MES, will conduct a 1989 program to raise the level of awareness of those individuals who use pesticides to rinse pesticide containers. The campaign is called Rinse and Win. This progressive effort will be aimed at having pesticide containers rinsed so that proper disposal and recycling can be carried out under current laws and regulations. (Dean Herzfeld)

WATER QUALITY RESEARCH PROGRAM - UNIVERSITY OF MINNESOTA

JAMES L. ANDERSON and GYLES W. RANDALL¹

Water is one of Minnesota's plentiful and valuable resources. Its high quality supports a very productive agricultural economy, an abundant fauna of fish and wildlife, and a large and profitable tourist industry. Water is a natural resource that should be protected and maintained at any cost.

Agriculture is a major contributor to Minnesota's economy. At the same time, the cropland is subjected to large inputs of agricultural chemicals. Minnesota ranks fifth in the nation in fertilizer nitrogen use and third in use of pesticides. Pesticide use is predominately herbicides, but significant amounts of insecticides and fungicides are used in certain areas.

The potential for transport of these chemicals into waters is great. since these chemicals are applied in large quantities, and some of them are toxic at very low concentrations, water contamination has serious consequences.

CENTER FOR AGRICULTURAL IMPACTS ON WATER QUALITY

To meet the challenges of clean water with a productive agricultural system and considering the diversity of research and educational groups involved with water, a Center for Agricultural Impacts on Water Quality was formed within the College of Agriculture, University of Minnesota. The Center consists primarily of an interdisciplinary faculty steering committee with a Director and an industry/agency consultative committee. The steering committee is composed of individuals in the Departments of Agricultural and Applied Economics, Agricultural Engineering, Agronomy and Plant Genetics and Soil Science and in the Branch Stations but also interacts with those from Entomology, Plant Pathology, Forest Resources and Geology.

Objectives of the CENTER

The Center's objectives include 1) minimizing groundwater contamination by agricultural chemicals, 2) developing and improving managerial procedures that reduce agricultural chemical use, 3) increasing our understanding of the behavior and longevity of agricultural chemicals in soil and groundwater systems, and 4) assessing the social and economic impacts of management practices.

¹ Associate Professor Department of Soil Science, University of Minnesota, St. Paul, MN 55108 and Soil Scientist and Professor, Southern Experiment Station, University of Minnesota, Waseca, MN 56093. Contribution from the University of Minnesota Center for Agricultural Impacts on Water Quality. Presented at the Annual Meeting of Minnesota Farm Managers and Rural Appraisers at the Normandy Inn, Minneapolis, February 2, 1989.

Role of the CENTER

The Center:

- provides information on agriculturally-related water quality issues to legislators, state and federal agencies, educational bodies, and the general public.
- facilitates multi-disciplinary research on water quality issues.
- provides leadership in prioritizing research and educational needs.
- obtains funding for research and education.
- procures and supervises the use of laboratory equipment and facilities.

Research Program

Research at the Center focuses on the basis behavior of chemicals and nutrients in the environment, the practices for responsible management of chemicals, and modeling of chemical behavior in the environment.

Defining the agriculturally sensitive areas. All states have geographic areas that are more sensitive than others to ground and surface water quality problems related to agriculture. In Minnesota, agriculturally sensitive areas to groundwater contamination have been identified. The areas receiving priority attention are primarily (1) the coarse-textured, irrigated soils and (2) the medium-textured, shallow, loess soils located over fractured limestone (Karst) and sandstone in southeastern Minnesota. Intensive livestock production with subsequent manure availability is also a characteristic of this latter area. Even though the majority of Minnesota's crop production and fertilizer usage occurs on the finer-textured, glacial till soils, these areas are presently considered less sensitive due to slow percolation rates, greater denitrification potential, and greater depth to the groundwater.

Current research - sandy irrigated soils. Research on these soils is located on the Rosholt Experimental Farm near Westport, Minnesota. Research at this 40-acre site is being conducted in three separate phases. Phase I uses 30 non-weighing lysimeter installed in 1975 to intensively monitor the effects of tillage (roto till vs no till) and five N treatments. Each lysimeter measures 5' in diameter and is plumbed so that all leachate draining through the profile is collected at the bottom (4'), extracted, and analyzed for its nutrient concentrations. This system allows for a very detailed analysis of the effects of specific management practices over time. The end result will be to quantify the N losses via leaching, N remaining in the soil, and N uptake by the plant to establish a N budget for a corn-soybean system.

Phase II monitor the effects of two crop rotations (continuous corn and corn-soybean) on the nitrate and pesticide movement through these soils. This large area allows for measurements in spatial variation as well as the transport of the contaminants in the shallow aquifer. These studies are conducted in cooperation with the U.S. Geological Survey who have installed numerous monitoring wells.

Phase III focuses on efficient N management utilizing a large number of replicated research plots. The variables include tillage, crop rotation, N source, rate, and timing and the inclusion of nitrification inhibitors.

Current research - Karst silt loam soils. Research on these soils is located primarily on a leased 6-acre tract located 6 miles east of Rochester (Olmsted Co.) on the Lawler farm. This deep Port Byron silt loam soil is underlain with limestone at depths ranging from 7 to 11'. The purposes of studies at this site are to (1) determine the cause and effect relationship of specific N and tillage management practices on corn production and NO_3 and pesticide accumulation/movement through the soil and (2) identify best management practices that minimize groundwater contamination while maintaining economic profitability.

One study involves fall, spring and split applications of anhydrous ammonia, the inclusion of N-Serve, two tillage systems, and two rates of spring-applied liquid hog manure. These treatments have been applied annually beginning in the fall of 1986. Plant, soil and water samples are being taken to develop a "complete" N budget. Plant samples are taken at silking and again at maturity (grain and stover). Soil samples are taken in 1-foot increments to a depth of 10' (if possible) in the spring before planting and after harvest. Soil water is obtained by suction lysimeters installed at 5' and 7.5' depths in each plot.

Another study is determining the effect of four tillage systems (moldboard plow, chisel plow, ridge-plant, and no tillage) on the movement/accumulation of four pesticides in the soil profile. The pesticides (alachlor 'Lasso', atrazine, dicamba 'Banvel', and terbufos 'Counter') are applied to all plot at planting. Pesticide movement is being monitored through soil sampling in 6-inch increments six times during the season and by stainless steel suction lysimeters installed at 5' and 7.5' depths in each plot.

Results from these studies are preliminary in that the studies are designed to look at the 5-year effects of each management system. However, the 2-year data (1987-88) shown in Table 1 provide some evidence as to the initial economical and environmental effects of the treatments.

Table 1. Corn yield, economical return (BENEFIT) and $\text{NO}_3\text{-N}$ concentration in the soil water (RISK) as influenced by N treatments in Olmsted Co.

Tillage	N rate ¹ lb/A	Time	Two-Yr Average Yield bu/A	Fert. Cost \$/A	Return on Fert. ² \$/A	Nitrate-N Conc. in Soil Water ³ mg/L
Chisel	0	--	95	0	-	1
Chisel	75	Spr.	161	11.25	154	6
Chisel	150	Spr.	177	22.50	182	12
Chisel	225	Spr.	169	33.75	151	18
Chisel	150	Fall	175	22.50	178	24
Chisel	150 + NI	Fall	174	29.50	168	22
Chisel	75 + 75	Spr + SD	173	27.00	168	10
No till	150	Spr.	177	22.50	182	14
Chisel	Hog Man.	Spr.	184	?	-	41
(6050 gal, 175# avail. N) ⁴						
Chisel	Hog Man.	Spr.	185	?	-	63
(9200 gal, 265# avail. N) ⁴						

¹ Nitrogen applied as anhydrous ammonia.

² Based on \$2.50/bu.

³ From the 5' depth on Oct. 5, 1988.

⁴ Total N applied = 315 and 490 lb/A, respectively.

Conclusions drawn after the second years are:

- 1) Economical return was optimized with 150 lb N/A applied preplant in the spring regardless of tillage system.
- 2) Fall and split N applications produced yields similar to the spring preplant applications. However, fall applications resulted in $\text{NO}_3\text{-N}$ contaminations in the soil water at 5' almost twice that of spring and split applications.
- 3) Inclusion of N-Serve with the fall application did not improve economical return or lessen environmental risk.
- 4) Nitrate-N concentrations in the soil water at 5' on Oct. 5, 1988, were related linearly with N application rate when spring-applied. Rates of 75 lb N/A or less reduced profitability but lessened environmental risk.
- 5) Realistic application rates of liquid hog manure resulted in high loadings of N and highest corn yields, but very high $\text{NO}_3\text{-N}$ concentrations in the soil water.

Technology Transfer

As this type of information is obtained from the field and laboratory studies conducted by the Center, it is important that it be delivered to farmers and land managers.

To accomplish this a plan has been developed to provide the information at the local level on a site specific basis. Two activities are underway to accomplish this.

A pilot project is being conducted with the Soil Conservation Service to provide nutrient and pest management standards and specifications for inclusion in the Soil and Water Conservation District Field Office Technical Guides. These standards and specifications will be used by District Conservationists, Extension agents and Soil and Water Conservation District personnel as they work with individual land managers.

Extension recommendations on cultural and chemical weed control will be combined with soil survey information in a computerized format to provide site specific analysis of options available to control weeds as well as determine the environmental risk.

Future

This interdisciplinary approach appears to be leading toward a better understanding of agricultural chemical movement through the soil profile and the potential for ground water contamination. With additional years we should be able to identify 1) those management practices that optimize benefits (profitability) while minimizing risks (i.e., NO_3 in ground water), 2) the factors that govern the rate of downward movement of various agricultural chemicals, and 3) those socioeconomic issues that will be most helpful in developing policy to ensure protection of water quality in Minnesota's most sensitive areas.

Acknowledgment

These interdisciplinary investigations would not have been possible without financial assistance from the Legislative Commission of Minnesota Resources (LCMR) and the fine cooperation and participation of the Soil Conservation Service and the Minnesota Extension Service.

NITROGEN AND PESTICIDES IN TILE DRAINAGE

Gyles W. Randall
Soil Scientist
Southern Experiment Station
Waseca, MN 56093

The productivity of poorly drained soils is enhanced by the removal of excess water via tile drainage lines. These lines are usually installed about 4' deep. Mobile nutrients and pesticides move through the soil with percolating water and can be discharged into surface waters by these tile lines.

Studies have been conducted at Lamberton since 1973 and Waseca since 1975 to determine the effect of crop and fertilizer management practices on the loss of N to tile drainage. Since 1985, pesticide loss data have been collected at Waseca.

Lamberton

Nitrogen rates of 18, 100, 200 and 400 lb N/A were applied annually to continuous corn from 1973 through 1979. Nitrogen had not been applied to this experimental area for at least 13 years before the study was started. Results from the first 3 years indicate relatively little NO_3 -N loss from the tile lines at the 100 lb rate (Table 1). At N rates of 200 and 400 lb/A, losses to the tile lines were increased by 140 and 380%, respectively. At the end of the 7-year application period (1973-79) NO_3 -N concentrations in the tile water averaged 172 mg/L with the 400-lb rate and substantial losses occurred. Over this period an equivalent of 15% of the applied N was lost via the tile drainage when the recommended rate of N was used. Moreover, it should be noted that NO_3 -N concentrations never averaged less than 10 mg/L even when no N fertilizer was applied to this high organic matter soil.

Table 1. Average NO_3 -N concentrations and cumulative NO_3 -N losses thru tile drainage water at Lamberton as influenced by N rate

Annual N rate (1973-79) lb N/A	Average NO_3 -N Concentration		Total NO_3 -N Losses	
	1973	1979	1973-75	1973-79
	-- mg NO_3 -N/L --		lb/A -----	
18	13	16	37	80
100	15	47	47 (4) ^{1/}	160 (14)
200	13	106	83 (8)	299 (17)
400	12	172	160 (11)	630 (21)

^{1/} () = Equivalent percent of the applied N

Waseca - Study 1

A similar study using annual N rates of 0, 100, 200, and 300 lb N/A was conducted at Waseca from 1975 thru 1980. Conditions were very dry in 1975 and 1976, yields were low, tile lines did not flow. Residual N accumulated in the soil during these years contributed to the high NO_3 -N concentrations in the tile water in 1977 with all of the N applications (Table 2). By 1980, one year after the last N application, NO_3 -N concentrations had returned to background levels except with the 300-lb rate. Similar to Lamberton, NO_3 -N concentrations were seldomly below 10 mg/L and the equivalent of 15% of the applied N was lost when applied at the recommended rate.

^{1/} Presented at Ag. Professionals Tour, Southern Experiment Station, Waseca, MN June 27, 1988.

Table 2. Average $\text{NO}_3\text{-N}$ concentrations and the equivalent percent of the N lost in the tile drainage at Waseca as influenced by N rate.

Annual N rate (1975-79) lb N/A	Average $\text{NO}_3\text{-N}$ Concentration			Total $\text{NO}_3\text{-N}$ Lost % of applied
	1977	1979	1980	
	----- mg $\text{NO}_3\text{-N/L}$ -----			
0	13	13	9	--
100	41	19	10	12
200	58	32	12	16
300	85	44	23	22

Waseca - Study 2

Continuous corn and continuous soybeans were grown from 1977 thru 1982 in another study. Results showed both a yield and environmental advantage for the spring application of ammonium sulfate compared to the late-fall plowed down application (Table 3). Corn yields over the 5-yr period were increased by 15 and 5% with spring application at the 120 and 180-lb rates, respectively. Spring application of N also reduced NO_3 losses to the tile by about 30%.

Table 3. Corn and soybean yields and $\text{NO}_3\text{-N}$ lost thru the tile lines as influenced by N rate and time of application at Waseca.

Crop	N Treatment		1978-82 Avg. Yield bu/A	1978-81 $\text{NO}_3\text{-N}$ lost thru tile lines lb/A
	Rate lb/A	Time		
Corn	0	----	66	28
"	120	Fall	131	107
"	120	Spr.	150	75
"	180	Fall	160	136
"	180	Spr.	168	106
Soybeans	0	----	48	119

Waseca - Study 3

Within the last few years there has been some speculation that conservation tillage allows more water to infiltrate into and percolate thru the soil, and thus increase the likelihood of leaching. Studies have been conducted comparing moldboard plow tillage with no tillage for continuous corn. Nitrogen has been spring-applied annually as ammonium nitrate at 180 lb N/A to all plots beginning in 1982. Data shown in Table 4 indicate little difference between the two tillage systems for either total tile line drainage or NO_3 losses. Again, N lost via the tiles as a percent of the applied N was about 15%.

Table 4. Corn yield, tile drainage, and $\text{NO}_3\text{-N}$ loss as affected by tillage at Waseca from 1982-87.

Parameter	Tillage	
	MP	NT
Avg. grain yield (bu/A)	138	131
Total tile discharge (inches)	59	63
Total $\text{NO}_3\text{-N}$ lost in drainage (lb/A)	140	152
N lost via tile lines as a percent of applied N (%)	13	14

These same plots have been used to determine the loss of Lasso, atrazine, and Counter to the tile lines. Lasso has been applied for 15 consecutive years for a total application of 49.5 lb/A. Atrazine was applied from 1974-76 and from 1978 thru 1988 (14 yrs) for a total of 34.8 lb/A. Counter was applied in 1977, '79, '82, '84, '86 and '88 for a total of 6 lb/A.

Since October, 1985, 95 water samples from this study have been analyzed. At detection limits of 0.25 ppb, 92 of 95 samples contained detectable levels of atrazine (Table 5). Atrazine concentrations have averaged about 1 ppb. Neither Lasso nor Counter has been detected.

Table 5. Number of atrazine, Lasso, and Counter detections in tile water from both the MP and NT plots at Waseca since 1985.

Year	No. of samples	Pesticide			Avg. atrazine concentration ppb
		Atrazine	Lasso	Counter	
		----- No. of detections -----			
1985	4	4	0	0	0.5
1986	36	35	0	0	0.9
1987	31	31	0	0	1.6
1988	24	22	0	0	0.9

Total	95	92	0	0	Avg. = 1.0

Atrazine losses can be calculated by multiplying concentrations x flow rates. Annual losses were very small (<1.6 gram/A) and ranged from 0.12 to 0.02% of the annual application (Table 6).

Table 6. Atrazine losses in the tile water averaged over MP and NT tillage at Waseca.

Year	Tile flow	Atrazine application rate	Atrazine lost in tile drainage	
	acre-inches	g/A	g/A	% of applied
1986	16.6	1362	1.60	0.12
1987	1.6	1362	0.27	0.02
1988	0.6	1362	0.06	0.004

SUMMARY

1. Nitrate losses to tile drainage are closely related to the rate of N application. Rates higher than plant removal result in excessive NO₃ losses.
2. Nitrate-N concentrations seldomly were less than 10 mg/L even when no fertilizer N was applied to these high organic matter soils.
3. An equivalent of about 15% of the applied N was lost via the tile lines when recommended rates of N were applied.
4. Continuous soybeans can result in substantial losses of NO₃ to tile drainage.
5. Nitrate losses did not appear to be affected by tillage.
6. Although atrazine was consistently detected in the tile water, concentrations and losses were very small (<0.12%).
7. Lasso was never detected in the tile water even though 50 lb/A had been applied over the 15-year period (1974-88).

SUMMARY

DEVELOPING STANDARDS AND SPECIFICATIONS for NUTRIENT AND PESTICIDE MANAGEMENT for the USDA Soil Conservation Service by the University of Minnesota

by James L. Anderson, Director Center for Agricultural
Impacts on Water Quality

PURPOSE

A Procedural Manual on how to prepare technical standards and model specifications for nutrient and pesticide management to minimize surface and groundwater impacts will be prepared. Prototype nutrient and pesticide management standards and specifications for the Soil Conservation Service (SCS) will be developed in five states. The manual will be used by SCS National Technical Centers and State Offices to develop individual nutrient and pesticide management standards.

NEEDS

SCS needs to develop the technical skills of its field personnel in the area of nutrient and pesticide management. It is anticipated that SCS field personnel will become more involved in giving advice to land users on nutrient and pesticide management.

OBJECTIVES:

The objective of the project is to improve SCS expertise and performance in analyzing nutrient and pesticide management. These efforts will be part of Resource Management Systems (RMS's) recommended to farmers, ranchers, and other land users to aid them in meeting their agricultural objectives. Recommendations will be consistent with those of the Cooperative Extension Service and appropriate state agencies. With this approach, the landowner will receive a consistent message about nutrient and pesticide management practices.

RESOURCES:

Existing information, data and technologies from a variety of sources are being used and evaluated. These include private and public sector research institutions, Rural Clean Water Projects, Model Implementation Program projects, RCA Special Studies, Section 208 Planning Studies, EPA, state, and other agency studies, SCS technical studies, and other sources.

PROCEDURAL MANUAL:

The manual developed by this project will have three distinct sections as follows:

Section 1 - Literature review of current knowledge of nutrient and pesticide management. The review is based on a comprehensive literature review.

Section 2 - A review of existing SCS nutrient and pesticide standards and a review of other current SCS practice standards having nutrient and pesticide components.

Section 3 - The prototype standards and specifications developed by the five cooperating states (California, Illinois, Minnesota, New York and North Carolina). Comments and suggestions to help other states understand the process involved in developing standards and specifications.

Project Status:

Sections 1 and 2 of the manual are being sent out for review the week of February 20. Each of the state has prepared drafts of these standards which are under review by multi-agency groups within each state.

After the draft standards are reviewed, Section 3 will be prepared. Results will be presented to the other states in a workshop format.

THE ROLE OF
THE MINNESOTA EXTENSION SERVICE
AND
THE MINNESOTA AGRICULTURAL EXPERIMENT STATION
IN THE
WATER QUALITY ISSUE

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THE ROLE OF THE MINNESOTA EXTENSION SERVICE AND
THE MINNESOTA AGRICULTURAL EXPERIMENT STATION
IN THE WATER QUALITY ISSUE

Executive Summary

Our water can be contaminated by hazardous wastes, sediment, pesticides, nutrients and bacteria. Solutions to Minnesota's water quality problems aren't easy. No single agency or scientific specialty has all the answers.

The Minnesota Agricultural Experiment Station and the Minnesota Extension Service can play important roles in research, education and information. Research on agricultural management/water quality is expensive and time consuming. It takes at least three to five years to establish the best management practices from valid research projects.

Funding is needed to continue present studies for at least three years. And additional funding is needed if new water quality research is to be started.

The Minnesota Extension Service has identified water quality as a priority issue. But other issues--such as the farm crisis and Project Support, mediation and the 1988 drought have been priorities. And it's taken money from other planned extension programs to fund them.

The well is dry. The Minnesota Extension Service needs additional funding to provide leadership and conduct high quality, in-depth educational programs to help solve Minnesota's water quality problems.

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THE ROLE OF THE MINNESOTA EXTENSION SERVICE AND
THE MINNESOTA AGRICULTURAL EXPERIMENT STATION
IN THE WATER QUALITY ISSUE

Minnesota is blessed with an abundance of natural resources for which its citizens are justifiably proud. The state depends on its water resources for a wide range of needs including daily survival, agricultural production, manufacturing, recreation/tourism and transportation. The growing concern for preserving and protecting the quality and quantity of our water resources is legitimate.

The water quality issue is a complex problem. Water quality problems vary from place to place depending on the nature of the water resource, land use, soil geologic and hydrologic characteristics, management practices and other factors. The range of problems includes contamination from point and nonpoint sources of hazardous wastes, sediment, pesticides, nutrients and bacteria, to name a few. Because of the diversity of water quality problems in the state, finding solutions will be a challenge. Solutions to "the water quality problem" will not be found within one community, agency, discipline or research group. The Minnesota Extension Service (MES) and the Minnesota Agricultural Experiment Station (MAES) understand that an integrated approach involving many disciplines and agencies is necessary. Education, information, technical assistance, research, monitoring, incentives, standards, regulation and coordination are needed to research the problems, suggest solutions, and design and deliver educational programs to help people and communities solve such problems. There are many methods of approaching the water quality issue, and the various agencies should focus on what they do best.

ESSENTIAL ROLES IN TOTAL WATER QUALITY PROGRAM

(Agencies listing includes those with a significant role in a particular area and is not meant to be totally inclusive.)

Listing of Agencies

ASCS - Agricultural Stabilization & Conservation Service
DNR - Department of Natural Resources
EPA - Environmental Protection Agency
MAES - Minnesota Agricultural Experiment Station
MDA - Minnesota Department of Agriculture
MDH - Minnesota Department of Health
MEEB - Minnesota Environmental Education Board
MES - Minnesota Extension Service
MGS - Minnesota Geological Survey
MPCA - Minnesota Pollution Control Agency
SCS - Soil Conservation Service
SPA - State Planning Agency
TI - Technical Institutes
USGS - United States Geological Survey

1. Monitoring

To assess the quality of our water resources, evaluate trends in water quality and to evaluate the effectiveness of practices implemented to maintain or correct water quality conditions.

Agencies: USGS, MGS, MPCA, MDH, DNR, SCS

2. Water Quality Standards

Standards need to be established to protect the public health and to limit contaminant concentrations to acceptable levels.

Agencies: MPCA as the designated EPA agency has the legal responsibility but with inputs from several other agencies, especially MDH and DNR.

3. Regulations

Several types of activities are currently regulated. This process requires collection and evaluation of information, the issuance of permits, follow-up to see that plans and permit provisions are being followed and possibly enforcement.

Agencies: MPCA, DNR, MDA, MDH, SPA

4. Technical Assistance

Technical assistance should be provided and delivered to the public to assist them in planning and carrying out practices that impact on water quality.

Agencies: SCS, MPCA, DNR, MDA, MDH

5. Information

The public needs to be kept informed about policies, regulations, standards, services, events and other developments in or related to water quality. The public also needs access to information on existing knowledge, data collected, and other factual items related to water quality.

Agencies: All State and Federal Agencies, MAES, MES

6. Education

The public needs educational programs to empower them to make responsible decisions. Sound educational programs provide the public with scientific knowledge and principles, present relevant research, interpret research results, assist in problem analysis, identify options in a non-biased format and develop understanding of the interactions and implications of their actions.

Agencies: MES, MEEB, Universities and Colleges, TI's

7. Research

Both basic and applied research are needed to understand the processes by which contamination occurs, to develop best management practices to eliminate or minimize contamination, to develop alternative products or practices, to respond to health concerns and many other current or developing real and/or perceived problems associated with the water quality issue.

Agencies: MAES, MES, Universities and Colleges, USGS, MGS

8. Incentives

Cost effective programs and practices are essential to the long-range success of the efforts in water quality. Incentives, both of a positive nature like cost-sharing and a negative nature like cross-compliance, are necessary, however, to demonstrate that society is willing to share the cost and to initiate new technologies. Current incentive programs include

ACP cost-sharing, RIM, CRP and the Highly Erodible Lands cross-compliance provisions in the 1985 Farm Bill.

Agencies: ASCS, MDA, SCS

The University of Minnesota's mission is to provide the highest caliber teaching, research, extension and public service. The MAES as a research agency of the University and the State of Minnesota has a mission to organize and support basic and applied research in agriculture, forestry, home economics and other areas, to benefit the state's economy and the well-being and quality of life of its citizens. The MES is the outreach arm of the University. Its mission is to offer research-based information and educational programs in an unbiased way to people of all ages throughout the state in cooperation with county, state and federal partners.

Water quality has been identified as a priority issue by Extension Service-USDA, by the Cooperative Extension System on the federal level, and by MES. County partners across the state have also identified water quality as a priority concern. A water quality "issue team" has completed its report and the water quality "implementation team" recommendations are being implemented. MES, in consultation with various state agencies, has identified three water quality "sub-issues" on which to begin coordinated education programs drawing on the strengths of the various disciplines and program areas represented within the organization. These sub-issues are:

- Impacts of Agricultural Practices on Water Quality
- Safe Drinking Water for Families and Communities
- Management and Utilization of Waste to Prevent Water Contamination

Across all these priority sub-issues there are common educational needs. There is a need for basic educational programs and materials about the significance of geology, soils, topography and other factors as they relate to water quality problems and solutions.

As a part of each of the priority sub-issues, it will be necessary to expand programs on public policy that deal not only with process, but that assist individuals and communities to work toward making wise, informed decisions about land use and waste management that affect water quality.

MES is currently providing specific and practical education on several water quality issues for many different audiences. Some examples include:

- MES conducts programs and produces publications for rural residents and other homeowners on water quality, including well-water testing.
- MES trains commercial and private pesticide users in safe and proper use of pesticides. This is done through a Memorandum of Understanding with the Minnesota Department of Agriculture.
- MES teaches youth in 4-H camps about water quality and conservation.
- MES trains installers, local sanitarians and state agency personnel about on-site sewage treatment systems. This is in cooperation with the Minnesota Pollution Control Agency.
- MES trains dealers, consultants and farmers about sound nutrient management techniques to reduce impacts on surface and ground water.

Successful educational programs in the area of water quality are as unique as the problem itself. The key to a successful educational process is developing programs and conducting learning experiences that result in a change in the behavior of participants. Implementing sound practices and changing behavior that will result in less water quality risk doesn't always have an immediate economic impact. Programs of this nature must continue over an extended period of time. Changes in behavior will not often occur as a result of reading a flyer or a proposed regulation. The educational effort must eventually get to people's conscience if they are to make a difference. MES educational programs draw on the strengths of the research base, faculty members and departments from across the University, state extension specialists staff, area

agents and cluster agents as well as extension faculty members in each of Minnesota's 87 counties. Extension staff from across all program areas (agriculture, home economics, 4-H/youth development, community and natural resource development) bring their expertise together to design and deliver unbiased, objective, research-based educational programs that help Minnesota's citizens, businesses and communities put knowledge to work.

MES has internally reallocated resources to address the water quality issue, but those resources can be stretched only so far. Just as water quality is a priority issue, other issues are also of high priority. Project Support is a widely acclaimed success story in MES programming. By nearly everyone's account the Farm Mediation program has been superbly managed by MES. Project Future is a new rural revitalization effort underway. The 1988 Drought Response of MES was an unplanned but highly successful effort. Each of these "priority issues" have resulted in reallocation of resources to get the job done. At this point the well is dry. If MES is to play the leadership role that it can and should have in providing the type of high quality, in-depth educational programs that are necessary to help solve Minnesota's water quality problems, additional funding will be required.

MINNESOTA AGRICULTURAL EXPERIMENT STATION

The College of Agriculture, with funding from the Agricultural Experiment Station through a state legislative special and a grant from the Minnesota Resources for the Future Commission (formerly LCMR), established the Center for Agricultural Impacts on Water Quality to focus on research and educational programs related to agriculture. The scientists from the departments of Agricultural and Applied Economics, Agronomy and Plant Genetics, Plant Pathology, Entomology, Agricultural Engineering, Soil Science, and the branch stations all have relevant expertise to address fertilizer and pesticide usage in relation to natural resource management.

In addition, the Center cooperates with other state and federal agencies, and local citizens' organizations through a permanent consultative committee. This committee helps set research priorities, indicates educational needs and provides a sounding board for the development of proposals.

Current research projects and education activities are summarized in the document "Current Inter-Disciplinary Research and Education Projects of the Center for Agricultural Impacts on Water Quality." Field and laboratory studies are being conducted to:

- 1) increase the understanding of the behavior of chemicals and nutrients in the environment;
- 2) minimize surface and groundwater contamination;
- 3) develop best management practices; and
- 4) assess the social and economic impacts of changed management practices.

From these research activities, best management practices will be recommended to farmers to both maintain profitability and minimize the impacts on water quality. This research needs to be conducted and completed before these practices can become a part of any incentive or regulatory program.

The two primary sources of funding have been the establishment by the legislature of a \$250,000 per year line item budget in the Experiment Station and a two-year \$150,000 per year grant from the Minnesota Resources for the Future Commission (LCMR).

The availability of a line item budget has allowed scientists, in cooperation with the Center, to compete for other specific research grants. An example is the \$85,000 contract with the Soil Conservation Service to develop nutrient and pesticide management standards and specification for their field office technical guides.

During the winter and spring of 1988, a comprehensive research proposal on agricultural practices and water quality was submitted to the LCMR for funding. This proposal was not funded. However, this effort led to the submission of project proposals to other granting agencies (state and federal). Proposals have been

submitted to the Minnesota Department of Agriculture, Greater Minnesota Corporation, Soil Conservation Service, and U.S. Geological Survey. How many, if any, of these proposals will be funded remains to be seen. The loss of the \$150,000 per year from the LCMR grant is significant. If the proposals indicated above are not successful, our research efforts in this area will be cut back.

Research on agricultural management practices and their relationship to water quality is expensive and time consuming. To establish best management practices and provide valid comparisons between agricultural management systems requires a minimum of three to five years. Funding needs to be provided to continue the present studies for at least three years and provide a base from which new solutions can be investigated.

In the area of research on agricultural practices, clearly the Minnesota Agricultural Experiment Station should be the lead research agency. If an increased water quality research effort is to be accomplished, additional funding needs to be committed.

Minnesota Agricultural Experiment Station

"Sustainable Agriculture/ Alternative Crops and Products/ Basic Plant Science"

Portion of the 1989-91 Legislative Request

The 1989-91 legislative request includes 14 initiatives that address high priority concerns for which new funding is requested to combine with existing and reallocated funding. Three of these initiatives are highlighted below:

Sustainable Agriculture: Regardless of the size or enterprise of farms or farm families, sustainable agriculture is an economic, environmental, or social concern. It affects agribusiness from input suppliers through producers and processors. A truly sustainable agriculture will be dependent on scientific advances and technical innovation. \$250,000 is requested to serve as core funding for research in a Center on Sustainable Agriculture at the University which has been initiated in the form of a working group.

Research envisioned as part of this center would include issues such as:

- Reduced off-farm inputs for crop and livestock production
- Fertilization tailored to soil and tillage type
- Identification of time-optimum field operation windows
- Biological pest control and/or bio-degradable pesticides
- Optimization of manure management

These research efforts will focus on providing farmers and families the research base to practice sustainable agriculture.

Center for Alternative Crops and Products: A Center for Alternative Crops and Products has developed as a unit within the College of Agriculture, the Minnesota Agricultural Experiment Station, and the Minnesota Extension Service. Scientists in the center generate and evaluate new crops and product ideas, facilitate research and development efforts, and collect and disseminate information. \$100,000 is requested specifically for the following research activities:

(over)

- Research on new agricultural enterprises such as lupine and amaranth
- Feasibility analysis of new crop and product opportunities
- Support for interdisciplinary research teams to solve problems related to commercialization limitations
- Development of a database on expertise available for new crops and new products and an information database about these crops

Basic Plant Science: The new Plant Biology Department will draw together in a single unit, coordination of much of the basic plant biology research on campus, which is presently underway in several departments. It will provide fundamental research related to the mission of the Minnesota Agricultural Experiment Station. \$60,000 in new funds is requested to provide seed money for joint projects among faculty in the College of Agriculture and the College of Biological Sciences.

**Sustainable Agriculture/
Alternative Crops and Products/
Basic Plant Science**

	<u>1989-90</u>	<u>1990-91</u>
Sustainable Agriculture	\$100,000	\$250,000
Alternative Crops and Products	75,000	100,000
Basic Plant Science*	30,000	60,000

*Primarily in the College of Biological Science

UNIVERSITY OF MINNESOTA
The Institute of Agriculture,
Forestry and Home Economics

MINNESOTA DEPARTMENT OF AGRICULTURE
SUSTAINABLE AGRICULTURE GRANT PROGRAM
1988/1989 GRANT RECIPIENTS

TITLE: Herbicide Ban? Could you Adapt on a Budget?
COUNTY: Lac Qui Parle APPLICANT: David Michaelson FUNDS: \$16,000
DESCRIPTION: Show other farmers that they can raise soybeans and corn while reducing external inputs (fertilizer & herbicides). Demonstrate that many farmers already own the equipment they need to reduce these inputs.

TITLE: A Demonstration of An Intensive Rotational Grazing System for Dairy Cattle
COUNTY: Houston APPLICANT: Ken Tschumper FUNDS: \$12,800
DESCRIPTION: This project will demonstrate the intensive rotational grazing system for dairy cattle feeding. The project will show: 1. New fencing technology, 2. improved productivity, 3. high quality forages without chemicals, 4. reduced fertilizer inputs.

TITLE: Improving groundwater quality and agricultural profitability in EC MN
COUNTY: Isanti APPLICANT: Rod Elmstrand FUNDS: \$21,075
DESCRIPTION: Research a field nitrate testing kit for farmers to do "on the spot" analysis which will eliminate excessive nitrogen use and maximize economic inputs.

TITLE: Modified Ridge Till System for Sugarbeet Production
COUNTY: Grant APPLICANT: Alan Brutlag FUNDS: \$24,900
DESCRIPTION: This project will modify ridge till systems and make it adaptable to sugarbeet production. Should reduce soil erosion and fertilizer and herbicide use. De-ridging and planting into a moist well drained, warm seed environment should net higher yields.

TITLE: Alternative Mulch Systems for Intensive Specialty Crop Production
COUNTY: Ottertail APPLICANT: Ron Roller FUNDS: \$12,618
DESCRIPTION: This project is designed to look at a number of alternative mulching systems in comparison to standard plastic mulch and no mulch systems. Advantages will include decrease soil and moisture loss, increase soil organic matter, and higher grade crops.

TITLE: Intensive Rotational Grazing in Sheep Production
COUNTY: Wadena APPLICANT: James Robertson FUNDS: \$14,457
DESCRIPTION: This project will demonstrate how to implement an intensive rotational grazing system on a farm which has used a conventional cool season low-intensity grazing system. Project will evaluate environmental benefits, and production costs and levels.

TITLE: Demonstration of tillage effects on utilization of dairy and hog manure
COUNTY: Goodhue APPLICANT: James Swan FUNDS: \$25,000
DESCRIPTION: This project will evaluate farming systems which emphasize more efficient utilization of manure as a source of nitrogen, and the relationship between manure and N fertilizer in groundwater contamination.

TITLE: Demonstration of land stewardship techniques in the Red River Valley
COUNTY: Norman APPLICANT: Donald Ogaard FUNDS: \$25,000
DESCRIPTION: Conservation tillage and reduced chemical inputs for sugar beet, spring wheat, and soybean production will be demonstrated on 80 to 160 acres in the Red River Valley.

TITLE: Transition-Soil Building and Maintenance
COUNTY: Yellow Medic. APPLICANT: Larry Olson FUNDS: \$20,543
DESCRIPTION: Will show advantages and disadvantages of using raw manure, compost, and legumes to build and maintain soil fertility. Farm profitability and environment effects will be monitored.

TITLE: Hairy Vetch and Winter Rye as Cover Crops
COUNTY: Freeborn APPLICANT: Mark Ackland FUNDS: \$ 3,700
DESCRIPTION: This study would test the usefulness of hairy vetch, hairy vetch plus winter rye, or winter rye alone as cover crops after oats and preceding corn. A randomized replicated experiment will include the cover crops plus a no cover crop control.

TITLE: Minnesota Integrated Pest Management Apple Project
COUNTY: Dakota APPLICANT: Apple Growers FUNDS: \$22,600
DESCRIPTION: Establishment of baseline information on scab sporulation and infection. Information on the conditions which are ideal for infection will be made available biweekly to apple growers participating in the project to help reduce fungicide applications.

TITLE: Alternative Methods of Weed Control in Corn
COUNTY: Jackson APPLICANT: Esther Nickel FUNDS: \$20,810
DESCRIPTION: This demonstration will evaluate alternative methods of weed control for row cropped corn. Treatment would be banded herbicide, no herbicide and an intercropped legume.

TITLE: Mechanical Mulching of Tree Seedlings
COUNTY: Fillmore APPLICANT: Tim Gossman FUNDS: \$ 2,800
DESCRIPTION: This project will demonstrate a method of improving the survival rate of tree seedlings and through statistical and financial analysis that mulching is a viable alternative in economic terms to the conventional chemical control of weeds.

TITLE: Benefits of Crop Rotation in Reducing Chemical Inputs and Increasing Profit
COUNTY: Aitkin APPLICANT: George Shetka FUNDS: \$18,222
DESCRIPTION: The normal practices of applying a fungicide and a herbicide on continuously cropped wild rice will be compared to alternately rotating wild rice with winter rye or sweet clover/buckwheat without applying these chemicals on wild rice years.

TITLE: Strip-cropping legumes with specialty crops
COUNTY: Hennepin APPLICANT: Mark Zumwinkle FUNDS: \$25,000
DESCRIPTION: A living mulch system will be strip cropped between ridges of pepper and broccoli. The reduction in fertilizer and pesticide inputs will be compared to the conventional chemically intensive methods of producing these crops.

TITLE: Using Sheep and Goats for Brush Control in a Pasture Management System
COUNTY: St. Louis APPLICANT: Alan Ringer FUNDS: \$11,638
DESCRIPTION: This proposed project will demonstrate that sheep and goats can be used as biological controls to suppress woody brush growth so that a permanent pasture can be established.

TITLE: Benefits of Weeder Geese and Composted Manures in Commercial Strawberries
COUNTY: St. Louis APPLICANT: Joan Weyandt-Fulton FUNDS: \$ 7,291
DESCRIPTION: This project will demonstrate that geese are an economical and practical alternative to pre-emergent herbicides for keeping a PYO strawberry field clean of weeds. Will also demonstrate benefits of using composted manures for a well balanced fertility prog

Clean
Water

Everybody's Concern

Minnesota Extension Service

Summary of
Water Quality

Programs

1988

Introduction

The Minnesota Extension Service has made a major commitment to developing educational programs in water quality. Some of the long established educational programs in agriculture have incorporated significant water quality components. The MES is committed to examine all areas of educational programs and deliberately incorporate information about the implications these production practices potentially have on water quality. MES publishes many bulletins, brochures, fact sheets, and other resource materials. During 1988, faculty and staff incorporated water quality considerations into many of these efforts. A complete revision of private pesticide applicator training materials was completed in 1988. Water quality considerations in the use of pesticides was a new and important part of the revisions.

The following pages are a recap and summary of some of the many programs that Extension conducted during the past year. These program were accomplished without receiving new resources. The Minnesota Extension Service is committed to assisting Minnesotans address water quality concerns with the latest research-based information, educational programs, demonstrations, and printed materials to assist people solve their problems in water quality, individually and collectively. Extension agents are serving on many of the county task forces to help write and develop the county water plans. This involvement has helped many leaders understand the importance of a well informed and educated public. Extension has brought important factual data and information to the county water planning efforts.

MES has provided Extension agent training programs during 1988. All agents have had opportunities to participate in Extension Annual Conference and specialized agent training for agriculture and home economics agents. In addition, all county Extension offices have received a comprehensive water quality resource notebook. These training programs have resulted in Extension agents and specialists planning programs that you will read about in the following pages. Additional training will be provided in 1989.

The Water Quality Assessment Report, completed in March of 1988, identified three priority sub-issue areas in water quality that MES would devote staff time and resources to. The following summary of programs outlines programs in the sub-issue areas of waste management and utilization, safe drinking water for families and communities, and agriculture practices impacting water quality.

Water Quality Education Programs

Waste Management and Utilization

1. On-site Sewage Treatment Workshops: Cooperative Efforts between the Minnesota Extension Service and the Minnesota Pollution Control Agency.

Fifteen hundred twenty-one persons have been trained and passed the exam in these workshops since starting in 1980. Resource people from MPCA and MES present in-depth training for individuals installing sewage treatment systems, inspectors, site evaluators, designers and/or pumpers. Extensive educational materials have been developed to assist these people. Intensive three day basic workshops are held each year in several different locations and three day recertification workshops are held in two locations. In 1989, 825 people have participated or are enrolled in basic and recertification workshops. (Jim Anderson)

2. Animal Manure Management Programs

Extension agents and specialists have held many educational programs on building new and/or remodelled manure handling systems. They have also advised individual farmers on alternative designs which minimize the negative impact of animal manure on water quality. This Extension effort is aimed at helping producers make maximum use of animal manure for plant and crop production systems. (Fred Bergsrud)

3. "Waste Management News"

This monthly newsletter has been developed to provide background information for agents, specialists, and researchers.

Utilizing existing money, Extension transferred an experienced agent to campus to give leadership to waste management programs. This person is located in the Soil Science Department. Valuable assistance is being provided to local county government units with waste management information.

4. Research on Waste Management

Extension is taking lead to seek out research on waste management from departments throughout the University of Minnesota. This research information will then be provided to individuals, governmental units, and others concerned with waste management problems. (Tom Halbach)

Safe Drinking Water for Families and Communities

1. Brown County 4-Hers are participating in the county-wide well testing project by calling to remind neighbors in their township to have their water tested. The young people involved remind their neighbors of the requirements, location, date and time of the testing.
2. The Faribault, Martin, and Watonwan Water Quality Program is being formulated for 1989. The thrust of the plan evolved into three areas:
 - a. Water well monitoring program - each county identifies 10 to 20 wells. Samples will be taken from these wells 3 to 4 times per year. (After spring planting, around July 1, later in the season, and before ground freeze-up.) The intent is to identify any changes in what is being found in the water.
 - b. Water well testing program (repeat of last year's program). This effort is encouraging families depending on wells for drinking water to have their water tested regularly.
 - c. Drainage wells - education emphasis through media sources and incorporation into other education programs.

*The programs indicated are dependent upon the reception of grant monies.
4. The Freeborn, Steele, Rice, Mower County Cluster has received an Extension Service innovative grant to help defray expenses of proper well abandonment demonstrations scheduled for 1989. Similar demonstrations were held in Martin, Jackson, and Blue Earth counties in 1988 with several hundred people attending.
5. Blue Earth County Extension is in the process of editing an educational video on proper well abandonment, featuring actual footage from the demonstrations sponsored by the Blue Earth County Board of Commissioners. An innovative Extension grant was awarded to pay the expenses related to the video production. After completion, it will be available within the thirteen county area upon request.
(Mary Lou Ihrke)
6. Extension Agents were offered training on health issues related to water, including water treatment devices and water conservation at Annual Conference and Home Economics Specialization Training. Extension Homemaker Lessons on this topic will be offered in many counties in the near future. The program in Sibley County was one of the first in the area.

7. Watonwan, Nicollet, and Faribault County Extension Agents helped publicize the hazardous waste pick-ups offered in their counties. Blue Earth County continues as an information center for this topic. This topic is incorporated into on-going lessons for homeowners.

The MES is developing a series of three radio public service announcements entitled, "The Water Quality Minute." The series will be aired by nearly 100 radio stations in Minnesota. The series of PSAs will be a specific set of topics providing answers to citizen concerns and referring them to specific information for help. This should help Minnesotans become aware of factual information, practical solutions, and answers to some of their concerns about water quality. (Marty Moen)

Agricultural Practices Impacting on Water Quality

1. The water quality issue will continue to be included in crop production and management programs; "Groundwater and Ag Chemicals: Impacts On My Farming Practices." Through a Memorandum of Agreement, there will be consistency in the technical recommendations for agriculture practices of the Soil Conservation Service and the MES.

Implications of chemical use, including safety, will continue to be incorporated into the Pesticide Certification Training program. Extension Home Economists from Nicollet, Cottonwood, Martin, and Jackson counties attended a special training session in "Protective Clothing Worn While Applying Pesticides." (Wanda Olson)

2. Safe use of yard and garden chemicals was discussed on a video by Steve Poncin, Horticulture Specialized Agent, and Dawn Mattson, Horticulture Assistant. The video was broadcast for an urban audience. This information will also be part of the Master Gardener training to be held in February and March, 1989, and The Blue Earth County Spring Gardening Workshop.
3. A video entitled "Groundwater and Agriculture Chemicals" is available in each Extension office in Minnesota. Rod Hamer, Jackson County, and other agents have used it as an awareness tool with service clubs, including rural and urban citizens (all county offices).
4. "Catch a Raindrop" will be the 1989 theme of the LeSueur-Waseca Conservation Day, reaching 650 4th and 5th graders. This will be the second year that Water Quality will be included in the day's program. This topic is also being taught through local club meetings, 4-H Federation programs, and Camp programs. Youth have also helped promote recycling projects. Teaching materials, videos, teacher guides and student handouts suitable for grades K-8 will soon be available from Minnesota Extension Service. These include "Waste Water," "Surface Water" and "Ground Water." Available now is the slide-type set, "Water, We Can't Live Without It." (Mike Liepold)

5. The "Water Resources III" Conference in March focused specifically on pesticides, how they are impacting our water supplies, and contamination prevention and clean up activities. This program was held at the University of Minnesota-Morris for community and agriculture leaders in the west central area of Minnesota.
(Jerry Wright)
6. The "Environmental Education Resources Conference" was held in November of 1988. This conference created an opportunity for persons working with environmental issues to share educational programs and ideas. It also identified environmental education resources and ways to use them to more effectively create public understanding and adoption. (Jerry Wright)

The Minnesota Extension Service, through the Private Pesticide Applicator Training program, has certified 35,000 private applicators. This training has focused on the safe use and handling of pesticides and appropriate uses.
(Dean Herzfeld)

The 1989 publications on Weed, Disease, and Insect Controls include considerations relative to the use of pesticides and water quality. Also, descriptions and techniques are included, which provide alternatives to pesticides. (Ken Ostlie)

Field days are an effective tool for reaching several thousand Minnesotans each year. In 1988, field days held at branch research stations provided findings relative to water quality and the use of pesticides and nutrients. This research is tracing the path of nutrients and pesticides in our soils. The information and conclusions from this research is being incorporated into current Extension programs.

A correspondence course is being made available to people in Watonwan County. This is a pilot water quality correspondence course, and if it is met with success will be expanded to include other areas of the state.
(Gary Wyatt)

Soil testing and other diagnostic services offered by MES are helpful to farmers making decisions about the proper use of plant nutrients and pesticides. These services are available to farmers in Minnesota.

The Minnesota Extension Service and Minnesota Department of Agriculture are cooperating on a 1989 program to raise the level of awareness of those individuals using pesticides to properly rinse pesticide containers. The campaign is called Rinse and Win. This progressive effort will be aimed at having pesticide containers rinsed so that proper disposal can be carried out under current laws and regulations. (Dean Herzfeld)

Report prepared by Thomas L. Thorburn, Program Leader
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MINNESOTA DEPARTMENT OF AGRICULTURE

ENERGY AND SUSTAINABLE AGRICULTURE

PROJECT OVERVIEW

The Energy and Sustainable Agriculture Program was established in 1987 in response to concern over the impact of conventional agricultural practices on farm profitability, health and the environment. The purpose of the program is to demonstrate and promote alternative practices which are energy efficient, environmentally sound, profitable, and which enhance the self-sufficiency of Minnesota farmers.

Program activities include on-farm demonstrations, workshops, resource databases, an energy audit program to recommend ways for farmers to reduce petrochemical inputs, a grant and low-interest loan program to integrate sustainable technologies into farming operations.

ON-FARM DEMONSTRATIONS 1988 & 1989

PARTICIPANTS: Farmers, County Agents, Extension Specialists, Crop Consultants

TYPE: Non-Chemical Pest Control (Weed, Insect and Pathogens)

OBJECTIVES: To demonstrate to farmers, agri-professionals and the general public the petrochemical savings and profitability of various non-chemical or reduced chemical pest management strategies.
To display and observe on actual working farms the energy savings and profitability of non-chemical pest control practices.

PROJECTS: All of the projects listed below will reduce energy use by reducing overuse of pesticides (herbicides, insecticides, & fungicides).

• **Rye-Weed Control:** Rye is seeded in the fall or the spring, and allowed to grow until 3 days prior to soybean planting. The rye is killed with tillage or a herbicide, and soybeans are planted into the rye residue. The release of an allelopathic substance (an inhibitory substance released by the plant) from the rye residue inhibits weed germination and growth. Preplant incorporated (PPI) preemergence (Pre) and postemergence (Post) herbicide applications will be reduced.

• **Mechanical Weed Control:** The rotary hoe and row crop cultivator will be used as the primary means of weed control in the non-chemical plots. Following corn or soybean planting the rotary hoe is used to control weeds that have germinated but not emerged. The rotary hoe is used repeatedly until adequate in-row weed control is accomplished. As the crop reaches the 8 to 12 inch stage the cultivator is used to control weeds that were not taken out by the rotary hoe. This mechanical method will be compared to the most up to date herbicide program. Studies show that mechanical weed control has the potential to reduce net petrochemical use when compared to many conventional chemical control programs.

● **Integrated Pest Management:** Cultural, chemical, and biological pest control strategies will be demonstrated on a range of pests, i.e. biological control of European Corn Borer; reduced rates of herbicides for weed control; and apple scab monitoring for insecticide reductions. These demonstrations will show the benefit of prior planning and integration of pest control strategies. Specifically, the reduction in petrochemical use when unnecessary pesticide applications and tillage operations are used.

TYPE:

FARM PRODUCED PLANT NUTRIENTS

OBJECTIVES:

To show the energy savings and profitability of substituting farm produced nitrogen for petrochemical based nitrogen.
To demonstrate to farmers, agri-professionals and the general public the petrochemical savings and profitability of legume sources of nitrogen.

PROJECTS:

The projects listed below will reduce energy use by substituting atmospherically fixed nitrogen for petroleum based nitrogen.

● **Companion Crops:** Annual alfalfa will be underseeded in small grains. The alfalfa will accumulate nitrogen in above and below ground tissues. Following the small grain harvest for grain or as silage, the annual alfalfa will continue to grow until killed by a frost in the late fall. Fall or spring tillage will be used to incorporate the legume residue into the soil for use by the following corn crop.

● **Overseeding:** Legumes will be seeded into standing corn or soybean crops at last cultivation or at the onset of soybean maturity. Following the harvest of corn or soybeans, the legume will grow (accumulating nitrogen in its biomass) until it is winter-killed or tilled under by fall or spring tillage.

● **Compost:** Animal manures will be composted and applied to crop fields to demonstrate the superior nutrient content & stability of this fertilizer. The process of composting reduces significantly the amount of manure applied. The nutrients are stabilized and concentrated in a much smaller mass of manure, therefore reducing petrochemical use for transportation and hauling. In addition, the fertilizer value of the compost reduces the need for purchased petroleum based fertilizers.

● **Nitrogen Credits:** The use of nitrogen credits for animal manures and alfalfa will be demonstrated under various farmer tillage situations. This project will show dairy farmers the importance of calculating the energy savings value of manure, alfalfa and other farm based sources of nitrogen.

TYPE: HEATING AND COOLING SYSTEM DEMONSTRATIONS

OBJECTIVE: To demonstrate to farmers, agri-professionals and the general public the economic and energy savings when energy saving devices are installed in livestock operations.

PROJECTS: **In Line Heat Exchanger for Dairy:** The installation of heat exchangers in the cooling operations of a dairy farm can save significant amounts of energy by making the milk cooling process more efficient while utilizing excess heat for water heating.

Storage Water Heating: The installation of storage water heaters in a dairy operation can significantly reduce the peak energy use during milking.

TYPE: CROPPING SYSTEM COMPARISON

OBJECTIVE: To demonstrate to farmers, agri-professionals and the general public the viability of whole cropping systems that substitute on-farm renewable resources while reducing reliance on external and petrochemical inputs.

PROJECTS: This project is the synthesis of all of the above projects into a whole farm system. Effective projects have to be incorporated into whole farm systems to be accepted by farmers.

• **Conversion Comparison:** Economic and petrochemical inputs will be monitored on two types of cropping systems; sustainable (reduced external inputs) and conventional (chemically intensive).

Cooperative Research into Sustainable Agriculture

- PURPOSE:** To provide a limited amount of funding for research in sustainable agriculture systems
- OBJECTIVE:** To encourage research into alternative production methods.
To provide research based information for farmers interested in sustainable agriculture.
- PARTICIPANTS:** University of Minnesota Researchers & Extension State Specialists, Non-Profits
- PROJECTS:**
- Use of Cover Crops for Erosion Control and Help in Weed Control for Corn and Soybeans in Minnesota.** To evaluate competition effects of moisture and nutrients between soybeans and various cover crops. Evaluate weed control effects by various cover crops and various killing dates of various cover crops.
- Influence of Reduced Herbicide Rates on Weed Control and Economic Returns in Corn and Soybeans.** To evaluate below label rates of herbicides on weed control in corn and soybeans; To evaluate the effects of time of application on efficacy of below label rates of postemergence herbicides; To evaluate the influence of cultivation on weed control with and without herbicides; To evaluate the risk involved with use of below label rates of herbicides.
- Tillage Effects on Utilization of Manure and Alfalfa Nitrogen and Ground Water Quality.** To develop a decay series for alfalfa and manure to aid in N recommendations in first, second and third year corn following application. To determine specific decay series for different tillage system. To monitor profile N and estimate the movement of N and water through the soil to estimate the amount of N entry into ground water following alfalfa or manure application. To evaluate the effect of manure applications and tillage on corn rootworm populations.
- Apple Scab Monitoring.** A leaf wetness recorder will be set up at the Carpenter St. Croix Valley Nature Center. The monitoring of apple scab perithecia development microscopically with the enhanced monitoring ability of the leaf wetness recorder should help to reduce the number of fungicide applications for apple growers in that area of the state.
- Stewardship Farming Project- On-Farm Research.** The Land Stewardship Project in Lewiston will conduct on-farm experimentation and demonstration work with farmers in southeastern Minnesota on: Nitrogen Management in corn-alfalfa rotation; Non-Chemical Weed Control in Corn; and Cover Crops and Establishment Systems.

SUSTAINABLE AGRICULTURE WORKSHOPS 1987 & 1988

- PURPOSE:** Communication of Sustainable Agriculture Information
- OBJECTIVE:** To facilitate information transfer on sustainable farming practices.
To facilitate dialog between agricultural professionals and farmers using alternatives to conventional production methods.
To encourage communication between farmer using and farmers desiring alternative production methods.
- PARTICIPANTS:** Farmers, County Agents, Extension Specialists, Non-Profit Organizations
- PROJECTS:** **Farmer - Researcher Sustainable Agriculture Workshop.** Farmers from various backgrounds and locations, at various stages of practicing sustainable techniques discuss with University of Minnesota researchers, extension agents, and administrators. These structured discussions revolve around the needs of this farm segment for information and research in sustainable agriculture. These workshops are unique in that farmers are presenting their findings and the information they have generated regarding sustainable practices. The farmers then request of the University additional research and information needs from their perspective.
- Farmer to Farmer Communications.** Small informal county work groups will meet in the winter months to discuss alternative management practices that may lead to a more sustainable agriculture. Discussion will be led by farmers experienced with various aspects of sustainable farming.

FARM ENERGY AUDIT 1988 & 1989

- OBJECTIVE:** To audit and document energy use on farms in Minnesota. To document enterprises of farm operations where energy conservation is needed. To recommend energy conservation practices.
- PARTICIPANTS:** Farmers, County Agents
- PROJECTS:** **Cropping Systems Audit.** Direct (fuel and electricity) and in-direct (fertilizers and pesticides) will be audited in the cropping enterprise of farm operations. Conservation and stewardship alternatives will be recommended in areas where energy use is excessive or inefficient.
- Dairy Enterprise Audit.** Direct and in-direct energy uses will be audited in the dairy enterprise of farm operations. Recommendations will be made for more efficient use of energy in all aspects of the operation from manure handling to milk cooling.
- Agricultural Energy Database.** Information from the above audits will be stored, managed and manipulated so as to elucidate energy use on Minnesota farms. This information will be valuable in the 1990's as energy costs begin to increase, again.

SURVEY OF MINNESOTA FARMERS USING SUSTAINABLE AGRICULTURE PRACTICES

- OBJECTIVE:** To determine what alternative management strategies are being used by Minnesota farmers. To determine why these alternative management strategies are being used. To establish a resource list of farmers with experience in sustainable farming. To gather information on alternative practices that could be used in Minnesota. To determine the information, research and policy needs of farmers using sustainable farming practices.
- PARTICIPANTS:** Farmers
- PROJECT:** Survey forms have been developed and sent out to farmers in the state known to be using sustainable farming practices. Data from the surveys is being managed and manipulated statistically on microcomputers. Results and resource lists will be sent to all farmers participating in the survey and to interested agricultural professionals.

SUSTAINABLE AGRICULTURE RESEARCH COMPUTERIZED DATABASE

- OBJECTIVE:** To locate and compile all of the agricultural research being done currently which is designed to address the issue of agricultural sustainability. To establish a list of universities and researchers which may be used as resources for information regarding sustainable agriculture. To network with other professionals who are interested in sustainable agriculture.
- PROJECT:** Letters of inquiry were sent to universities and researchers known or thought to be involved in sustainable agriculture. Information received is entered into a database management computer system. Resource lists are generated upon request for interested individuals and organizations.

SUSTAINABLE AGRICULTURE GRANT PROGRAM

- OBJECTIVE:** To make funds available to farmers in the state who will effectively perform on-farm demonstrations or research on sustainable farming practices. To demonstrate alternative farming practices to rural and urban populations.
- PARTICIPANTS:** Farmers, County Extension Agents, Extension State Specialists, Non-Profit Organizations, Soil and Water Districts, Farm Management Specialists
- PROJECT:** Funds (\$ 300,000) for this project were appropriated by the 1988 Minnesota Legislature to encourage farmers to try alternative farming practices and to demonstrate them for their neighbors. Grant applications may be made until November 15, 1988. The grants will be awarded following the recommendations of a technical review panel. Projects must be on farms in the state, and may be coordinated with local and state professionals.

SUSTAINABLE AGRICULTURE LOAN PROGRAM

- OBJECTIVE:** To make low interest loan funds available to farmers in the state who would like to make changes in their farming operation which would make it more sustainable. To help facilitate integration of sustainable technologies into farming.
- PARTICIPANTS:** Farmers
- PROJECT:** Funds (\$ 1,000,000) for this project were appropriated by the 1988 Minnesota Legislature to encourage farmers to try alternative farming practices by updating farm equipment, machinery, buildings, etc. The loans will be awarded following the recommendations of a technical review panel. The interest rate on the loans will be 6 % with a maximum loan amount of \$ 15,000.

How do I apply?

Farmers who are interested may obtain information and the necessary application forms by calling or writing.

Sustainable Agriculture Loan Program
Minnesota Department of Agriculture
90 West Plato Blvd
St. Paul, MN 55107
(612)296-7673

Farmers should be able to begin applying for this program in February or early March 1989.



Sustainable Agriculture Program
Minnesota Department of Agriculture
90 West Plato Boulevard
St. Paul, Minnesota 55107

Farmers invited to apply



**SUSTAINABLE
AGRICULTURE
LOAN PROGRAM**

Since 1980, farmers have undergone a major transformation in their attitudes toward farming practices, production costs and their basis for adopting new practices. Today decisions are based on the determination of whether or not a change of practice will cash flow or whether the payoff time is short enough.



In 1988, the Minnesota Legislature appropriated the funds for the shared savings loan program. The purpose of the shared savings loan program is to facilitate the adoption of alternative management practices that will enhance farm profitability and benefit the rural environment in the long term.



Low interest loans will be available for the purchase of new or used machinery, installation of equipment and projects that reduce or make more efficient use of energy and agricultural chemicals. These loans will be structured so that they can be repaid through a "shared savings" plan, whereby part of the savings generated by the improvement would be retained by the farmer with the balance repaying the loan.

The amount borrowed can be up to \$15,000 per individual with a term of 7 years or less. The interest rate is 6%. On joint projects funding can be as high as \$75,000.

Who is eligible to participate?

Loans will be made to residents of the State of Minnesota who are actively engaged in farming and can show adequate repayment.





Minnesota Environmental Education Board

**Minnesotans Educating Minnesotans to Make
Wise Environmental Decisions**

A Grassroots Approach

**Further Information:
Jackie Lind, Executive Director
(612) 296-0212**



MEEB

Legislative Mandate

Encourage development of life values and a style of living which fosters the constructive use, rather than exploitation of natural resources and the environment.

Promote coordination among various groups and institutions developing and distributing environmental education materials.

Include formal and nonformal education, prekindergarten, kindergarten through grade twelve, post-secondary, vocational, college and adult education. (MN Stat. 116E.01)

**The *Minnesota Environmental Education Board*
is a state agency established in 1973
as a grassroots driven volunteer organization
to help address the needs for environmental education
in our state.**

**There are thirteen *Regional Environmental Education Councils*
whose 200 volunteers,
assisted by a staff of *five regional coordinators*,
actively plan and conduct environmental education programs.**



MEEB: Need for Increased Funding

There are strong needs for more environmental education in Minnesota. Many agencies support increased funding for MEEB to meet those needs.

More Environmental Education Needed:

Minnesotans are demanding more educational programs because of many current, highly visible environmental issues: greenhouse effect, waste incineration, quality of drinking water, soil erosion, and air quality.

Public meetings for the Environmental Congress, the Environmental Trust Fund, and the Groundwater Strategy listed education as a high priority for addressing today's environmental issues.

Although MEEB's programs reached 9,000 teachers last year, there are 47,000 teachers in Minnesota. Many school districts do not yet have curriculum plans in compliance with the Elementary Rule.

MEEB has Statewide Delivery System:

Twelve agencies, forming an EQB Task Force on Environmental Education, stated that the "MEEB system is an excellent existing educational delivery system at the local level. It is prudent to strengthen the MEEB's curriculum staff and to fully fund its efforts."

MEEB has a 15-year history of local program delivery in environmental education for both adults and students.

(continued)

Adequate Funding Needed:

MEEB's strong framework for statewide planning and delivery is in place and needs to be appropriately funded to meet current demands.

Regional Coordination

Inadequate staff time is available to implement regional environmental programs and meet the educational needs of local communities. MEEB currently can fund 1/4 staff position and 1/6 clerical position for each of greater Minnesota's 12 regions. Part time and seasonal staff now serve 3 regions of the state, resulting in long travel distances and large workloads.

Curriculum Coordination

Inadequate funding exists to train teachers to use environmental curriculum materials in their classrooms, and to coordinate the classroom materials currently available so they are easily accessible to Minnesota teachers.



MEEB

Legislative Request for Increased Budget Fiscal Years 1990-1991

Need:

- Increased delivery and stronger coordination of environmental information for Minnesota students and adults

Request:

- 1 additional Regional Coordinator to plan and conduct local programs
- 1 Curriculum Coordinator for elementary and high school programs
- Part-time clerical support, travel and communications expenses

***Total:* \$110,000/year Increase**

Benefits:

- More Minnesota students and adults learning about the environment
- More environmental education programs at the local and regional levels
- More teachers trained to integrate environmental studies within the school curriculum
- Increased teaching of concepts about water, wildlife, forestry, prairies, land stewardship, waste management, and air quality
- Implementation of the environmental requirement of the Elementary Education Rule of 1986

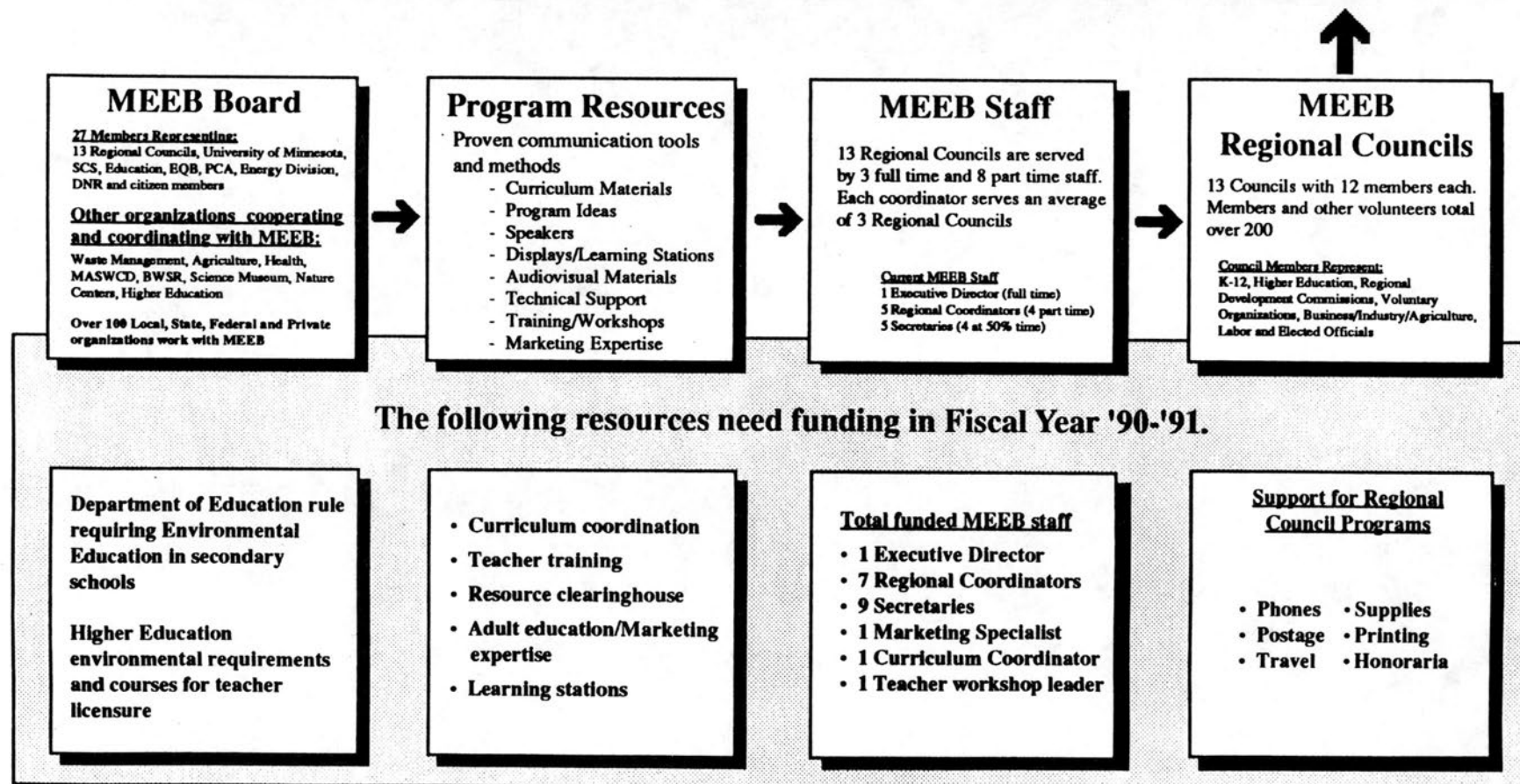
MEEB Program Delivery to Minnesota Target Audiences

- Students
- Educators

- Voters
- Elected Officials



- Agriculture
- Decision Makers
- Business
- Industry



MEEB

Minnesota Environmental Education Board

Staff Contacts

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(612) 296-2368

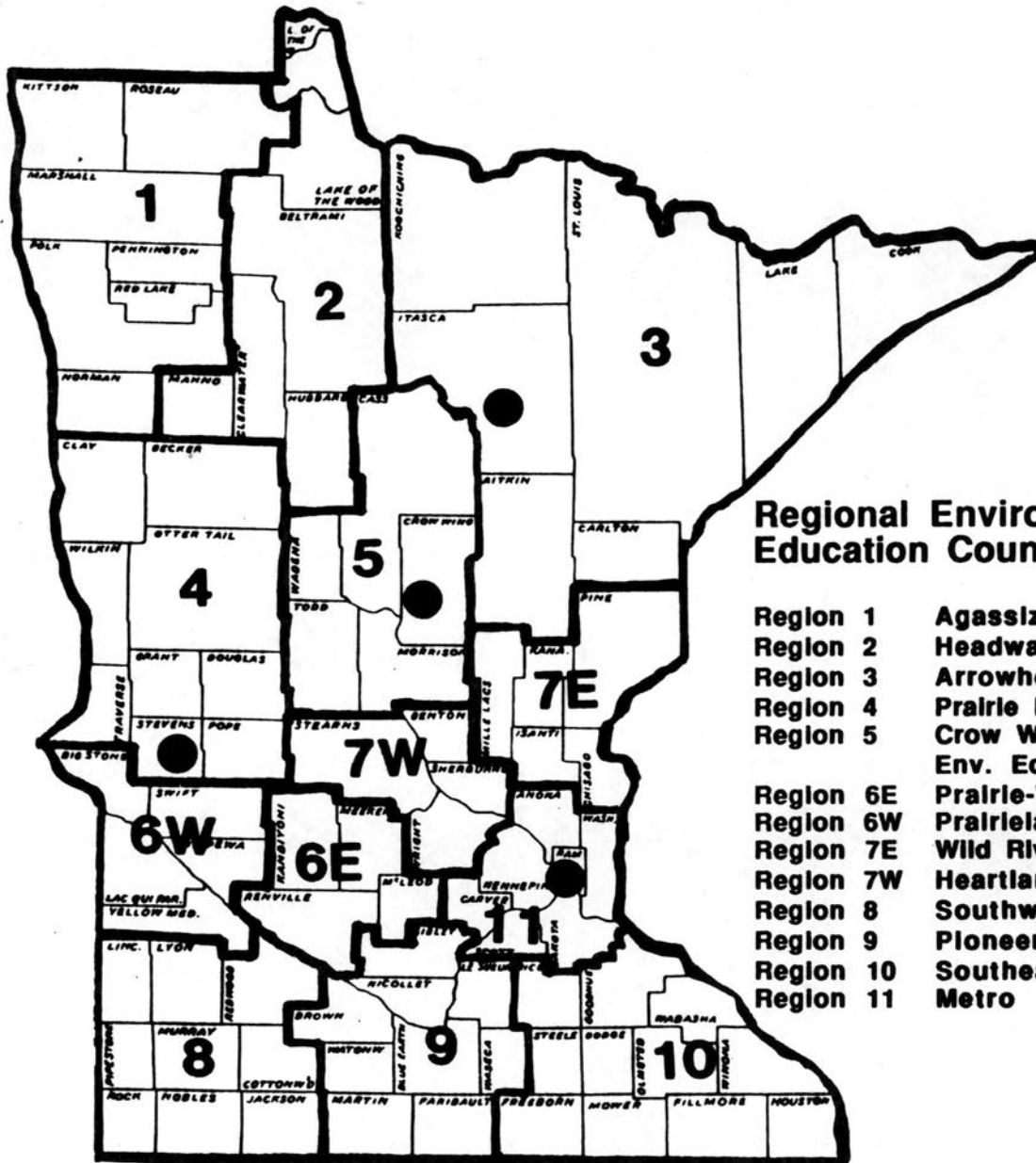
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Regional Environmental Education Councils

Region 1	Agassiz
Region 2	Headwaters
Region 3	Arrowhead
Region 4	Prairie Flyway
Region 5	Crow Wing/ Env. Ed. Volunteers
Region 6E	Prairie-Woods
Region 6W	PrairieLand
Region 7E	Wild Rivers
Region 7W	Heartland
Region 8	Southwest
Region 9	Pioneerland
Region 10	Southeastern
Region 11	Metro





MEEB Activities

July 1987 - June 1988

Audience:	% of Activities	# of Activities	#of Participants
Community, Adult	45%	110	55,309
Teachers *	38%	90	8,955
Students, K-12	17%	42	37,067
Total	100%	242	101,331
			* (Est. # students in teachers' classes) 180,000
			<u>Total Audience</u> 281,331

Program Activities:	% of Activities	# of Activities	#of Participants
Workshops		91	2,949
Conferences	66%	8	1,053
Presentations		45	8,405
Audio Visual		15	2,339
Fairs, Exhibits	19%	25	21,836
Field Activities		20	5,248
Publications		12	7,050
Distributions	7%	5	12,109
Awards		4	301
Media	5%	7	4,000 +
Curriculum Development		2	2,850
Learning Stations	3%	8	33,191
Total	100%	242	101,331



MEEB Programs

July 1987-June 1988

<u>Topic</u>	<u>#Activities</u>	<u>% of Activities</u>
<u>Wildlife</u>	72	27%
<u>Environmental Awareness</u>	54	20%
<u>Environmental Education Curriculum Plan</u>	31	11%
<u>Waste Management</u>	26	10%
<u>Forestry</u>	22	8%
<u>Water Quality</u>	21	8%
<u>Land Stewardship</u>	20	7%
<u>Other:</u> Acid Rain, Natural History Lyme Disease, Adaptation, Environmental Ethics, Habitat and Ecology, Humane Education	24	9%
Total	270	100%



MEEB's Role in Implementing Elementary Rule

**In 1986, the Minnesota State Board of Education adopted
the *Elementary Education Rule*
requiring that environmental education be integrated
within the elementary curriculum.
MEEB's programs help Minnesota teachers implement this rule.**

FY 1988 Programs for Elementary Teachers

- 25 Workshops for teachers on environmental
education curriculum planning and resource
materials**
- 6 Workshops and conferences for school
administrators**
- 21 Teacher workshops on Project Learning Tree
and Ag-Stravaganza**
- 22 Teacher workshops on Project Wild/Aquatics**

- 6 Publications featuring en-
vironmental lesson plans**

Others:

**Field trip information
Learning stations
School lyceum programs
Field activities
Distribution of resource
materials**



MEEB Resources

Funding and Staff Support for 13 Regional Councils

Staff: 3 full-time positions
 9 part-time and seasonal employees

<u>Budget:</u>	Salaries	\$282,800
FY 1989	Rent and Communications	39,800
	Program	<u>39,900</u>
	<i>Total</i> (State General Fund)	<i>\$362,500</i>
	Administered through	
	Department of Natural Resources	



MEEB Volunteers

Members of MEEB's 13 Regional Councils are volunteers representing a broad spectrum of the community. They plan and conduct environmental education programs.

<u># of Regional Council Members</u>	<u>% Regional Council Members</u>	<u>Volunteers' Backgrounds</u>
40	25	Teachers and Administrators (elementary & high school)
20	13	Federal & State Agency Specialists (DNR, PCA, Extension Service, USDA, Health, US Fish & Wildlife)
17	11	Business & Industry (Lawyers, utilities, insurance, retail, construction, consultants)
15	10	Nonprofit Organizations (nature centers, camps, arboretum, wildlife refuge, Lung Association, Land Stewardship)
15	10	Local Government Officials (RDCs, SWCDs, county commissioners, city health specialists)
14	9	Farmers & Agribusiness
13	8	Higher Education
10	6	Labor (carpenter, typist, postal workers, computer operator, medical and social workers)
6	4	Students & Homemakers
6	4	Retired
<u>156</u>		
(Total Council Members)		

(Volunteer Regional Council Members were 60% men and 40% women in October, 1988.)



MEEB Working With Others

**In Fiscal Year 1988, MEEB and the 13 Regional Councils
cosponsored programs with 100 local, state, and federal organizations.**

Dept. of Education
Dept. of Natural Resources
Forestry
Nongame Wildlife
State Parks
Hunter Education
Minerals
Waters
Fisheries

Audubon
Barlage Center for Science
Bemidji Arts Center
Board of Water & Soil Resources
Chamber of Commerce
Community Colleges
Community Education
Counties and cities
Countryside Council
Department of Health
Department of Agriculture
Ed. Cooperative Service Units
Energy Division
Environ. Learning Centers
Environ. Protection Agency
Environ. Quality Board
Farm by the Lake
Forest History Center
Forest Resource Center

Future Farmers of America
Heartland Animal Rescue Team
Izaak Walton League
Lake associations
Land Stewardship Project
League of Women Voters
Local school districts
McKnight Initiative Fund
Merchants associations
Mississippi Headwaters Board
MN Academy of Science
MN Assoc. of Environ. &
Outdoor Educators
MN Environ. Sci. Foundation
MN Forestry Assoc.
MN Historical Society
MN Humane Federation
MN Ornithologists
MN Power
MN Project
MN Science Museum
MN Water Quality Project
MN Zoo
Nat'l Agri-Marketing Assoc.
Nat'l Wildlife Refuges
National Park Service
Nature Centers
Nature Conservancy

Northwest Fur Post
Northern States Power
Opportunities In Science
Otto Bremer Foundation
Pheasants Forever
Pheasants, Inc.
Pollution Control Agency
Redwood, Cottonwood
Rivers/Control Agency
Regional Development Councils
Sierra Club
Silverton Foundation
Society of Am. Foresters
Soil & Water Conserv. Dists.
Soil Conserv. Service
St. Louis River Assoc.
State Universities
SW Agency Task Force
Land Stewardship Project
The International Coalition
of Land & Stewardship
U.S. Dept. of Agriculture
U.S. Forest Service
United Northern Sportsman Club
University of MN
Voyaguers National Park
Waste Management Board
WesMin RC & D

1988-2 SIGNUP EASEMENT ALLOTMENT REQUESTS
REVISED 2/17/89

COUNTY	EASEMENT #	LANDOWNER	TYPE OF EASEMENT		TYPE OF PERPETUAL			EASEMENT	EASEMENT	PRACTICE	TOTAL REQUEST
			20 YEAR	PERPETUAL	MARG	AG	WET	REST	LV	SNO	
			acres	acres	acres	acres	acres	acres	acres		
AITKIN	NONE								0.0	*	\$0.00
ANOKA	NONE								0.0	*	\$0.00
BECKER	3 - 1 - 88 - 2	BETHEL	16.3						16.3	*	\$2,356.16
BELTRAMI	4 - 2 - 88 - 2	CHARLES ONSTEAD	26.0						26.0	*	\$2,679.30
BENTON	5 - 1 - 88 - 2	GERALD GOEBEL		16.7			16.7		16.7	*	\$4,406.13
BIG STONE	6 - 1 - 88 - 2	JAMES TAPPE		44.4			44.4		44.4	*	\$23,579.06
	6 - 2 - 88 - 2	KEVIN TAPPE	53.2						53.2	*	\$18,364.11
	6 - 3 - 88 - 2	JEFFERY TAPPE	27.6						27.6	*	\$9,527.04
	6 - 4 - 88 - 2	JEFFERY TAPPE	14.0						14.0	*	\$4,832.66
BLUE EARTH	NONE								0.0	*	\$0.00
BROWN	8 - 3 - 88 - 2	DUANE WEERTS	31.5						31.5	*	\$20,692.66
	8 - 4 - 88 - 2	JEFF BALTRUSAITIS		11.5			11.5		11.5	*	\$10,776.77
	8 - 5 - 88 - 2	WILTSHECK	4.4						4.4	*	\$2,680.13
CARLTON	NONE								0.0	*	\$0.00
CARVER	10 - 4 - 88 - 2	JOEL VINKEMEIER		39.1			39.1		39.1	*	\$36,009.54
	10 - 5 - 88 - 2	MILAN WISCHNACK		14.9			14.9		14.9	*	\$13,483.46
	10 - 6 - 88 - 2	RANDALL FELTMANN	5.0						5.0	*	\$3,046.90
CASS	NONE								0.0	*	\$0.00
CHIPPewa	NONE								0.0	*	\$0.00
CHISAGO	13 - 1 - 88 - 2	DAVID EVANS	25.7						25.7	*	\$5,124.58
CLAY	14 - 2 - 88 - 2	R. PAUL SIMONSON		33.1			33.1		33.1	*	\$21,683.48
	14 - 3 - 88 - 2	THOMAS WATT		6.6			6.6		6.6	*	\$4,323.59
	14 - 4 - 88 - 2	THOMAS WATT	5.6						5.6	*	\$2,384.54
	14 - 5 - 88 - 2	JOHN ANDERS		23.4			23.4		23.4	*	\$9,480.04
CLEARWATER	15 - 1 - 88 - 2	SNOBECK	25.2						25.2	*	\$2,997.00
	15 - 2 - 88 - 2	JOHNSON		9.3			9.3		9.3	*	\$2,432.00
COOK	NONE								0.0	*	\$0.00
COTTONWOOD	17 - 6 - 88 - 2	RUSSELL GOERTZEN	16.0						16.0	*	\$10,274.72
	17 - 7 - 88 - 2	KEITH NELSON		7.5			7.5		7.5	*	\$7,126.58
	17 - 8 - 88 - 2	DALLAS LARSON		14.7			14.7		14.7	*	\$13,078.88
	17 - 9 - 88 - 2	ARVID REDMAN	6.3						6.3	*	\$3,515.09
	17 - 10 - 88 - 2	WALTER UNRUH	45.8						45.8	*	\$33,495.59
	17 - 11 - 88 - 2	WARREN PANKOMIN	28.1						28.1	*	\$15,678.40
	17 - 12 - 88 - 2	BRUCE MEWS	26.0						26.0	*	\$14,762.28
	17 - 13 - 88 - 2	KENNETH KASTNER		1.6			1.6		1.6	*	\$1,373.41
	17 - 14 - 88 - 2	DONALD SCHULTZ		20.6			20.6		20.6	*	\$17,498.26
	17 - 15 - 88 - 2	VERLYN PAST		8.0			8.0		8.0	*	\$8,385.04
	17 - 16 - 88 - 2	VERDA UNRUH	20.6						20.6	*	\$13,036.05
CROW WING	NONE								0.0	*	\$0.00
DAKOTA	19 - 4 - 88 - 2	RICHARD CRAGG	10.0						10.0	*	\$3,788.90
	19 - 6 - 88 - 2	MYRTLE PAHL	34.0						34.0	*	\$14,635.64
DODGE	NONE								0.0	*	\$0.00
DOUGLAS	21 - 2 - 88 - 2	ROBERT HOFFMAN	35.4						35.4	*	\$9,629.15
	21 - 3 - 88 - 2	PETER RUTTEN	13.6						13.6	*	\$3,966.99
	21 - 4 - 88 - 2	ROBERT FERRIS	22.3						22.3	*	\$6,504.69

1988-2 SIGNUP EASEMENT ALLOTMENT REQUESTS
REVISED 2/17/89

COUNTY	EASEMENT #	LANDOWNER	TYPE OF EASEMENT		TYPE OF PERPETUAL					EASEMENT	EASEMENT	PRACTICE	TOTAL REQUEST	
			20 YEAR	PERPETUAL	MARG	AG	WET	REST	LV	SNO	TOTAL	DOLLARS	DOLLARS	INCLUDING \$200
			acres	acres	acres	acres	acres	acres	acres	ACRES	* REQUESTED	* REQUESTED	* TITLE WORK	
FARIBAULT	21 - 5 - 88 - 2	ROBERT KOMES	10.0							10.0	*	\$2,553.90	\$750.00	\$3,503.90
	21 - 6 - 88 - 2	ROBERT KOMES		22.0				22.0		22.0	*	\$8,644.02	\$3,200.00	\$12,044.02
	21 - 7 - 88 - 2	RUBEN BOLIN	13.0							13.0	*	\$4,104.88	\$1,900.00	\$6,204.88
	21 - 8 - 88 - 2	MEINRAD MUNKBERG	18.0							18.0	*	\$4,896.18	\$1,350.00	\$6,446.18
	21 - 9 - 88 - 2	JAY STICH		22.0				22.0		22.0	*	\$9,880.42	\$3,700.00	\$13,780.42
	21 - 12 - 88 - 2	LAWRENCE OLSON		25.0				25.0		25.0	*	\$10,461.75	\$5,700.00	\$16,361.75
	22 - 7 - 88 - 2	STAN McCORMICK		9.8				9.8		9.8	*	\$10,612.42	\$980.00	\$11,792.42
	22 - 8 - 88 - 2	MORRIS HANSON		13.0				13.0		13.0	*	\$12,087.27	\$2,300.00	\$14,587.27
	22 - 9 - 88 - 2	MARILYN KRAUSE	4.1							4.1	*	\$26,502.81	\$3,075.00	\$29,777.81
	22 - 10 - 88 - 2	LYLE WIPPLINGER	12.0							12.0	*	\$7,427.76	\$900.00	\$8,527.76
FILLMORE	23 - 2 - 88 - 2	MANFORD CORSON		20.6				20.6		20.6	*	\$7,400.34	\$8,240.00	\$15,840.34
FREEBORN	24 - 3 - 88 - 2	ROBERT URBATSCH	4.5							4.5	*	\$2,139.26	\$337.50	\$2,676.76
GOODHUE	25 - 9 - 88 - 2	DAVID HOLTORF	5.0							5.0	*	\$1,843.35	\$375.00	\$2,418.35
	25 - 10 - 88 - 2	KENNETH LIFFRIG	5.7							5.7	*	\$2,651.01	\$427.50	\$3,278.51
	25 - 11 - 88 - 2	GRANT HOVEN	5.0							5.0	*	\$2,514.10	\$375.00	\$3,089.10
	25 - 12 - 88 - 2	WAYNE GADIENT		23.4				23.4		23.4	*	\$18,861.57	\$2,340.00	\$21,401.57
	25 - 13 - 88 - 2	JEROME MCGOUGH	23.7							23.7	*	\$7,801.57	\$1,777.50	\$9,779.07
GRANT	26 - 3 - 88 - 2	LEE RONHOUE		40.0				40.0		40.0	*	\$28,643.00	\$4,000.00	\$32,843.00
	26 - 5 - 88 - 2	JAMES HANSON	30.0							30.0	*	\$11,180.40	\$2,250.00	\$13,630.40
	26 - 6 - 88 - 2	GEORGE WEIGAND		29.9				29.9		29.9	*	\$19,351.88	\$4,490.00	\$24,041.88
HENNEPIN	NONE									0.0	*			\$0.00
HUBBARD	NONE									0.0	*			\$0.00
ISANTI	30 - 1 - 88 - 2	SCOTT JOHNSON		2.7				2.7		2.7	*	\$888.63	\$810.00	\$1,898.63
ITASCA	31 - 1 - 88 - 2	GEORGE BOWMAN		5.0					5.0	5.0	*	\$1,056.10	\$500.00	\$1,756.10
	31 - 3 - 88 - 2	JOHN CARPENTER	22.0							22.0	*	\$2,305.38	\$6,050.00	\$8,555.38
	31 - 4 - 88 - 2	JIM WOHRLE		6.0				6.0		6.0	*	\$1,278.40	\$600.00	\$2,078.40
	31 - 5 - 88 - 2	MELVIN KARKEAINEN	26.0							26.0	*	\$1,911.00	\$1,950.00	\$4,061.00
JACKSON	32 - 4 - 88 - 2	D.F.H.HARRIES	7.5							7.5	*	\$5,433.53	\$562.50	\$6,196.03
	32 - 5 - 88 - 2	MICHAEL De WALL		31.0				31.0		31.0	*	\$29,640.65	\$3,100.00	\$32,940.65
KANABEC	NONE									0.0	*			\$0.00
KANDIYOHI	34 - 8 - 88 - 2	JAMES BOURKQUIN		24.7				24.7		24.7	*	\$18,893.03	\$7,410.00	\$26,503.03
	34 - 9 - 88 - 2	GUSTE BLAD		43.0					43.0	43.0	*	\$38,511.66	\$4,300.00	\$43,011.66
	34 - 10 - 88 - 2	CONRAD AASEN		27.5					27.5	27.5	*	\$18,997.27	\$2,750.00	\$21,947.27
	34 - 12 - 88 - 2	ADOLPH FLESLAND	23.7							23.7	*	\$7,931.44	\$1,777.50	\$9,908.94
	34 - 13 - 88 - 2	HENRY RUTER	5.0							5.0	*	\$2,295.40	\$375.00	\$2,870.40
KITTSO	35 - 2 - 88 - 2	M.MARIE GILLIE		9.0				9.0		9.0	*	\$4,366.80	\$1,500.00	\$6,066.80
	35 - 3 - 88 - 2	MARVIN JOHNSON		49.0				49.0		49.0	*	\$6,835.99	\$1,600.00	\$8,635.99
KOOCHICHI	36 - 1 - 88 - 2	NELS RUDE	40.0							40.0	*	\$4,663.60	\$4,000.00	\$8,863.60
LAC QUI PAR	NONE									0.0	*			\$0.00
LAKE	NONE									0.0	*			\$0.00
LAKE OF WDS	NONE									0.0	*			\$0.00
LE SUEUR	40 - 1 - 88 - 2	JOHN WOESTEHOPF		19.0				19.0		19.0	*	\$14,996.32	\$950.00	\$16,146.32
	40 - 2 - 88 - 2	RICHARD DIETZ	6.0							6.0	*	\$3,188.40	\$300.00	\$3,688.40
	40 - 3 - 88 - 2	TED MELLBY	11.6							11.6	*	\$5,951.14	\$580.00	\$6,731.14
LINCOLN	41 - 1 - 88 - 2	TED RUPPERT		24.2				24.2		24.2	*	\$10,556.77	\$2,420.00	\$13,176.77

1988-2 SIGNUP EASEMENT ALLOTMENT REQUESTS
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COUNTY	EASEMENT #	LANDOWNER	TYPE OF EASEMENT		TYPE OF PERPETUAL			EASEMENT	EASEMENT	PRACTICE	TOTAL REQUEST			
			20 YEAR	PERPETUAL	MARG	AG	WET	REST	LV	SNO	TOTAL	DOLLARS	DOLLARS	INCLUDING \$200
			acres	acres	acres	acres	acres	ACRES	* REQUESTED	* REQUESTED	* TITLE WORK			
LYON McLEOD	41 - 2 - 88 -2	LEONARD STONE	8.7					8.7	*	\$2,146.46	*	\$3,598.96		
	41 - 3 - 88 -2	FRANKLIN JORGENSEN		33.0			33.0	33.0	*	\$13,703.58	*	\$17,203.58		
	41 - 4 - 88 -2	GORDON KNOPCZNSKI		26.0	26.0			26.0	*	\$9,274.20	*	\$12,974.20		
	41 - 5 - 88 -2	KENNETH CHRISTENSEN		30.7			30.7	30.7	*	\$12,748.48	*	\$16,018.48		
	NONE							0.0	*		*	\$0.00		
	43 - 5 - 88 -2	DARROL VOLLMER	17.4					17.4	*	\$8,856.77	*	\$10,549.27		
	43 - 6 - 88 -2	BRICE BETHKE		6.8	6.8			6.8	*	\$5,435.98	*	\$6,145.98		
	43 - 7 - 88 -2	ELLA FILK	25.6					25.6	*	\$13,228.54	*	\$15,598.54		
	43 - 8 - 88 -2	ARCHIE KUCERA	10.0					10.0	*	\$5,024.90	*	\$6,162.40		
	43 - 9 - 88 -2	NEIL JERGENS	7.0					7.0	*	\$3,617.18	*	\$4,342.18		
MAHNOMEN MARSHALL MARS/BELTR MARTIN	43 -10 - 88 -2	KEVIN KRAEMER	30.6					30.6	*	\$15,620.69	*	\$18,115.69		
	NONE							0.0	*		*	\$0.00		
	NONE							0.0	*		*	\$0.00		
	NONE							0.0	*		*	\$0.00		
	46 - 4 - 88 -2	LORETTA OLSEN	21.5					21.5	*	\$15,544.07	*	\$17,556.57		
	46 - 5 - 88 -2	TENHASSEN FARMS	22.3					22.3	*	\$15,121.63	*	\$16,994.13		
	46 - 6 - 88 -2	FRED KRAHMER	4.4					4.4	*	\$2,939.72	*	\$3,469.72		
	46 - 7 - 88 -2	FRED KRAHMER	40.0					40.0	*	\$26,724.80	*	\$29,924.80		
	46 - 8 - 88 -2	HAZELMERE BIT.CO.	11.1					11.1	*	\$7,597.73	*	\$8,630.23		
	MEEKER	47 - 4 - 88 -2	FRANCIS LARSON		1.4	1.4			1.4	*	\$979.57	*	\$1,319.57	
47 - 5 - 88 -2		RICHY FLANDERS	5.0					5.0	*	\$1,642.30	*	\$2,217.30		
47 - 6 - 88 -2		PETER DICK	64.0					64.0	*	\$29,409.28	*	\$34,409.28		
47 - 7 - 88 -2		DAVID LUTHENS		5.0	5.0			5.0	*	\$3,789.50	*	\$4,489.50		
47 - 8 - 88 -2		DAVID GRIMSGARD		46.0	46.0			46.0	*	\$31,809.00	*	\$36,609.00		
MILLE LACS		48 - 7 - 88 -2	ARTHUR MORT	5.6					5.6	*	\$3,122.48	*	\$5,622.48	
		48 - 8 - 88 -2	KEVIN KERN		11.2	11.2			11.2	*	\$2,442.61	*	\$6,002.61	
		MORRISON	49 - 2 - 88 -2	JEROME ROTH	5.2					5.2	*	\$1,212.80	*	\$1,932.80
			49 - 3 - 88 -2	PETER VOGEL	24.2					24.2	*	\$5,456.37	*	\$11,076.37
			49 - 4 - 88 -2	ROGER NELSON		34.9	25.3	9.6		34.9	*	\$9,985.24	*	\$17,185.24
	49 - 5 - 88 -2		DENNIS SANDERSON		5.0	5.0			5.0	*	\$1,463.30	*	\$3,663.30	
	49 - 6 - 88 -2		DONALD WEST	12.0					12.0	*	\$2,643.43	*	\$4,043.43	
	49 - 7 - 88 -2		DORMAN STRAND	15.0					15.0	*	\$2,354.00	*	\$5,554.00	
	49 - 8 - 88 -2		ROBERT BERTSCH		6.7	6.7			6.7	*	\$1,482.17	*	\$3,692.17	
	49 - 9 - 88 -2		RODNEY CROWE		18.0	18.0			18.0	*	\$5,441.50	*	\$10,141.50	
49 -10 - 88 -2	ZINNEY			5.7	5.7			5.7	*	\$1,649.10	*	\$2,249.10		
MOWER MURRAY	NONE								0.0	*		*	\$0.00	
	51 - 1 - 88 -2	IRVIN JOHNSON		11.0	11.0			11.0	*	\$7,164.63	*	\$8,464.63		
	51 - 2 - 88 -2	IRVIN JOHNSON		10.0	10.0			10.0	*	\$7,174.40	*	\$8,374.40		
	NICOLLET NOBLES NORMAN OLMSTED E OTR TAIL W OTR TAIL PENNINGTON	NONE							0.0	*		*	\$0.00	
		NONE							0.0	*		*	\$0.00	
		NONE							0.0	*		*	\$0.00	
		NONE							0.0	*		*	\$0.00	
		NONE							0.0	*		*	\$0.00	
		56 - 2 - 88 -2	LESTER BENSCH		26.6	26.6			26.6	*	\$6,506.09	*	\$9,706.09	
		57 - 1 - 88 -2	WARREN MOSBECK	45.5					45.5	*	\$7,774.58	*	\$10,000.00	

1988-2 SIGNUP EASEMENT ALLOTMENT REQUESTS
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COUNTY	EASEMENT #	LANDOWNER	TYPE OF EASEMENT		TYPE OF PERPETUAL				EASEMENT	EASEMENT	PRACTICE	TOTAL REQUEST			
			20 YEAR	PERPETUAL	MARG	AG	WET	REST	LV	SNO	TOTAL	DOLLARS	DOLLARS	TOTAL REQUEST	
			acres	acres	acres	acres	acres	acres	acres	acres	ACRES	* REQUESTED	* REQUESTED	* INCLUDING \$200	
														* TITLE WORK	
PINE	NONE										0.0	*	*	\$0.00	
PIPESTONE	59 - 1 - 88 -2	HOWARD KRUSSELBRINK		14.7				14.7			14.7	*	\$5,180.87	\$2,470.00	\$7,850.87
EAST POLK	NONE										0.0	*	*	\$0.00	
WEST POLK	NONE										0.0	*	*	\$0.00	
FOPE	61 - 2 - 88 -2	JOHN MORRIS	5.0								5.0	*	\$1,259.65	\$375.00	\$1,834.65
	61 - 3 - 88 -2	RUDOLPH HIMANGO	33.4								33.4	*	\$9,688.67	\$2,505.00	\$12,393.67
	61 - 4 - 88 -2	RONALD HIMANGO		37.3				37.3			37.3	*	\$16,645.87	\$3,730.00	\$20,575.87
FANSEY	NONE										0.0	*	*	\$0.00	
RED LAKE	63 - 2 - 88 -2	WALLACE CHRISTIANSO	6.5								6.5	*	\$1,109.16	\$487.50	\$1,796.66
REDWOOD	64 -10 - 88 -2	ANNA LIEBL EST.		35.3				35.3			35.3	*	\$35,226.22	\$5,030.00	\$40,456.22
	64 -11 - 88 -2	DONALD PETRACEK		6.5				6.5			6.5	*	\$4,416.30	\$2,150.00	\$6,766.30
	64 -12 - 88 -2	JON HAGEN		31.1				31.1			31.1	*	\$25,684.25	\$3,110.00	\$28,994.25
	64 -13 - 88 -2	JOHN HOOVER		28.9				28.9			28.9	*	\$23,867.35	\$4,090.00	\$28,157.35
RENVILLE	65 -29 - 88 -2	ART SIMMONS ETAL		50.7				50.7			50.7	*	\$41,238.87	\$5,070.00	\$46,508.87
	65 -30 - 88 -2	BEATRICE SIMMONS		39.4				39.4			39.4	*	\$32,047.57	\$3,940.00	\$36,187.57
	65 -31 - 88 -2	ARTHUR SIMMONS		10.7				10.7			10.7	*	\$8,703.27	\$1,070.00	\$9,973.27
	65 -32 - 88 -2	KENNETH SCHAUFER		5.0				5.0			5.0	*	\$4,554.15	\$500.00	\$5,254.15
	65 -33 - 88 -2	DELORES WERTISH		19.7				19.7			19.7	*	\$19,568.80	\$1,970.00	\$21,738.80
	65 -34 - 88 -2	PETER SVOBODA		16.5				16.5			16.5	*	\$16,390.11	\$1,650.00	\$18,240.11
	65 -35 - 88 -2	JAMES SCHEWE		20.0				20.0			20.0	*	\$19,736.00	\$2,000.00	\$21,936.00
	65 -36 - 88 -2	ROSELLA MALECHA	27.9								27.9	*	\$14,252.99	\$2,092.50	\$16,545.49
	65 -37 - 88 -2	BRAINARD WEIN	16.0								16.0	*	\$8,697.12	\$1,200.00	\$10,097.12
	65 -38 - 88 -2	ROBERT WEIS	25.0								25.0	*	\$16,734.75	\$1,875.00	\$18,809.75
	65 -39 - 88 -2	DePAUL WILLETTE	15.4								15.4	*	\$8,142.13	\$1,155.00	\$9,497.13
	65 -40 - 88 -2	JOHN JOHNSON	80.0								80.0	*	\$43,324.00	\$6,000.00	\$49,524.00
	65 -41 - 88 -2	DAVID FRANK	16.0								16.0	*	\$10,330.72	\$1,200.00	\$11,730.72
	65 -42 - 88 -2	LEONARD PETERSON	5.0								5.0	*	\$2,717.85	\$375.00	\$3,292.85
RICE	66 - 2 - 88 -2	BETTY DALY		33.0				33.0			33.0	*	\$25,218.93	\$4,000.00	\$29,418.93
	66 - 3 - 88 -2	EARL MILLS	10.0								10.0	*	\$3,750.80	\$450.00	\$4,400.80
ROCK	NONE										0.0	*	*	\$0.00	
ROSEAU	NONE										0.0	*	*	\$0.00	
ROOT RIVER	NONE										0.0	*	*	\$0.00	
NO ST. LOUIS	NONE										0.0	*	*	\$0.00	
SO ST. LOUIS	NONE										0.0	*	*	\$0.00	
SCOTT	70 - 2 - 88 -2	BERT SKATRUD	17.0								17.0	*	\$10,360.99	\$1,775.00	\$12,335.99
	70 - 3 - 88 -2	WILLIAM KONIARSKI		35.0				35.0			35.0	*	\$28,566.30	\$3,500.00	\$32,266.30
	70 - 4 - 88 -2	ROBERT SCHMITZ		51.5				51.5			51.5	*	\$42,033.27	\$5,150.00	\$47,383.27
	70 - 5 - 88 -2	RAYMOND TIEGS		19.0				19.0			19.0	*	\$14,017.25	\$1,900.00	\$16,117.25
	70 - 6 - 88 -2	DANA McCANNEL		34.4				34.4			34.4	*	\$33,883.31	\$3,388.00	\$37,471.31
SHERBURNE	NONE										0.0	*	*	\$0.00	
SIBLEY	72 -10 - 88 -2	CHESTER FRANK	20.0								20.0	*	\$12,430.40	\$1,500.00	\$14,130.40
	72 -11 - 88 -2	DEMAINE OLSON		4.0				4.0			4.0	*	\$2,617.60	\$400.00	\$3,217.60
	72 -12 - 88 -2	GORDON KRUSCHKE		10.8				10.8			10.8	*	\$7,067.52	\$1,080.00	\$8,347.52
	72 -13 - 88 -2	ELIZABETH VOS		14.0				14.0			14.0	*	\$11,524.10	\$1,400.00	\$13,124.10
	72 -14 - 88 -2	PAUL PIOSKE		55.5				55.5			55.5	*	\$45,684.83	\$4,315.17	\$50,200.00

1988-2 SIGNUP EASEMENT ALLOTMENT REQUESTS
REVISED 2/17/89

COUNTY	EASEMENT #	LANDOWNER	TYPE OF EASEMENT		TYPE OF PERPETUAL			EASEMENT	EASEMENT	PRACTICE	TOTAL REQUEST	
			20 YEAR	PERPETUAL	MARG	AG	WET	REST	LV	SNO	INCLUDING \$200	
			acres	acres	acres	acres	acres	acres	acres		TITLE WORK	
STEARNS	72 -16 - 88 -2	MARTHA VOIGT		10.0					10.0	\$8,025.50	\$1,000.00	\$9,225.50
	72 -17 - 88 -2	GREGORY JOHNSON	8.0						8.0	\$5,030.56	\$600.00	\$5,830.56
	NONE								0.0			\$0.00
STEELE	74 - 2 - 88 -2	BRENT REESE	14.0						14.0	\$6,876.38	\$1,050.00	\$8,126.38
STEVENS	75 - 8 - 88 -2	GORDEN THORSTAD		45.0		45.0			45.0	\$27,856.80	\$5,100.00	\$33,156.80
	75 - 9 - 88 -2	GEORGE KILL		17.0			17.0		17.0	\$10,982.51	\$1,700.00	\$12,882.51
	75 -10 - 88 -2	ROBERT ROLES		22.8		22.8			22.8	\$14,729.48	\$2,280.00	\$17,209.48
	75 -11 - 88 -2	GERALD HOFFMAN		8.0		8.0			8.0	\$5,355.52	\$1,100.00	\$6,655.52
	75 -12 - 88 -2	ROBERT SPEER		40.0			40.0		40.0	\$25,167.60	\$4,300.00	\$29,667.60
	75 -14 - 88 -2	MARVIN WILTS	6.2						6.2	\$2,790.43	\$665.00	\$3,655.43
	75 -15 - 88 -2	DENNIS WILTS	6.0						6.0	\$2,700.42	\$650.00	\$3,550.42
	75 -16 - 88 -2	RICHARD HANRAHAN		15.2		15.2			15.2	\$9,819.60	\$1,820.00	\$11,839.60
	75 -17 - 88 -2	DAVE LEUTHARD		31.7		31.7			31.7	\$22,220.12	\$3,170.00	\$25,590.12
SWIFT	76 - 5 - 88 -2	TIMOTHY KOOSMANN		10.2		10.2			10.2	\$5,763.51	\$4,080.00	\$10,043.51
	76 - 6 - 88 -2	DAVID MAHONEY		31.8		31.8			31.8	\$17,968.59	\$3,780.00	\$21,948.59
	76 - 7 - 88 -2	O'LEARY FARMS		10.9		10.9			10.9	\$5,205.84	\$1,390.00	\$6,795.84
TODD	77 - 1 - 88 -2	PECHAN	27.8						27.8	\$4,569.49	\$2,085.00	\$6,854.49
	77 - 2 - 88 -2	GROSSMAN	9.0						9.0	\$1,197.90	\$675.00	\$2,072.90
TRAVERSE	NONE								0.0			\$0.00
WABASHA	79 - 1 - 88 -2	STEVE GRESSNER		28.9		28.9			28.9	\$25,516.76	\$10,800.00	\$36,516.76
WADENA	80 - 5 - 88 -2	JAMES JUNG	23.3						23.3	\$2,355.86	\$1,747.50	\$4,303.36
	80 - 6 - 88 -2	ALAN LORENTZ	7.0						7.0	\$1,296.19	\$1,400.00	\$2,896.19
	80 - 7 - 88 -2	SCOTT MILLER	8.5						8.5	\$1,300.42	\$2,062.50	\$3,562.92
	80 - 8 - 88 -2	JEROME SCHOENROCK	22.0						22.0	\$1,694.66	\$2,650.00	\$4,544.66
	80 - 9 - 88 -2	AUGUST KREKLEW	11.0						11.0	\$1,112.21	\$825.00	\$2,137.21
	80 -10 - 88 -2	REUBEN DALLMANN	5.0						5.0	\$596.55	\$1,000.00	\$1,796.55
	NONE								0.0			\$0.00
WASECA	NONE							0.0			\$0.00	
WASHINGTON	NONE							0.0			\$0.00	
WATONWAN	NONE							0.0			\$0.00	
WILKIN	NONE							0.0			\$0.00	
WINONA	85 - 1 - 88 -2	ROBERT CHASE	5.0						5.0	\$1,269.15	\$375.00	\$1,844.15
	85 - 2 - 88 -2	GERALD MUELLER		1.9		1.9			1.9	\$613.34	\$142.50	\$955.84
	85 - 3 - 88 -2	HENRY WELLE		4.3		4.3			4.3	\$2,353.69	\$322.50	\$2,876.19
	85 - 4 - 88 -2	ALAN KRANING		2.3		2.3			2.3	\$1,258.95	\$172.50	\$1,631.45
WRIGHT	86 - 4 - 88 -2	MARVIN DIRKS WAGER		12.0		12.0			12.0	\$6,056.16	\$3,600.00	\$9,856.16
	86 - 5 - 88 -2	BERYL MUNSON		6.0		6.0			6.0	\$4,517.94	\$600.00	\$5,317.94
	86 - 6 - 88 -2	DALE STUEVEN		22.9		22.9			22.9	\$18,082.16	\$2,290.00	\$20,572.16
	86 - 7 - 88 -2	H. WILSON-BERGE	20.3						20.3	\$10,423.44	\$2,522.50	\$13,145.94
	86 - 8 - 88 -2	STEVEN MILLER		16.7		16.7			16.7	\$12,497.28	\$4,070.00	\$16,767.28
	86 - 9 - 88 -2	HOWARD YLITALO		13.5		13.5			13.5	\$10,165.37	\$4,650.00	\$15,015.37
	86 -10 - 88 -2	JOHN WELDELE		33.3		33.3			33.3	\$24,919.72	\$5,130.00	\$30,249.72
	86 -11 - 88 -2	WENDELL HUOTARI	26.0						26.0	\$12,725.44	\$2,362.50	\$15,287.94
YELLOW MED	87 - 1 - 88 -2	GWENDOLYN QUESNELL		17.0			17.0		17.0	\$9,859.20	\$2,100.00	\$12,159.20
	87 - 2 - 88 -2	EUGENE APPELDORN		5.0		5.0			5.0	\$4,173.70	\$800.00	\$5,173.70
TOTALS	183		1616.8	1955.6	1609.0	335.4	11.2		3572.4	\$1,983,675.71	\$409,013.59	\$2,429,289.30

NORTHEAST REGIONAL REPORT
CHRIS HOFSTEDE, BOARD REPRESENTATIVE

The Northeast half of Minnesota is somewhat unique in the types and size of its water and soil projects. Many of our BWSR programs are not adapted to Northeast Minnesota. There are also several water and soil concerns that are in need of any programatic assistance: the following are my recommendations of issues the Board should address.

Lakeshore Erosion

I believe that the billion dollar price tag has been the greatest hinderance to Agency programs addressing this issue (see Appendix A & B). The two basic programs SWCD's and Counties have in addressing Lakeshore Erosion are high project costs (rarely in less than the 5 digit range) and available engineering. Lake Superior being part of the Great Lakes is offered some unique opportunities for Federal funding. As you might expect, competition for Federal dollars in the eight state region is quite intense. It appears that the best way to get Great Lakes Federal funds is to be represented on the appropriate committees.

Recommendations:

- Increase cost share rate to 75%
- Increase SLR fund to \$3 million annually
- Establish engineering standards either thru an in-house engineering staff or contractor agreemtn.
- Establish Great Lakes representation (preferrably on the Great Lakes Governor's Association)
- Continue support for special projects that address Lake erosion

Forestry

Depending on who compiles the statistics, Forestry is rated the 2nd, 3rd or 4th largest industry in Minnesota. Over 20% of Minneosta's timber resource is on privately owned lands. Based on producer/user surveys, landowners want and need more assistance in managing our forest resource and industry would expand if they knew more accurately what product to expect from the private sector.

Recommendations:

- Financial supporting the Non Industrial Private Forest Inventor (NIPF) and the subsequent resource management
- Open cost share rules to allow forestry assistance/fold in an increased PFM Fund
- Establish a Financial Assistance Program on a temporary basis for SWCD's, W.O.'s or County to hire Forestry Technicians
- Continue to support projects that address forestry issues

Regional Office

The Northeast Board Representative is functioning at less than maximum efficiency. At least the majority of this problem could be solved with the employment of a full time assistant.

APPENDIX A

May 4, 1987

Lake County Shoreline Erosion Damage Estimates

Submitted by: Wayne Seidel
Conservation Specialist/County Ext. Agent
Lake County SWCD/Minnesota Ext. Service

Summary: Lake County has 55 miles of Lake Superior shoreline. The shoreline varies from gravel beaches to sheer bedrock cliffs. The bluff material may consist of heavy clay soil, shallow coarse topsoil over bedrock, or sheer cliffs. The bedrock material is fractured and in some cases sea caves exist because the underlying bedrock material has eroded away. The following data is offered as support material for the survey form.

* Note: This damage estimate is based on existing documentation only. The actual damages may be much higher. Given the time constraints of the survey we were not able to secure more detailed information. These estimates are conservative.

Structures Threatened

According to an April 1987 flight survey, 262 structures are situated either at the edge of the bluff or are located in a low area close to the waters edge (within 30 feet). These structures are critically threatened by the 602 water level and would need to be moved if the water were to go above this level.

No count was made to distinguish between occupied residential dwellings and unoccupied structures (boat houses, garages, sheds etc.).

The cost to move a structure back from the shoreline varies with each individual site. Estimates vary from \$8,000 - \$12,000 depending on type of foundation (basement or crawl space), compass reorientation of the structure and distance. This estimate does not take into account the changes in roads, septic systems, electrical hook-up and landscaping.

Assuming that 60% of the dwellings are occupied then:

157 homes x \$10,000 = \$ 1,570,000

105 other x \$3,300 = \$ 346,500

Total = \$ 1,916,500

Land Value

Facts: Lake County has 55 miles of shoreline.
Average price per frontage foot = \$225.00*
1986 average shoreline loss = 5.7 feet**
Average land depth (from Hwy. 61) = 881 feet***

* Values obtained from Lake County Assesors Office
** Data obtained from the 1986 Shoreline Erosion Survey
*** Data obtained from measuring 140 sites at random

Using the appraisers formula for determining land values of shoreline property (4-3-2-1) then:

$5.7/220.25 = 2.6\%$ (% land lost in first 25% of property)

$2.6\% \times \$90.00$ (value of first 25% of land) = \$2.34

Therefore, the value of the land per frontage foot = \$2.34

$\$2.34 \times 290,400$ feet of shoreline = \$679,536

Costs to stabilize eroding shoreline average \$300.00 per lineal foot.

$30\% \text{ with eroding shoreline} \times 290,400 = 87,120$ feet

$87,120 \times \$300.00/\text{foot} = \$26,136,000$

Specific Erosion Problems:

Minnesota Department of Transportation -

On-going problems due to high levels are occurring at eight to nine sites (32,000 feet of shoreline). Cost to armor the shore to protect Highway 61:

$$32,000 \text{ feet} \times \$750/\text{foot} = \$24,000,000$$

Duluth, Mesabi & Iron Range Railroad -

Severe erosion problems have resulted from the high 1986 levels. In two areas adjacent to the docks, sheet piling will need to be replaced totaling \$170,000 in repair costs. At a 603 level the sheet piling would need to be raised around all of the loading facilities. This would amount to \$10,000,000.

Reserve Mining Company -

No official comment was received, however, great potential for damages would occur at the 603 level.

Lake County Public Property -

At the 603 level, damages would result to two bridges located in Knife River. Total cost would be \$500,000.

Potential damage repair of Hwy. 21 in Two Harbors at a 603 level would amount to \$60,000 - 100,000.

Damages to the Knife River Marina in 1986 were over \$150,000.

Silver Creek Township reported that at a 603 level, potential damage would occur to roads 61SC1 and 61SC4.

The City of Beaver Bay reported that their water plant could be impacted by the 603 level. Estimated cost was \$50,000.

The City of Silver Bay reported that their sewer plant would be impacted by the 603 level. No estimate of damages was received.

City of Two Harbors - Present problems include: Two Harbors Municipal Campground, Boat Marina, public park and road system. At the 603 level, the water plant would also suffer damage.

Private Property Damages

Bussan's - \$30,000 for a retaining wall (1986 levels)

Hedin's - \$ 1,000 in damages (1986 levels)
\$ 95,000 potential damages (603 level)

Fenstad's Resort - \$4350 in damages (1986 levels)
\$500,000 potential damages (603 level)

Risch's - Moved home in 1986 at a cost in excess of
\$10,000. Also needed to put in a new septic
system. No cost given.

Hahn's - Installed rock rip-rap on eroding shoreline at
a cost of approximately \$ 15,000.

Encampment Forest Association - Installed rock rip-rap
on eroding shoreline at a cost of approximately
\$ 107,000

Nauhau's - Shoreline erosion control protection = \$1000

Summary of Damages

602 Level:

Value of land lost	= \$	679,536
Cost estimate to stabilize shoreline	=	26,136,000
MnDOT estimate to stabilize roads	=	24,000,000
DM&IR costs to repair docks	=	170,000
Knife River Marina	=	150,000
City of Two Harbors	=	23,000
Bussan's	=	30,000
Hedin's	=	1,000
Fenstad's Resort	=	4,350
Risch's	=	10,000
Hahn's	=	15,000
Encampment Forest Association	=	107,000
Nauhau's	=	1,000
TOTAL =		\$ 51,326,886

603 Level:

Structures (moved back from shoreline)	=	\$1,916,500
Lake County Bridges	=	500,000
Hwy. 21 repair costs	=	100,000
Beaver Bay Water Plant	=	50,000
City of Two Harbors (Water Plant)	=	3,320,000
DM&IR Railroad	=	10,000,000
Silver Bay Sewer Plant	=	?
MnDOT (roadside erosion)	=	?
Value of land lost (assuming same rates as 1986)	=	679,536
Cost to stabilize additional shoreline beyond 1986 levels	=	?
Fenstad's Resort	=	500,000
Hedin's	=	95,000
Encampment Forest Association	=	?

TOTAL = \$ 17,161,036 *

* Note: This total does not include damage estimates from MnDot, shoreline stabilization, Encampment Forest Association and the Silver Bay Sewage Plant.

SPECIAL PROJECTS PROGRAM - LAKESHORE EROSION PROTECTION - 1

Description of the Proposal:

The problem addressed in this special project proposal extension is shoreline erosion caused primarily by wave action erosion on small inland lakes. In 1987 the Minnesota Soil and Water Conservation Board awarded the Itasca and Aitkin County Soil and Water Conservation Districts a total of \$19,000 to devise solutions for wave action erosion in the two counties. During the course of the past year considerable progress has been made to develop a system that can effectively solve this problem. While a large amount of time was consumed in the process of developing this system, personnel in the field offices are confident that this delivery system can be used to expedite the future planning and installation of individual projects in a cost effective manner.

This proposal will, in part, review the problem areas identified in the 1987 proposal for special project funding, note the progress made in each area in 1987-88 and identify how, with additional funding in 1988, the system of delivery developed over the last year can be improved for use in 1988-89 and thereafter.

I. Resource Problems:

Shoreland erosion on small inland lakes is primarily caused by waves buffeting unprotected soil. (Soil Conservation Service, Minnesota Technical Release 2, Flexible Slope Protection for Streams and Lakeshores, April 1988, 73 pp.) As the force of the waves is unleashed upon a lakeshore, soil sized particles are dislodged from the shore and are deposited into the lake. This results not only in a net loss of shoreland, it also increases sediment and nutrient loading into lakes accelerating the eutrophication of the water body. Deposition into a lake has a direct deleterious effect on fish habitat, the aquatic plant and animal ecosystem, and the value of the lake for recreational use.

Itasca County alone has over 1000 lakes within its borders. While shoreland erosion on any given lake varies because of specific site conditions, it can be safely stated that over a continuum erosion does affect each lake. Because each of these lakes offers area residents a variety of recreational opportunities that greatly impact the economy of our area, the retarding of this erosion process can directly impact our quality of life.

The SWCD's direct contact with area shoreland owners who have been affected by lakeshore erosion has been accelerated in Itasca County since 1983, when County Commissioners revised shoreland zoning ordinances to necessitate review of any lakeshore site where owners wish to alter their existing frontage within 50 feet of the lake. This review is carried out by a three person Shoreland Alteration Committee (SAC) consisting of representatives of the County Zoning Office, County Planning Commission and the Itasca County SWCD. This review process allows the SAC to meet the landowner on the site to view existing conditions and go over plans for proposed changes so that minimal adverse impacts occur to the lakes. An average of 80 individuals annually apply for such review in order to receive a permit from the county. While most individuals that apply for these permits are in the process of developing lakeshore frontage for recreational use and have not experienced prior erosion problems, about 10 percent of these inspections annually involve sites where a wave erosion problem exists. In 1985 and 1986 the Itasca County SWCD was in contact with 31 individual landowners both as a result of involvement in the SAC and through unsolicited inquiries to the SWCD on how to solve lakeshore erosion problems. During this time the SWCD did not have a standard procedure in place to effectively deal with lakeshore erosion problems. It was the feeling of the SWCD that such a process should, if possible, be created to assist lakeshore landowners in a cost effective manner, since we undoubtedly were only in contact with a low percentage of individuals with this problem. Further, it was our perception that if the SWCD could create effective wave erosion protection measures at a low cost, such measures would, with proper promotion be used on a wider scale throughout Itasca County and in other places. Because of frequent contact with the Aitkin County SWCD we realized lakeshore erosion was a common concern in both counties.

It was with this background that former SWCD Manager Loren Gelle prepared the 1987 Itasca and Aitkin County Special Project Proposal for Lakeshore Erosion Protection, submitted to the Minnesota Soil and

SPECIAL PROJECTS PROGRAM - LAKESHORE EROSION PROTECTION - 3

Water Conservation Board for their consideration. In June of 1987 the MN-SWCB awarded \$19,000 to the Aitkin and Itasca SWCD's to install lakeshore erosion protection on small inland lakes in the two counties in 1987-88. Because each county had accumulated a backlog of landowners with lakeshore erosion problems we readily identified who we could work with. Subsequent contacts and discussion with landowners was used to identify and prioritize problem sites and landowners who would follow through with project installation.

II. Technical Assistance Delivery Problems:

Description:

Immediately after receiving notification of allocation of Streambank, Lakeshore and Roadside funds by the SWCB the Grand Rapids field office staff started contacting a number of agencies and private firms around the region to inquire about where to obtain lakeshore erosion control engineering review and approval assistance, and when we could schedule training sessions for field office staff. Because all of the private engineering firms in the region had no prior experience in dealing with lakeshore erosion protection and individuals from other public agencies (such as the DNR, and U.S. Army Corps of Engineers) were either tied up with their own large scale projects or had only worked with more costly materials or larger rock rip rap, our only viable option was to work with the Soil Conservation Service to revise SCS MN Technical Release #2 in order to have a guideline document for field office use and planning. This revision was being drafted in 1987 by Sonia M. Jacobson, a Hydraulic Engineering Specialist with SCS in St. Paul.

It was the consensus of both field office's staff, the SWCD Boards and SWCB Area 3 Representative Chris Hofstede to formalize these discussions by bringing together all concerned parties to discuss viable techniques available. This two day meeting was finally held in late September, 1987 in Grand Rapids. At that time Sonia was able to review a variety of erosion protection methods.

Her conclusion was that smaller sized rock rip rap used with an underlying filter material would be a cost effective erosion protection technique suitable for use on small inland lakes. Her work in revising Technical Release #2 centered on this method. A second day was spent viewing potential work sites in both counties with Sonia and Leland Anderson, SCS Assistant State Conservation Engineer. At this time she stated that Technical Release #2 would be in a final draft form in late 1987 and available for use in training by 1988.

This training session was held in late January in Grand Rapids. The first day was spent reviewing Technical Release #2 with Area 3 SCS/SWCD staff and other interested parties. Day two was spent reviewing and critiquing specific project plans that had been drawn up by field office staff. We discussed final engineering review procedures and were assured of prompt review and turnaround by the SCS. To date this has been the case.

It is the thinking of both the field office staff and engineers that with the experience gained in this pilot project, eventually only a final plan review will be necessary for most installations. Through the use of both Technical Release #2 and a field office generated checklist we will be able to gather all of the information necessary to successfully survey, plan and implement small inland lakeshore erosion protection. With this mechanism in place the field office staff will be able to effectively provide shoreland owners with an effective means to solve their lakeshore erosion problems.

III. Practice Application Problems:

Description:

After working with the SCS on the initial installations for this shoreland erosion protection project, field office staff feel confident that most typical low banked lakeshore sites can be dealt with through this project at an average cost of \$30 per foot of lakeshore. The Itasca County SWCD Board of Supervisors set an initial cost-share total per lakeshore landowner of \$1500 for typical installations, based on this estimate and the fact that many existing

SPECIAL PROJECTS PROGRAM - LAKESHORE EROSION PROTECTION - 5

lakeshore lots are 100 feet or less in width.

Sonia Jacobson addressed the concerns of field office staff pertaining to installation costs and landowner willingness to take part in this project by:

1. Using smaller sized rock where possible as a realistic method to control shoreland erosion when using rip rap.
2. Developing rip rap toe protection that will be realistic for landowners to install both in terms of rock availability and cost.
3. Giving field office staff the option to use fabric and/or granular filters under the rock rip rap. There may be circumstances when a granular filter is our only option; we have yet to do so.
4. Encouraging the development of a landowner questionnaire by the field offices which can be used during discussions with lakeshore owners to:
 - explain a variety of factors needed to be considered during the planning of the project,
 - get an idea of the desires of the landowner, and explain his/her responsibilities,
 - stress the need for vigilant maintenance and repair as necessary.

These concerns were addressed in detail in the 1987 Special Project Proposal, and seem to be resolved in Technical Release #2.

One area that we have yet to address is in working on an atypical lakeshore site. The main reason we haven't done so by this date is the magnitude of cost to work on all of the sites we've encountered to date.

Because of increased stabilization costs work on such a site may be beyond the scope of this project. We have three individuals interested in this project who are SWCD cooperators owning atypical lakeshore sites who may be worked with in the future. We may devote any remaining 1988 project funds for use to begin such a project or,

if this proposal is funded, work with one or more of these individuals in 1989.

We have been able to find contractors willing to work on all of the sites where we will be installing rip rap in 1988. We also have sources of rock and filter fabric identified. In addition, because of a possible need for a source of hand labor, we have worked out an agreement with the Itasca County Juvenile Probation Office where we will be able to use first time juvenile offenders owing community service time as a labor source. Virtually all of the problems in development and delivery of technical assistance and other services have been effectively dealt with.

It would benefit all parties to continue the funding of this special project in both counties for at least an additional year in order to streamline and refine the system of delivery and gain additional experience. Also, there will be a greater number of example installations in place after the 1989 field season that will provide demonstration sites for viewing the results of using rock rip rap to prevent shoreline erosion.

IV. Project Timetable:

At present both field offices have at least six project sites selected, and have completed field surveys of these sites. Plans for each installation, including material estimates and costs will be sent to the SCS for review and approval in order to be installed during the 1988 field season. In addition, whenever necessary DNR Protected Waters Permits and additional county permits are being obtained. Work at these sites can proceed as soon as these hurdles are cleared.

If funding can be obtained, an additional six sites will be identified to be worked on in 1989 during the '88 field season. Landowner contacts will be made and field surveys can be completed in order to finish design work before the 1989 field season. Three of these sites will be typical installations, with the other three being atypical, requiring more intensive treatment.

SPECIAL PROJECTS PROGRAM - LAKESHORE EROSION PROTECTION - 7

V. Project Costs:

Funds are requested for the lakeshore landowners in which 50% of construction costs would be provided by each of the SWCD's. In addition, 20% of the funds would pay for a portion of the SWCD's administrative costs for all phases of the project, from initial landowner contact through completion of construction. The remainder of funding for district staff involvement will be covered by the District as a part of the SWCD's 1989 Annual Plan and Budget.

Typical installations: 3@ \$3000 x .50 = \$ 4500

Atypical installations: 3@ \$10,000 x .50 = \$15000

Total Cost Share Funds per County \$19500

TOTAL \$39,000.00

Funding and Sources

State share 50% or \$39,000; source: MN-BWSR/SLR

Local share 50% or \$39,000; source: Lakeshore Landowners

VI. Project Objectives:

1. Continued use and application of SCS' revised Technical Release #2 to solve erosion problems on small inland lakes in Itasca and Aitkin Counties on privately owned lakeshore properties.
2. Maintenance of lake water quality through prevention of sediment loading caused by wave action erosion on small inland lakes.
3. Continuation of 1987 SLR funded Lakeshore Erosion Protection Special Project for Itasca and Aitkin Counties.

Lakeshore erosion protection using rock rip rap and filter material can, with maintenance, become an effective long term cost effective remedy to stop shoreland erosion. Maintenance is the key to success, and it is stressed as a part of the landowner responsibility.

On site damage varies from site to site, depending upon a number of variables such as lake depth, location on the lake, amount of open

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water and the on shore soil type. Off site damage includes degradation of our water resources.

Problem causing areas are privately owned. The SCS/SWCD field office staff provide the sole mechanism for technical assistance available to this constituent group. The public benefits resulting from each completed project will be for all residents on a given lake where installation will be made. On a larger scale the watersheds these lakes flow through can benefit through a decrease in sediment and nutrient loading and slowed eutrophication. On a smaller scale individual lakeshore owners will be able to benefit directly and indirectly through the project by installing a low cost effective erosion protection on their shoreland.



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ASSESSMENT OF BOARD OF WATER AND SOIL RESOURCE PROGRAMS IN RELATION TO NORTHEAST MINNESOTA

COST-SHARE PROGRAM

Northeast Minnesota does not have a lot of agricultural land. Thus, the cost-share program is only moderately effective in addressing the needs of northeast Minnesota. The opening up of the Cost-Share Program to include the SLR practice was of much benefit to northeast Minnesota. Many of the northeast counties are large counties and have much road and small populations, thus the tax base is not there to fund proper conservation road work. Several of the projects that do occur in the area are not of the nature that would require large financial expenditure, however the dollars are few and far between and any assistance that the districts can offer is greatly appreciated by the county or the state whichever might be applicable. The addition of this practice to the cost-share program has greatly improved relations between Soil & Water Districts, townships, counties, and state government.

SLR PROGRAM

The SLR Program is right on target as far as addressing the needs of northeast Minnesota. There are many stream bank, lakeshore and roadside problems in northeast Minnesota.

The problem with the SLR program is that it is severely under funded. The lakeshore and stream bank problems that occur in northeast Minnesota, even though they have a severe impact on public waters, are rated low because they are on private lands. Costs are excessively high, oftentimes, the 50% cost-share rate puts many of the projects out of the realm of possibility for a private land owner.

The second problem with this program is the standards and specifications that are required. Present program guidelines allow standards and specifications that are "generally recognized" can be used, however, there are few engineering firms or agencies other than Soil Conservation Service that are willing to provide the often timely engineering that is necessary for the stream bank and lake shore projects. Because of the nature of many of the lakeshore and roadside issues in northeast Minnesota, (watersheds for these projects are quite large) SCS engineering is required to go through several engineering approval steps. Oftentimes engineering takes an excess of two years, simply for the design end of the project. After two years when the project estimates come in and are given to the

landowner, the costs are generally so high that the project is killed. Thus we are not only not solving the problem of the erosion, we are also wasting engineering time and money. I believe the biggest improvement to this program would lie in financial assistance to local units for technical assistance both in the planning phase and in the technical phase. It has been demonstrated that adjustments based on availability of materials, manpower and reducing practice life to less than 40 years, can often cut costs in excess of 90%. Along with this financial assistance in the planning and technical phase should be funds for monitoring so that an analysis can be made of new and innovative techniques for treatment of stream and lakeshore erosion.

MINNESOTA FORESTRY INCENTIVE PROGRAM (MFIP)

Another grant program that is widely used in northeast Minnesota is a Minnesota Forestry Incentive Program (MFIP). This program is made available by the legislature through a Department of Natural Resources and administered by the BWSR. At the local level districts are contacted by the Department of Natural Resources private Forest managers who have had or know of landowners who have a particular forestry related problem such as tree planting, gopher control, access roads, etc. This program is very beneficial to MN Forestry resource and well liked by SWCDs.

Where SWCDs have used mass media to advertise the program there has only been enough dollars to address approximately 10% of landowners' requests. There are three issues that if addressed would greatly improve the program.

1. Reducing the time lag between legislative appropriation of the funds and notification to SWCDs to encumber funds for specific projects. Oftentimes the time delays limit the landowner to 2 months construction time.
2. A great improvement to this program would be additional funding and technical assistance. Additional funding should be sought at a level to be able to honor 75% of landowners' requests.
3. Technical Forestry assistance is presently being talked about in a couple of northeast Districts. Funding be shared by the SWCD, BWSR and the Minnesota Department of Natural Resources. An employee would be brought on as a Forestry/Conservation technician who would have his technical responsibilities in the areas of forestry under the direction of DNR forester and other activities under the direction of the district manager.

OTHER GRANTS

The State also administers a General Service Grant and a Technical Education Grant (the TED grant). These 2 grants are certainly well used by many districts but the accountability of the grants is not of highest standards. It would be beneficial not only to the districts but to the state if these grants were administered on a basis of effectiveness. For instance, districts that have an effective

education plan would be eligible for additional funding. The same logic could be used with the General Service Grant, that district meeting high standards of innovative character, would be eligible for more funding. Conversely the districts that were mediocre in their approach would be in a sense penalized.

SPECIAL PROJECTS

The District Manager Program was aimed at providing funding for the SWCD to hire a district manager where none previously existed. The objective was to demonstrate to the district the value of such a position. Three districts in northeast Minnesota, North St. Louis, Kanabec, and Mille Lacs have participated in the program. In all three cases the districts realize the value and are seeking a permanent source of funding. Although these districts are well aware of the effectiveness of good management in dealing with the resource needs, the counties have been suffering financial hardships and find it difficult to fund manager positions at this time.

A special project within the Cost-Share program was a cooperative effort between the US Forestry Service, Department of Natural Resources, St. Louis County and the North St. Louis SWCD. The project consists of identifying logging skid areas where excessive erosion would take place for several years after the logging operation. In the past, treatment of these areas did not take place because seeding standards and specifications required extensive site preparation (i.e. removal of stumps, brush, etc. to create a uniform seed bed). This project gets around the site preparation issue by broadcast seeding and fertilizing. The objective was to determine what percentage of seed cover or protection would take place on these sites with minimal site preparation. The results of this program have been outstanding not only from the erosion control standpoint, but the creation of prime wildlife habitat. I strongly recommended that this practice be included in the cost-share docket on a permanent basis.

Recent interpretation of cost-share rules make it impossible to use cost-share funds for a special projects that do not strictly meet Soil Conservation Service standards and specifications. Perhaps the greatest improvement to the cost-share program would be to liberalize the cost-share rules and regulations so that it would be open to experimental standards and specifications.

On behalf of Northeast Minnesota, Aitkin and Itasca SWCD applied for and received SLR funds for a special project dealing with lake shore stabilization. The project is aimed at developing uniform methods for dealing with small cut (less than 3') lake shore erosion. At this time success or failure is unknown but it is a success in the sense that we have the opportunity to go beyond present standards to find better ways to deal with our resource concerns.

ENVIRONMENTAL EDUCATION DISSEMINATION SYSTEM

In spite of the large sums of money that are spent protecting and managing our natural resources, we are making little headway in the area of citizen stewardship of our natural resources. Emphasis in the area of natural resources over the past 40 years has primarily been aimed at the resource while little energy has been spent on the consumer. As urbanization and mass marketing have grown, environmental ethics have waned. With a strong environmental ethic instilled in our future decision makers/consumers, natural resource agencies/organizations will not have to sell wise conservation.

THE PRESENT NATURE OF ENVIRONMENTAL EDUCATION

There are several excellent environmental education programs and materials, however, they are not always easy to locate or they are not readily integrated into required curriculums. Because of this, programs such as Project Learning Tree, Ag. Stravaganza, Project Wild, etc. are not being used to their full extent by educators.

THE OBJECTIVE

Development of a cross-referencing catalog (the Hofstede Dissemination System) would enable teachers to find environmental education materials that are adapted as support materials for major required curriculum and establish a system for publishing, delivering and training on the use of the Hofstede catalog.

THE PROJECT

The Board of Water and Soil Resources has been soliciting environmental education materials both nationally and internationally for about four years. In the past year we have begun the process of cataloging environmental materials by their required topic category and target age group. Environmental materials exist for all age levels and range from Acid Rain to Zoophyte Propagation. The next step is to arrange these age categories of major curriculum areas (math, English, social studies, etc.) in a format most usable by educators.

STATE ORGANIZATION AND FUNDING

Inappropriate funding and inconsistent formatting have been the primary factor in a less than optimal environmental education program on both the state and federal level.

Education efforts have been funded through the organization perceived as appropriate (ie: agriculture/USDA or MNDA, ground water issues/MPCA, etc.). Each agency or organization chooses its preferred method of education. This approach leads to the development of much excellent material in inconsistent formats that are all too often not usable to the teacher.

Environmental education is a long range activity and as periods of short money supply occur, long range issues are put off to deal with

immediate needs. Agency funding often relates to their recordable accomplishments. Education is difficult or impossible to record in "units accomplished per dollar" leaving environmental education as an agency issue incapable of producing immediate returns in terms of funding.

A major portion of the various agencies' (DNR, MNDA, MPCA, BWSR, etc.) education funds should be routed to an agency whose primary responsibility is environmental education. Agencies and legislation requiring education activities would be given time from the Environmental Education Agency rather than money. The Environmental Education Agency would be charged with the development of an environmental ethic in Minnesota. This would be done by disseminating the environmental topics directed by the environmental agency and legislature into required curriculum areas (acid rain would be taught through examples in math, science, history, etc.). By using this method, the state would benefit by being able to dovetail most agencies' issues into a statewide dissemination system that would be backed by a statewide delivery system.

LOCAL DELIVERY

To insure consistent and ongoing local delivery, each school district should have a teacher designated as the environmental education coordinator. This individual should be provided adequate release time and funding to provide fellow teachers with both inservice training and one-on-one assistance.

DEMONSTRATION PROJECT/TESTING

Systems similar but less comprehensive to the Hofstede Dissemination System have been employed by the U.S. Department of Education and other states and proven exceptionally successful. In order to insure optimum effectiveness, a three year demonstration project in Minnesota should be implemented. The first step is to complete the Dissemination catalog. The catalog, at present, consists of 24 three inch volumes arranged by the major curriculum (math, English, art, etc.). Additional materials need to be cataloged into the system and a complete table of contents developed for each grade. This first step would require one and one half staff years of an education specialist (preferably from UMD under the direction of the department chairman and the Board of Water and Soil Resources).

The second step in a demonstration project should be a two year delivery and testing program in three school districts. Results would evaluate acceptance of the Dissemination catalog by teachers and absorption of environmental issues by students. At the end of two years results would be measured by comparison to pretest levels. Again, step two testing could be administered through the UMD graduate education program.

BOARD OF WATER AND SOIL SUPPORT:

Both Watershed Districts and Soil and Water Districts need an increased level of regional staff support.

The board representative position was created in the mid 70's, a time when the board had only one Cost-Share Program and very few district employees to work with. Now in the late 80's, districts can have as many as 8 Cost-Share Programs, 3 to 10 employees, audit responsibilities, as well as a wide range of local issues to deal with. I believe we are doing our primary clientele a disservice by offering new programs, added report requirements and not being able to provide them with regional staff assistance. Districts look to the regional staff for guidance and leadership, a function we are all too often not available to provide due to lack of time.

Now that we are about to enter the 90's, we should at least be staffed to address the needs of the 80's.