

**CLEAN WATER PARTNERSHIP
PROJECT WORK PLAN
FOR THE**

Chippewa **R**iver **W**atershed **P**roject

NOVEMBER 1998

Project Sponsor:

Chippewa County

Contributing Sponsors:

Chippewa, Douglas, Grant, Kandiyohi, Pope, Stevens, and Swift
Counties

Chippewa, Douglas, Grant, Kandiyohi, Pope, Stevens, and Swift
County Water Planners

Chippewa, Douglas, Grant, Kandiyohi, Pope, Stevens, and Swift
Soil and Water Conservation Districts

Prairie Country and WesMin Resource Conservation & Development
Councils

Land Stewardship Project

US Geological Survey

Agricultural Research Service

Benson Wastewater Treatment Plant

Natural Resources Conservation Service

Mn Department of Natural Resources - Fisheries

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Section 1: Statement of Problems and Existing Conditions

A. General description of the Chippewa River and its Watershed

The Chippewa River is one of 13 major tributaries of the Minnesota River. The Chippewa River Watershed drains a 2,080 square mile basin, or 1,331,200 acres. The counties in this basin include portions of Otter Tail, Grant, Douglas, Stevens, Pope, Swift, Kandiyohi, and Chippewa. The source of the Chippewa River is in southern Otter Tail County near the Fish Lake area, from where it flows 130 miles south to its mouth in the Minnesota River at Montevideo, Chippewa County. The Chippewa's gradient is 4 1/2 feet per mile. The annual mean flow at the mouth is 200 cubic feet per second, although it has been as high as 10,000 cubic feet per second at flood stage. The main tributaries are: The Little Chippewa River, East Branch Chippewa, and Shakopee Creek. Together, these tributaries contribute nearly half the flow of the main stem.

Geomorphology of the Chippewa River Watershed includes a complex mixture of moraines, till, lacustrine, and outwash plains. The eastern half of the Chippewa River Watershed, extending from approximately Evansville in the north to just below the town of DeGraff in the south, lies within the North Central Hardwood Forest Ecoregion. More specifically, with the exception of a long narrow section of the Belgrade-Glenwood outwash plain along the east-central edge of the basin, the eastern half of the watershed falls within the geomorphic setting of the Alexandria Moraine Complex. This morainal complex is composed of well drained, loamy, silty, sandy, and mucky soils with moderate to steep sloping landscapes (6-45%), producing a large potential for sediment delivery to streams. As such, water erosion potential within this section of the watershed is classified as moderate to high. The section of the watershed situated in the Belgrade-Glenwood outwash plain, lying east of the line from Glenwood in the north to Lake Johanna in the south, is characterized by nearly level to gently sloping (2-6%), well drained landscapes with sandy-loamy soils of moderate water and wind erosion potential.

Lands in the western half of the Chippewa River Watershed fall within the Northern Glaciated Plains Ecoregion, primarily within three geomorphic settings, the Big Stone Moraine on the far western edge, the Appleton-Clontarf Outwash Plain along the lower Chippewa River, and the Benson Lacustrine Plain within the south-central section of the watershed. Landscapes within the Big Stone moraine are characterized as rolling (6-12%), with well drained, silty and loamy soils. Water erosion potential within the moraine is generally classified as moderate. Lands within the Appleton-Clontarf outwash are characterized as being nearly level to gently sloping (2-6%), poorly drained, and extensively tiled. Water and wind erosion potentials are classified as moderate for this region. The Benson Lacustrine Plain is also nearly level (0-2%), poorly drained and extensively tiled. Soil textures in the lacustrine plain range from silty clay to silt loam, water erosion potentials are high for lands adjacent to streams and much of the plain has the potential for significant wind erosion.

The climate within the Chippewa River Watershed is continental, with cold dry winters and warm wet summers. An average of twenty-five to twenty-eight inches of precipitation annually fall within the watershed with two thirds of this precipitation normally falling in the five months from May through September. Average annual runoff is estimated to be between two to four inches.

The higher headwaters regions (Pope & Douglas counties) of the Chippewa are rich in wetlands, lakes, fish, and wildlife resources. The U. S. Fish and Wildlife Service has restored dozens of wetlands in this area, water quality and fish populations are relatively healthy.

The lower reaches of the river from just north of Benson and southward have not fared as well. Several miles of the river near Benson were channelized in the 1950's. Much of Shakopee Creek has been channelized and wildfowl marshes have been greatly reduced in this area through drainage. It is estimated that upwards of 95% of the original wetlands in the lower basin have been drained.

Twenty five cities, towns and hamlets are found in the Chippewa River Watershed. More than 75 lakes are also found within its boundaries including significant recreational waters such as Lake Minnewaska, Lake Emily, Pelican, Norway, Games and Andrews Lakes, Red Rock Lake, Lake Reno and Lake Villard. Three State Parks (Glacial Lakes, Sibley and Monson Lake) call the watershed their home and more than 60 State Wildlife Management areas (including the 2,298 acre Danvers Marsh) dot the watershed's landscape. Tracts of native prairie (including the famous Ordway Prairie near Starbuck), scenic byways (such as Inspiration Peak and Terrace Mill) , regional trails (Glacial Lakes, Chippewa County) and canoe routes (from Big Bend to Watson Lions Park) all combine to make the Chippewa River Watershed a unique and special place to live.

B. Why the Project is Taking Place

The Chippewa River Watershed is one of 13 major tributaries of the Minnesota River, which in turn has been identified as the most polluted tributary of the Mississippi River north of St. Louis and is considered one of the 10 most threatened rivers in the nation. Citizens and farmers downstream from Lake Pepin (Minnesota) to the Gulf of Mexico are calling on those of us who live upstream to stop sending so much sediment and nutrients their way. The Chippewa River has been identified in preliminary studies as contributing significant amounts of sediment, phosphorus, and harmful bacteria to the Minnesota River. Many recreational lakes in the watershed are being negatively affected by the Chippewa River which flows through them. Many lifelong residents of the watershed have seen the water quality of the river degrade and they want to do something to stop and reverse this trend.

Since January 1996, representatives from the 7 counties in the watershed, including local county commissioners, water planners, state and federal agencies, non-profit organizations and citizens (MORE THAN 25 ORGANIZATIONS/AGENCIES IN ALL) have been meeting to develop a way to work together to address water quality and quantity issues in the basin.

Known as the Chippewa River committee, this group agrees that our long-term goal is to improve the water quality and flooding problems in the watershed while also promoting a healthy agricultural, industrial and recreation-based economy for the region. The first step toward achieving this goal has been to develop communication, trust and cooperative working relationships among the counties in the watershed. Now that a mechanism for regional cooperation is established, the next step is to conduct a basin-wide diagnostic study of the watershed.

Unlike many other watersheds of this size, there has been no formal watershed district or joint powers board working in the basin. Distrust of federal and state government-based research and a fear that

studies will lead to increased regulation has historically been prevalent throughout the watershed. Thus we are developing a study design that is politically acceptable on the local level and that gradually builds taxpayer support for a watershed council that can address the study's findings in the implementation phase of this project.

C. The Known Water Quality Problems

There are several scattered reports and studies relating to the water quality of certain portions of the watershed, but it has not been compiled or assembled into one place.

The MPCA's MRAP study focused only on collection data at or near the mouth of the Chippewa (which was largely impacted by Montevideo's aging sewage treatment plant) and in the channelized portions of the river, thus the data that it presented was not representative of the watershed as a whole. However there is data that has been collected by the MPCA for several years at certain points along the river that still needs to be compiled and interpreted. The MPCA is also the keeper of lake monitoring records gathered for several Lake Assessment Project studies and Citizen Lake Monitoring Program (CLMP's) in the watershed. They need to be gathered together and studied in the context of the watershed wide project.

The USGS has historical flow data and limited water quality data from its permanent station along Highway 40 that needs further interpretation and analysis. Recently, the USGS conducted fish habitat surveys on Dry Weather and Shakopee creeks, the results of which have yet to be published.

The DNR has conducted several fish habitat surveys in the watershed that need to be studied and integrated with studies listed above. In addition, an old and incomplete study of the east branch of the Chippewa River several years ago may inform this new watershed-wide initiative. More recently, the DNR has conducted extensive two year monitoring project of the Upper Shakopee Creek watershed. The results will be compiled and published in the spring of 1999.

The US Army Corp of Engineers (USCOE) also has water quality information relating to the Chippewa which they have made available to the U. S. Geological Survey. In 1997 the USCOE dredged 8,000 cubic yards of sediment out of the river bed above the dam control structure at Watson Lion's Park on the lower end of the Chippewa River.

The U. S. Fish and Wildlife Service has been working in the Upper 2/3rds of the Chippewa Watershed for more than 20 years. Dozens of wetlands have been restored with their supervision and guidance. Their records and inventories need to be brought together in this project.

Local County Water Plans have collected extensive information pertinent to the watershed. They need to be surveyed and compiled.

Last but not least, **the anecdotal stories and testimonies of elders** living in the watershed need to be gathered and recorded.

D. The Suspected or Potential Water Quality Problems

There has not been a comprehensive study of the water quality conditions and problems of the watershed as a whole. The following concerns stem from findings drawn from limited studies conducted by the USGS, DNR, citizen lake monitoring programs and the general observations of citizens in the watershed.

Sediment appears to be a major pollutant affecting the watershed, especially in the lower 1/3 of the basin. Small retention dams in Terrace and Swift Falls are chock full of sediment. Suspended clay fines are prevalent in many tributaries and ditch systems that feed the main stem of the river. It is suspected that a primary source of the sediment is from field runoff and stream bank erosion. In 1997 the US Army Corp of Engineers (USCOE) dredged out 8,000 cubic yards of sediment from above the dam control structure at Watson Lion's Park on the lower end of the main stem of the Chippewa River.

Excessive nutrients, primarily in the form of phosphorus, nitrogen and ammonia are another major water quality concern. Throughout the watershed, citizen-based, DNR and MPCA monitoring efforts have detected excessive phosphorus levels in many inlets and streams. Non-conforming septic systems, field, lawn, and feedlot runoff are suspected sources of this pollution.

Harmful bacteria (i.e. fecal coliform) is also a problem in certain areas of the watershed. There is a concern that the presence of fecal coliform will negatively impact recreational use of lakes and rivers in the watershed. Again, non-conforming septic systems, feedlots and unsewered communities are suspected sources of this pollution. (See Appendix A - Chippewa River Unsewered Communities)

Although it is not a direct water quality concern, **water quantity** concerns are important in the minds of many watershed residents. There is a perception (with little research to support it) that increased drainage has led to increased flooding and increased stream bank erosion, which in turn exacerbates the sediment and nutrient pollution problems.

Finally, there are concerns about the fauna of the watershed. Many residents are concerned about the safety of the fish they eat and others look to indicator species to gauge the health of the watershed. The MPCA's MRAP cites the lower Chippewa River as having habitat quality well below the tributary average for the basin. Surveys reveal the Chippewa as having the lowest levels of macro invertebrate life (i.e. mayflies, caddisflies etc. which are sensitive to pollution and key indicators of water quality) in the entire Minnesota River watershed.

E. The Economic Significance of the Water of Concern

Three major state parks exist within the Chippewa Watershed (Sibley, Glacial Lakes, and Lac qui Parle) that bring more than 450,000 visitors a year to the area. The state parks alone, not to mention the recreational lakes (Red Rock, Pelican, Minnewaska, Emily, Andrew, Norway, Games, etc.) that are impacted by the Chippewa, provide a tremendous economic impact to this part of the state. In many respects, the Chippewa River is a primary resource upon which many other wildlife, recreation, and economic resources depend.

The Chippewa River is a major priority listed in the Water Plans of Douglas, Pope, Kandiyohi, Swift, Grant, Stevens, and Chippewa Counties. As stated before, the Chippewa River is the largest watershed of the five tributaries in the Upper Minnesota River basin. The Chippewa has excellent potential for development into a significant canoeing and camping river as its beautiful banks, sand bars, and moderate current make it accessible to family and church group outings.

F. Land Use Information

Municipalities -- Several municipalities are located directly on the river or a branch of it and **use the river water to discharge sewage treatment plant effluent or storm water effluent.** There are no municipalities directly on the river that depend on the Chippewa for drinking water and there are no factories in the watershed that heavily draw on water resources. However, the City of Granite Falls, which is 15 miles downstream from the confluence of the Chippewa and the Minnesota, does depend on the Minnesota for some of its drinking water supply and the Chippewa does have a major influence on the health of the Upper Minnesota River.

Agriculture -- The landscape within the Chippewa River Watershed is presently dominated by intensive agricultural practices. Corn, soybeans, and sugar beets are the predominant row crops of the lower 1/3 of the watershed. The primary use by agriculture in the watershed is drainage. Agriculture depends on the river's connection to an extensive network of drainage ditches and tile systems to move water off the land and make it suitable for row crop farming. Pasture-based agriculture operations along riparian areas are also found, though they are becoming less prevalent.

The breakdown of land uses is as follows:

60%	Agriculture
~76.7%	Drained/Tiled
.7%	Urban/Suburban
~1.2%	Impervious Surface
4.5%	Forest
3.1%	Wetland
6.2%	Water
10%	Pastureland

Recreation --A wide variety of recreational activities take place in the watershed. Fishing, canoeing, snowmobiling, birdwatching, nature walks, camping and cross country skiing, along with duck and geese hunting, deer and pheasant hunting are all very popular activities throughout the watershed.

Section 2: Statement of project goals and objectives:

A. Overall resource goal:

To improve the water quality and flooding problems in the Chippewa River Watershed while also promoting a healthy agricultural, industrial and recreation-based economy for the region.

B. Water quality characterization goals and objectives:

Phase I Goal:

To assess the Chippewa River Watershed's water quality and land use through a cooperative partnership and citizen based approach that leads to widespread public support for Clean Water Implementation Projects through the completion of a thorough diagnostic study.

Objectives:

1. **Identify** the specific tributaries, streams, and ditches that are primary sources of sediment, nutrients and bacteria loading in the Chippewa River Watershed.
2. **Research and identify non-conforming septic systems and unsewered or undersewered communities** and determine what percentage of the nutrient and bacteria load in the river they contribute.
3. **Involve the citizens and landowners** of the basin in the identification of the above-mentioned problem areas through a citizen monitoring network that compliments and coordinates with the results of professional monitoring sites in the watershed.
4. **To set numerical, measurable, and achievable** stream goals.
5. **Study the relationship between water quality and land use** practices in the watershed.
6. **Study stream bank erosion** and determine the reasons for the relative stability or instability in certain places.
7. **To qualify fish and macro invertebrate life and existing fisheries habitat** characteristics within the Chippewa River and describe the impact of land use and water quality on fisheries resources and recreation angling opportunities.
8. **Use whole farm planning and monitoring** in an interdisciplinary approach to assess the effectiveness of alternative land use practices in improving water quality.
9. **Integrate and coordinate** the efforts of federal, state and local government agencies, schools, non-profit organizations and citizens through a **watershed-wide council** that meets regularly to plan, share information and make decisions regarding the next step.

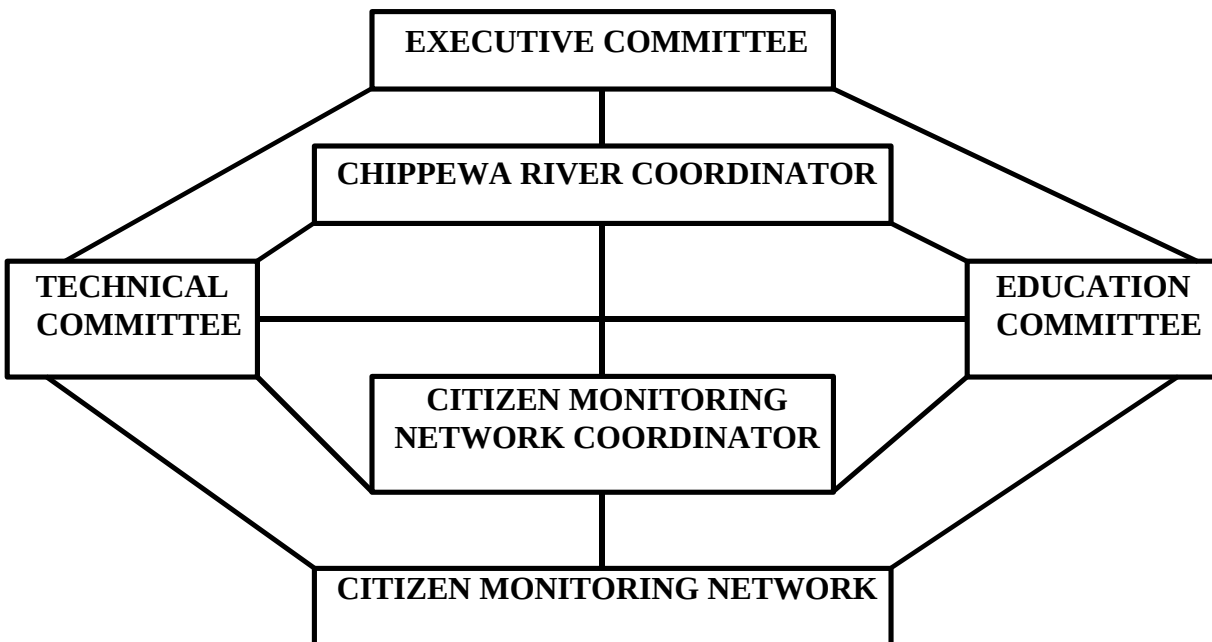
C. Information and education goals for citizens in the project area:

To utilize cultural marketing and extensive farmer and landowner contacts to maximize public input and ownership of the study. To engage citizens in the decision making process to further education of themselves, their friends, and neighbors about the Chippewa River's problems and the opportunities for restoring it.

Section 3: Project Organization and Responsibility

The Project Sponsor is Chippewa County. The Project Representative is Prairie Country Resource Conservation and Development Council. Contribution Sponsors include Swift, Kandiyohi, Pope, Douglas, Stevens, and Grant counties (County Water Planning Offices & SWCD's), the U. S. Geological Survey, WesMin RC & D Council, Land Stewardship Project, Agricultural Research Service of Morris, Benson Wastewater Treatment Plant, Natural Resources Conservation Service, MN Department of Natural Resource - Fisheries, and the Minnesota Pollution Control Agency. The Project Coordinator is Kylene Olson and the Project Citizen Monitoring Coordinator is Kyle Anderson. Hydrologic and water quality monitoring will be conducted cooperatively by the USGS, Chippewa River Watershed Project (CRWP) staff, DNR, MPCA, and county personnel.

Following is the Structure Flow Chart for the CRWP:



The Executive Committee will be comprised of 5 - 8 County Commissioners, (one from each county within the watershed), one council member from Prairie Country RC & D, one council member from WesMin RC & D, plus 5 - 8 citizen representatives (non-agency reps) appointed by March 1999, plus 5 - 8 additional citizen representatives, appointed by March 2000. The total of this committee not to exceed 26. This will be the decision making committee insofar as any major decision, financial or otherwise, that will need to be made regarding the project. They will meet monthly or every month or be available by phone between meetings if needed by the CRWP Coordinator.

The Technical Committee will focus on the technical, assessment, and research issues involved with the study. They will meet as needed or every other month. This committee will mainly be composed of county, state, and federal agency person, but the public is welcome and invited to attend meetings.

The composition of the Education Committee will be a partnership of agencies, non-profit organizations, and citizens. Their focus will be on events, cultural marketing, and education programs regarding the Chippewa River Watershed. Over the next 2 1/2 years the Education Committee will meet to develop and implement cultural marketing events throughout the watershed. Individual county Soil and Water Conservation Districts (SWCD's), water planners, lake associations and other groups will be invited to submit ideas for cultural marketing events in their locales.

The Citizen Monitoring network will include landowner, citizens, teachers, and students who will engage in a variety of monitoring activities, including rain gauge, staff gauge, and transparency tube monitoring, physical, chemical and biological analysis of streams and ditches in the watershed. Supervision and oversight of this network will be provided by the Project Coordinator and the Citizen Monitoring Coordinator.

The Chippewa River Coordinator will be coordinating the monitoring and assessment efforts, and the executive, technical, and educational committees through this diagnostic study phase of the project. The Citizen Monitoring Network Coordinator will be training and coordinating the citizen monitors, as well as assisting the project coordinator. Both positions will be involved with education and increasing awareness of the watershed and the diagnostic study.

The following agencies/organizations are participating to varying degrees in the project:

CHIPPEWA COUNTY: The Chippewa County Board of Commissioners passed a resolution to become the Project Sponsor. The county supports the project and the Clean Water Partnership/Phase I Diagnostic Study. Chippewa County is contributing \$4,000 cash and \$25,000 through in-kind services to assist with the Development of the Work & Monitoring Plans, Watershed Assessment, Pilot Project Monitoring, Information/Education Projects and Activities, Data Analysis and Assessment, and Development of Implementation Plan. Assistance for the Phase I Diagnostic Study will be provided by the County Water Plan and the Chippewa Soil and Water Conservation District.

SWIFT COUNTY: The County supports the project and the Clean Water Partnership/Phase I Diagnostic Study. Swift County is contributing \$8,000 cash to the project and \$25,000 in-kind contributions to assist with Development of Work & Monitoring Plans, Watershed Assessment, Pilot Project Monitoring, Information/Education Projects and Activities, Data Analysis and Assessment and Development of Implementation Plan. Assistance for the Phase I Diagnostic Study will be provided by the County Water Plan and Swift Soil and Water Conservation District.

KANDIYOHI COUNTY: The County supports the project and the Clean Water Partnership/Phase I Diagnostic Study. Kandiyohi County is contributing \$4,000 cash and \$8,000 in-kind contributions to assist with Development of Work & Monitoring Plans, Watershed Assessment, Pilot Project Monitoring, Information/Education Projects and Activities, Data Analysis and Assessment, and Development of the Implementation Plan. Assistance will be provided by the Kandiyohi County Water Plan and Kandiyohi Soil and Water Conservation District.

DOUGLAS COUNTY: The County supports the project and the Clean Water Partnership/Phase I Diagnostic Study. The County Water Plan is contributing \$4,000 to assist with water quality

monitoring. Douglas County is contributing in-kind services of \$2,500 for Development of Work and Monitoring Plans, Watershed Assessment, Pilot Project Monitoring, Information/Education Projects and Activities, Data Analysis and Assessment and Development of Implementation Plan. Assistance will be provided by the County Water Plan and Douglas Soil and Water Conservation District.

STEVENS COUNTY: The County supports the project and the Clean Water Partnership/Phase I Diagnostic Study. Stevens County is contributing \$750 cash and \$10,000 in-kind services to assist with Development of Work and Monitoring Plans, Watershed Assessment, Pilot Project Monitoring, Information/Education Projects and Activities, Data Analysis and Assessment, and Development of Implementation Plan. Assistance will be provided by the Stevens County Water Plan and Stevens Soil and Water Conservation District.

GRANT COUNTY: The County supports the project and the Clean Water Partnership/Phase I Diagnostic Study. Grant County is contributing \$500 cash and \$7,000 in-kind services to assist with Development of Work and Monitoring Plans, Watershed Assessment, Pilot Project Monitoring, Information/Education Projects and Activities, Data Analysis and Assessment, and Development of Implementation Plan. Assistance will be provided by the Grant County Water Plan and Grant Soil and Water Conservation District.

POPE COUNTY: The County supports the project and the Clean Water Partnership/Phase I Diagnostic Study. Pope County is contributing \$4,000 cash and \$25,000 in-kind services to assist with Development of Work and Monitoring Plans, Watershed Assessment, Pilot Project Monitoring, Information/Education Projects and Activities, Data Analysis and Assessment, and Development of Implementation Plan. Assistance will be provided by the Pope County Water Plan and Pope Soil and Water Conservation District.

COUNTY WATER PLAN DEPARTMENTS: Each of the above seven counties committed its water plan office to completing the initial monitoring site proposal and working with USGS in making the final site selections. The Water Plan offices will assist in the watershed assessment by identifying point source facilities and permitted/unpermitted feedlots in the watershed. They will also assist with the Level II feedlot inventory, information and education efforts, and implementation plan development.

SOIL AND WATER CONSERVATION DISTRICTS: The seven county districts will provide a combined in-kind contribution of \$46,460 in services and materials to the project. The SWCD's will be responsible for the following components of a watershed assessment: potential CRP survey, streambank survey, TISWA, and Level II feedlot inventory within the Chippewa River Watershed. They will also assist with the information and education program element through work on demonstration projects, field days, bus tours, etc. to promote the project. The districts will aid in the development of the implementation plan.

PRAIRIE COUNTRY RC&D COUNCIL: Prairie Country RC & D is the Project Representative. They will serve as the fiscal administrator and will hire the staff to coordinate the project. Prairie Country has committed an in-kind contribution of \$14,500 and will assist with Development of Work and Monitoring Plans, Information/Education projects and activities, Data Analysis and Assessment and Fiscal Management and Administration.

WesMin RC&D COUNCIL: WesMin RC&D has committed in-kind services of \$10,000. They will assist with Development of Work and Monitoring Plans, Information/Education Projects and Activities.

LAND STEWARDSHIP PROJECT: LSP will convene and coordinate the Chippewa River Whole Farm Planning and Monitoring Team. They have pledged in-kind services of \$60,000 and will assist with Pilot Project Monitoring, Information/Education Projects and Activities. LSP will collaborate with the Chippewa River Watershed Project on a joint quarterly newsletter, *The Chippewa Current*, for distribution to the Chippewa River Whole Farm Planning and Monitoring Team and the database of the Chippewa River Watershed Project.

US GEOLOGICAL SURVEY: The USGS has committed in-kind services of \$36,000. They will assist with Water Quality Monitoring, Data Analysis and Assessment. Installation of staff gauges and wire weight gauges, and low-flow monitoring for establishment of baseline rating curves will be completed by the USGS.

USDA AGRICULTURAL RESEARCH SERVICE: ARS has committed \$28,000 in-kind services/equipment to the project. They will assist with Water Quality Monitoring and Data Analysis and Assessment. ARS will also provide equipment including water stage recording, stream gauging equipment and recording rain gauges to assist with the diagnostic study. ARS will perform nutrient and sediment analyses of all water samples collected during the diagnostic study.

BENSON WASTEWATER TREATMENT PLANT: The Benson Wastewater Treatment Plant has pledged in-kind services of \$5,250. They will assist with Water Quality Monitoring, Citizen Monitoring, and Data Analysis and Assessment. They will provide all fecal coliform analyses on water samples collected throughout the diagnostic study.

NATURAL RESOURCES CONSERVATION SERVICE: The NRCS offices within the counties in the Chippewa River Watershed, along with the state NRCS office have committed an in-kind contribution of \$57,450. They will assist with Development of Work and Monitoring Plans, Water Quality Monitoring, Citizen Monitoring, Watershed Assessment, Information/Education Projects and Activities, and Implementation Plan Development. They will also provide telephone/fax service, use of office equipment, office supplies and the use of a vehicle.

MN DEPARTMENT OF NATURAL RESOURCES - SECTION OF FISHERIES: The Glenwood and Spicer area offices of the DNR have committed \$42,500 of in-kind services to the project. Using their standardized stream survey protocol they will perform physical and biological surveys of the East and West Branches of the Chippewa River to quantify and qualify existing habitat conditions and associated invertebrate and fish community structure.

MN DEPARTMENT OF NATURAL RESOURCES - DIVISION OF FORESTRY: The Alexandria Area DNR Forestry Area have committed \$1,000 of in-kind services to the project. They will provide technical forestry (information and education) assistance during the diagnostic study and Implementation Plan Development.

MINNESOTA POLLUTION CONTROL AGENCY: The MPCA will assist with development of the Work and Monitoring Plans, Water Quality Monitoring, Information and Education, Watershed

Assessment, Data Analysis and Assessment, Implementation Plan Development, GIS support, and technical assistance.

MILESTONE SCHEDULE: See SECTION 5: Milestone Schedule

CRWP DIRECTORY: See Appendix B

SECTION 4: IDENTIFICATION AND SUMMARY OF PROGRAM ELEMENTS

Program Element 1: Development and Revision of the Project Work and Monitoring Plans

The Chippewa River Watershed Project Staff, the Project Representative, representatives from local regional, state, and federal agencies will develop and revise the work and monitoring plans as required or warranted.

Program Element 2: Water Quality Monitoring

Joe Magner of the MPCA and Greg Payne of the USGS, have developed a preliminary plan for studying the river in cooperation with local water planners and the citizens of the watershed. In the spring of 1998 five intensive mechanical monitoring sites were established by the Citizen Monitoring Coordinator, the USGS and the National Weather Service, and the MPCA. These mechanical sites will be installed on the main stem of the river just below Benson, at the confluence with Shakopee Creek, and at the historic site at Highway 40, on the East Branch Chippewa River just northeast of Benson and on Dry Weather Creek. In addition, 20 other “synoptic” monitoring sites have been identified throughout the watershed for the collection of manual samples and stream health indicators after major storm events and at regular intervals throughout the year. A combination of USGS, MPCA, CRWP staff and interns will be responsible for collecting the samples. Samples analyses will be conducted by ARS in Morris, Benson Wastewater Treatment Plant in Benson, and EcoAgri Lab in Willmar. For a more detailed overview of this element see Section 6: Monitoring Plan.

Program Element 3: Fish and Macro Invertebrate Life Assessment and Fish Containment Monitoring

Concurrent with the water quality and land use studies, the DNR Division of Fisheries, will complete stream surveys on the East and West Branches of the Chippewa River. Current information on the physical and biological characteristics of the River will be generated. This information will describe various existing stream attributes such as fisheries habitat, fish and macro invertebrate community structure, public accessibility, streambank degradation, and barriers to navigation or fish movements. Data comparisons among similar stream reaches will supplement hydrologic and water quality information and allow for quantitative interpretations of the influences of land uses and pollutants on fisheries resources. Division of Fisheries staff from the Glenwood Area Headquarters will conduct surveys on the West Branch of the River (See Appendix C). Survey work on the lower reaches will be completed by Spicer Area staff.

The physical survey and fish community assessments of the Chippewa River and its tributaries present an opportunity to collect and analyze fish for specific environmental contamination. As with the existing joint Minnesota Department of Health (MDH), MPCA, and DNR fish surveys from the East and West Branches will be submitted to the MPCA analytical laboratory for determination of the levels

of mercury and PCBs present within tissues. A public health risk evaluation and potentially, a fish consumption advisory by the MDH will result from this monitoring effort. Segregation of findings by stream reach may serve to identify different levels of contamination or health risks associated with location or land use attributes.

Program Element 4: Citizen Monitoring Network

A citizen monitoring network working in cooperation with professional researchers will be established. This network will include landowners, citizens, teachers and students who will engage in a variety of monitoring activities, including rain gauge monitoring, staff gauge monitoring, transparency tube monitoring, physical, chemical and biological analysis of streams and ditches in the watershed. Supervision and oversight of this program element will be provided by the Project Coordinator and the Citizen Monitoring Coordinator.

Program Element 5: Watershed Assessment

Local county SWCD's, Water Planners, and Environmental Officers will work with the Minnesota River Basin Information Center in Mankato to develop a land use assessment of the watershed. All available land uses, soils, wetlands and groundwater data will be collected and compiled. The data will be translated to ARCVIEW format for subsequent analysis with PC technology. GIS layers that will be developed include:

- Surface hydrology layers - watershed, drainage ditches, national wetlands inventory
- Land use inventory -- impervious areas, cropping practices, forest, feedlots, CRP, CREP, RIM, pasture, point source outflows such as non-conforming septic systems and undersewered or non-sewered communities.
- Soils
- Streambank Assessment (See Appendix D).
- TISWA (See Appendix E).

Maps and data bases developed by this process will provide a viable means to identify areas within the watershed for possible implementation projects during the Phase 2 period.

Program Element 6: Interdisciplinary Monitoring of Pilot Demonstration Projects

The Land Stewardship Project will continue to convene and coordinate the Chippewa River Whole Farm Planning and Monitoring Team which combines farmers, university researchers and agency staff in a collective inquiry of how alternative land use practices contribute to water quality, farm profitability and bio-diversity. Biological monitoring, water infiltration studies, herd and riparian pasture health monitoring and holistic management principles are all included in the work of this team.

It is our intent to have 3 to 4 years of monitoring data collected by the time results of the Phase I water quality monitoring study are available. We hope that this "on the ground" data collected by farmers

and researchers will help in the adoption of alternative land use practices designed to improve water quality.

Program Element 7: Information and Education

Cooperatively sponsored field days, bus tours, workshops and other public education and information dissemination activities will be organized during the Phase I period to maximize public input and ownership of the study. These events will combine the “cultural marketing” expertise of non-profit organizations like CURE and the Land Stewardship Project with the extensive farmer and landowner contacts and experience of the SWCD’s and the NRCS.

Of course, another key element of the information and education dissemination plan for the study is the Citizen Monitoring Network and the monthly meetings of the Chippewa River Watershed committees. By participating in the study and by engaging in the decision making process, citizens will educate themselves and their friends and neighbors about the Chippewa River’s problems and the opportunities for restoring it.

The CRWP and the Chippewa River Whole Farm Planning and Monitoring Team will work cooperatively to develop and issue a joint quarterly newsletter, *The Chippewa Current*. This will be distributed to the data-base of cooperating agencies and citizens involved with both projects. Through an increase in public meetings to be held, the size of this database of contacts will also increase.

The Project staff will also develop a display to be used at open houses, conferences, meetings, etc. to increase exposure of the project. In addition, brochures will be developed for hand-outs/mailings to increase the awareness of the project to the public. Project signs will be erected in accordance with the Clean Water Partnership guidance document.

Program Element 8: Data Analysis and Assessment

Monthly meetings of the Chippewa River committees will be convened by the project coordinators to track the progress of the various elements of the Phase I study and the project’s work. However, the work of compiling and interpreting the data analysis will be conducted by a joint interdisciplinary team comprised of Project staff, representatives from the USGS, the MPCA, SWCDs, Water Planners, RC&D Councils, Farm Organization Representatives and communications specialists (i.e. Tom Cherveney of the ***West Central Tribune***). We want to convey the findings of the study in a way that can be understood by the average citizens in the watershed. Thus the interdisciplinary approach, combined with oversight from the Watershed committees, will insure that we have a study where the results are not contested and the implications are owned by the watershed residents.

Program Element 9: Implementation Plan Development

Once the findings of the study have been developed into an easy-to-understand format, open houses will again be held to communicate the findings of the study to the public. The Chippewa River Watershed Council will solicit suggestions from watershed residents and landowners as to how to best

implement projects to improve water quality in the Basin. Based on this public input, a special committee will be established to identify, justify, and select the best management practices for problem areas of the watershed. The work of the implementation plan development will be supervised by the Project Coordinator with assistance from the Watershed Council, Local Water Planners, SWCDs, Prairie Country RC&D, and NRCS.

Program Element 10: Fiscal Management and Administration

Chippewa County will serve as fiscal agent for the watershed during Phase I. The Prairie Country RC & D Council will serve as the project administrator and hire staff to coordinate the project. The Prairie Country RC & D will be responsible for issuing quarterly in-kind and cash outlay reports for the project. In addition, we need two full-time staff people to carry out the administrative and coordinating tasks outlined above. Two staff people will be able to build on each other's energy and hold each other accountable. One will be able to focus on the overall fundraising and coordination with agencies while the other will concentrate on citizen and landowner involvement. We believe this staffing configuration is crucial to the success and public ownership of study results.

Section 5: Milestone Schedule

Tasks that will be completed within each Program Element (Section 4)

<u>PROGRAM ELEMENT</u>	<u>TIME FRAME</u>	<u>RESPONSIBILITY</u>
1) Development of the Project Work and Monitoring Plans	4/98-11/98	CRWP Coordinators Prairie Country RC&D, CRWC
2) Water Quality Monitoring	4/98-10/00	
A) Order and purchase of needed equipment	4/98,2/99	CRWP Coordinator
B) Placement & maintenance of 5 auto-samplers	4/98-10/98 4/99-10/99 4/00-10/00	CRWP Coordinators MPCA
C) Routine Monitoring - 20 synoptic sites including 5 Auto-samplers:		
Water Sample Collection	5/98-10/98 4/99-10/99 4/00-10/00	CRWP Coordinators, Project Interns, USGS
T-Tube Monitoring	5/98-10/98 4/99-10/99 4/00-10/00	CRWP Coordinators, Project Interns,USGS
Staff Gauge Readings (Weekly & Storm Events)	5/98-10/98 4/99-10/99 4/00-10/00	CRWP Coordinators Project Interns,USGS
Rating Curve Development	9/98-2/99	USGS
Sample Analysis	5/98-10/98 4/99-10/99 4/00-10/00	ARS, Benson Wastewater Treatment Plant, EcoAgri Lab
TMDL	5/99-10/99 5/00-10/00	CRWP, MPCA

3)	Fish and Macro Invertebrate Life Assessment and Fish Containment Monitoring	7/98-9/98 7/99-9/99	DNR-Glenwood, Spicer
4)	Citizen Monitoring Network A) Monitoring tasks including: rain gauges, T-Tubes, staff gauges, physical, chemical, and biological monitoring, soil moisture B) Citizen Monitor Open Houses and Workshops	5/98-10/98 4/99-10/99 4/00-10/00 1/99-4/99	CRWP Citizen Monitoring Coordinator, Citizens, Landowners, Teachers, Students CRWP Coordinators
5)	Watershed Assessment A) Feedlot Inventory B) TISWA C) Land Use/Streambank Survey D) Surface hydrology - GIS	 9/98-4/00 1/98-4/00 1/98-4/00 1/98-4/00	 County Water Planners, SWCDs, CRWP County Water Planners, MPCA, SWCDs, CRWP County Water Planners, MPCA, SWCDs, CRWP MPCA, MN River Data Center
6)	Interdisciplinary Monitoring of Pilot Demonstration Projects	4/98-12/00	Land Stewardship Project (LSP), Chippewa River Whole Farm Planning and Monitoring Team
7)	Information and Education A) Field Days, Bus Tours, Workshops B) Monthly Meetings C) Newsletter	 4/98-12/00 4/98-12/00 8/98-12/00	 CRWP Technical and Education Committees CRWP Coordinators, Technical and Education Committees CRWP Coordinator, Chippewa River Whole Farm

			Planning and Monitoring Team, LSP
	D) “Word of Mouth”	5/98-12/00	Citizen Monitoring Network
	E) Displays, Brochures	6/98-12/00	CRWP Coordinators
8)	Data Analysis and Assessment		
	A) Compiling & Interpreting Data	10/98-12/00	USGS, MPCA, Coordinators, Farm Organization Reps, Communications Specialists, CRWP Technical Committee
	B) TMDL estimates	10/99-4/00 10/00-12/00	CRWP Citizen Monitoring Coordinator, MPCA
	C) Diagnostic Report	9/99/12/00	CRWP Coordinators
9)	Implementation Plan Development		
	A) Open houses to present findings of Diagnostic Study to public/Solicit suggestions for implementation Technical and Education	1/00-5/00	CRWP Coordinators, Committees
	B) Select priority Subbasin watersheds for implementation of BMP’s	1/00-12/00	CRWP Coordinators, Technical and Education Committees
	C) Implementation Plan Development	1/00-12/00	CRWP Coordinators, Technical and Education Committees
10)	Fiscal Management and Administration	4/98-12/00	Prairie Country RC&D, CRWP Coordinators
	A) Semi-annual Report	7/98, 7/99	CRWP Coordinator, Prairie Country RC&D
	B) Annual Report	1/99, 1/00, 1/01	CRWP Coordinators, Prairie Country RC&D

SECTION 6: MONITORING PLAN

A. Purpose of Water Quality/Quantity Monitoring

One of the most significant aspects of the Chippewa River Basin is the diversity of landscape features, soil types, and land use within its boundaries. The basin can be divided into broad subregions based on logical groupings of these factors. It is expected that both streamflow and water quality are influenced by these factors and that there may be significant differences in the hydrologic response and water quality between subregions. These differences will require development, adaptation, and adoption of those best management practices that are particularly suited to address the problems and setting of each subregion. Monitoring and assessment can be used to identify which problems are present in each subregion, prioritize them, and then work to apply an appropriate suite of best management practices or other solutions to those particular problems.

Flooding and water quality are the water-related problems identified by basin residents during group sessions conducted during 1994-95. These two issues are partially linked because large volumes of water in flood flows can carry large quantities of pollutants that can have significant impact on receiving water bodies. The affects of flooding and degraded water quality on the Chippewa River, Lac qui Parle Reservoir, the Minnesota River, and several meandered lakes are of particular concern. The objective of the study is to monitor and evaluate the variability of water quality and flow volume within the basin.

B. Summary of Previous Studies

Data on streamflow and water quality have been collected in the Chippewa River Basin. Daily streamflow record has been obtained on the Chippewa River at the Milan gauging station (Highway 40 bridge) from 1937 to present. In addition, daily suspended-sediment concentrations and loads were determined during summer high flows at this station from 1972-81. Samples for chemical analysis, including nitrate and phosphorus, were collected periodically at the gauging station from 1960 to 1975.

Daily streamflow was also determined on the Chippewa River near Benson from 1949-51, on Shakopee Creek from 1949-54, on the East Branch Chippewa River near Terrace from 1970 to 1973. Annual peak-flow data have been collected from 1958 to present for Spring Creek which drains a 16 square-mile watershed near Montevideo. The MPCA routine samples the Chippewa River at the Highway 7 bridge in Montevideo. Samples also were collected at the Highway 7 site for the MRAP (Minnesota River Assessment Project) during 1989-92.

Much of the Chippewa River flow is diverted to Lac qui Parle reservoir through the diversion channel located north of Watson. At low flow, one half of the Chippewa River's streamflow is diverted to the reservoir. At high flow, 1000 cubic feet per second is allowed to flow the natural channel to join the Minnesota River at Montevideo, while the remainder is diverted to the reservoir.

C. Monitoring Site Selection

Selection of the twenty sites for monitoring was based on input from citizens and the Chippewa River Watershed Committees (See Appendix F and G). Input from local partners who were familiar with landscape features, cropping and land-use practices, previously-identified site-specific flooding and water-quality problems, and other water-related interests was a significant part of the selection process. Field reconnaissance was done in the summer on 1997 to further evaluate proposed sites and determine their suitability for data collection.

Criteria used to guide site-selection in the Chippewa basin followed an overall need to (1) differentiate water quality arising from varied land-use and geographic subregions and (2) quantify the pollutant and sediment loading arising from major tributary watersheds. Sites were strategically located such that each site represents, as narrowly as possible, the affects of selected subregions or the loading from a selected tributary.

The sampling will be done using three approaches, designated Level 1, Level 2, and Level 3. Level 1 sampling will involve collection of continuous streamflow data and intensive collection of water-quality samples using automated equipment during runoff events. Level 2 sampling will be synoptic and will consist of sampling stream segments in downstream order over a short time period (generally same-day sampling) such that changes in water quality along the stream's course can be documented. Level 3 sampling will utilize cost-effective measures such as turbidity tube readings, gage observations and rain gage networks. Level 3 work will be done at the sampling sites and also at any site where there is citizen interest. The turbidity tube readings are expected to be useful for isolating source areas in more detail than can be provided by the more costly Level 2 efforts.

Level 1 sampling is planned at five sites, strategically placed such that major subwatersheds of the Chippewa River are monitored. These are the East Branch Chippewa River at Benson, Chippewa River near Clontarf, Shakopee Creek near its mouth, Cottonwood Creek near its mouth, and Chippewa River at Highway 40 near Milan. It is expected that about 5 runoff events will occur at these sites during the study period which will be April-October 1998, and April-October 1999.

Level 2 sampling will be done at all sites and is planned to coincide with relatively steady flow conditions (non-runoff periods) during major seasonal periods. Level 2 sampling will consist of a manually-collected water sample along with a determination of instantaneous streamflow at the time of sampling, either from a current-meter discharge measurement or a previously established stage-discharge relation. The U. S. Geological Survey will provide discharge measurements and develop stage-discharge relations.

Level 3 sampling will be initiated at sites where there is citizen interest and volunteer assistance. Sediment, nitrate, ammonia, and phosphorus have been identified as the main non-point-source constituents in the Minnesota River Basin by the MRAP study and other previous investigations, and will be sampled in this study. Samples for determination of fecal bacteria contamination arising from both point and nonpoint sources also will be collected. Laboratory analyses will be done at the Agricultural Research Station (ARS) at Morris, Minnesota, the Benson Wastewater Treatment Plant in Benson, and EcoAgri Lab in Willmar.

D. Sampling Frequency

Level 2 (low-flow) sampling will be done at approximately one-month intervals from April-October 1998, from April-October 1999, and April-October 2000. Level 2 sampling will consist of a manually-collected water sample along with a determination of instantaneous streamflow at the time of sampling, either from a current-meter discharge measurement or a previously established stage-discharge relation. The U. S. Geological Survey will provide discharge measurements and develop stage-discharge relations.

It is expected that about 5 runoff events will occur at the five Level 1 sites during the study period which will be April 1998 - October 2000. Multiple, discrete samples will be collected during each runoff event.

For Level 3 sampling, project staff, with the help of volunteers when available, will use turbidity-tube readings to further detail stream reaches determined to be problematic based on Level 1 and Level 2 sampling.

SELECTED PARAMETERS FOR ANALYSIS AND FREQUENCY OF SAMPLING

	Field/Lab	Baseline Frequency Level 1 & 2 Sites (April-Oct 1998)	Storm
<u>Frequency</u> <u>Parameter</u>	<u>(F/L)</u>	<u>(April-Oct 1999)</u>	<u>(Level1 Sites)</u>
DO	F	Monthly	5
Transparency Reading	F	Monthly	5
pH	F	Monthly	5
Specific Conductance	F	Monthly	5
Temperature	F	Monthly	5
Stage Reading	F	Monthly	5
Flow-Meter	F	Monthly	5
Total Phosphorus	L	Monthly	5
Ortho Phosphorus	L	Monthly	5
Nitrate/Nitrite	L	Monthly	5
NH ₄	L	Monthly	5
Total Kjeldahl N	L	Monthly	5
Total Suspended Solids	L	Monthly	5
Fecal Coliform	L	Monthly	5

The timing of sample collection is very important. Sampling at normal and low flows is necessary to evaluate the water quality of the Chippewa River and its tributaries with respect to their capability for sustaining desired uses. Aquatic systems are often stressed at low flow, particularly if there are acute point-source loadings during low-flow periods. In contrast, high-flow periods typically move large loads of problematic nonpoint-source constituents that may adversely impact the Chippewa River mainstem, Lac qui Parle Reservoir, and the Minnesota River. Meandered lakes located throughout the basin also may be impacted during these high flow periods.

E. Water Quality Parameters

Samples collected for Levels 1 and 2 will be analyzed for total phosphorus, soluble reactive phosphorus, dissolved nitrate, dissolved ammonia, total Kjeldahl nitrogen and total suspended solids. Temperature, dissolved oxygen, pH, and specific conductance will be measured at each site during Level 2 sampling using portable meters. A sample determination of fecal coliform bacteria will be collected at each site as part of Level 2 sampling. Bacteria samples also will be collected manually during runoff events at the five Level 1 sites. Transparency readings will be taken using a T-Tube at each site during Level 2 sampling and also by citizen monitors. It is expected that this will allow development of a relation between turbidity-tube readings and total suspended solids. Laboratory analyses for determination of nutrients and suspended solids will be determined at the Agricultural Research Station (ARS) at Morris, Minnesota and at the EcoAgri Lab in Willmar, Minnesota. The ARS figures their price at cost per set which includes all lab parameters, the cost per sample set is \$26. The CRWP will be responsible only for the reagents, which are 25% of the total cost or \$6.50 per sample set. Bacteria samples will be processed by the Benson Wastewater Treatment Plant in Benson, Minnesota using standard methods. The cost of processing the bacteria samples is an in-kind contribution to the CRWP from the Benson Wastewater Treatment Plant.

The Level 2 sampling schedule is expected to provide opportunity to examine water quality during different seasons and varying flow regimes. The Level 1 sampling is expected to provide the data needed to accurately calculate loads of constituents in transport at the strategically selected points in the study area. Multiple discrete samples will be collected during each runoff event. This will enable calculation of total load while also documenting extremes with regard to concentrations.

In addition, in cooperation with the MPCA's 303d Impaired Waters study, the CRWP will be monitoring for TMDL near the mouth of the Chippewa River at Montevideo.

SECTION 7: WATERSHED ASSESSMENT

A. Physical description of the Chippewa River and its Watershed

The Chippewa River is one of 13 major tributaries of the Minnesota River. The Chippewa River Watershed drains a 2,080 square mile basin, or 1,331,200 acres. The counties in this basin include portions of Otter Tail, Grant, Douglas, Stevens, Pope, Swift, Kandiyohi, and Chippewa. The source of the Chippewa River are in southern Otter Tail County near the Fish Lake area, from where it flows 130 miles south to its mouth in the Minnesota River at Montevideo, Chippewa County. The Chippewa's gradient is 4 1/2 feet per mile. The annual mean flow at the mouth is 200 cubic feet per second, although it has been as high as 10,000 cubic feet per second at flood stage. The main tributaries are: The Little Chippewa river, East Branch Chippewa and Shakopee Creek. Together, these tributaries contribute nearly half the flow of the main stem.

Geomorphology of the Chippewa River Watershed includes a complex mixture of moraines, and till, lacustrine, and outwash plains. The eastern half of the Chippewa River Watershed, extending from approximately Evansville in the north to just below the town of DeGraff in the south, lies within the North Central Hardwood Forest Ecoregion. More specifically, with the exception of a long narrow section of the Belgrade-Glenwood outwash plain along the east-central edge of the basin, the eastern half of the watershed falls within the geomorphic setting of the Alexandria Moraine Complex. This morainal complex is composed of well drained, loamy, silty, sandy and mucky soils with moderate to steep sloping landscapes (6-45%), producing a large potential for sediment delivery to streams. As such, water erosion potential within this section of the watershed is classified as moderate to high. The section of the watershed situated in the Belgrade-Glenwood outwash plain, lying east of the line from Glenwood in the north to Lake Johanna in the south, is characterized by nearly level to gently sloping (2-6%), well drained landscapes with sandy-loamy soils of moderate water and wind erosion potential.

Lands in the western half of the Chippewa River Watershed fall within the Northern Glaciated Plains Ecoregion, primarily within three geomorphic settings, the Big Stone Moraine on the far western edge, the Appleton-Clontarf Outwash Plain along the lower Chippewa river, and the Benson Lacustrine Plain within the south-central section of the watershed. Landscapes within the Big Stone moraine are characterized as rolling (6-12%), with well drained, silty and loamy soils. Water erosion potential within the moraine is generally classified as moderate. Lands within the Appleton-Clontarf outwash are characterized as being nearly level to gently sloping (2-6%), poorly drained, and extensively tiled. Water and wind erosion potentials are classified as moderate for this region. The Benson Lacustrine Plain is also nearly level (0-2%), poorly drained and extensively tiled. Soil textures in the lacustrine plain range from silty clay to silt loam, water erosion potentials are high for lands adjacent to streams and much of the plain has the potential for significant wind erosion.

The climate within the Chippewa River Watershed is continental, with cold dry winters and warm wet summers. An average of twenty five to twenty eight inches of precipitation annually fall within the watershed with two thirds of this precipitation normally falling in the five months from May through September. Average annual runoff is estimated to be between two to four inches.

The higher headwaters regions (Pope & Douglas counties) of the Chippewa are rich in wetlands, lakes, fish and wildlife resources. The U. S. Fish and Wildlife Service has restored dozens of wetlands in this area, and water quality and fish populations are relatively healthy.

The lower reaches of the river from just north of Benson and southward have not fared as well. Several miles of the river near Benson were channelized in the 1950's. Much of Shakopee Creek has been channelized and wildfowl marshes have been greatly reduced in this area through drainage. It is estimated that upwards of 95% of the original wetlands in the lower basin have been drained.

Twenty five cities, towns and hamlets are found in the Chippewa river Watershed. More than 75 lakes are also found within its boundaries including significant recreational waters such as Lake Minnewaska, Lake Emily, Pelican, Norway, Games and Andrews Lakes, Red Rock Lake, Lake Reno and Lake Villard. Three State Parks (Glacial Lakes, Sibley and Monson Lake) call the watershed their home and more than 60 State Wildlife Management areas (including the 2,298 acre Danvers Marsh) dot the watershed's landscape. Tracts of native prairie (including the famous Ordway Prairie near Starbuck), scenic byways (such as Inspiration Peak and Terrace Mill) , regional trails (Glacial Lakes, Chippewa County) and canoe routes (from Big Bend to Watson Lions Park) all combine to make the Chippewa River Watershed a unique and special place to live.

Refer to Appendix H for a detailed map of the Chippewa River Watershed.

B. Land Use

Municipalities -- Several municipalities are located directly on the river or a branch of it and **use the river water to discharge sewage treatment plant effluent or storm water effluent.** There are no municipalities directly on the river that depend on the Chippewa for drinking water and there are no factories in the watershed that heavily draw on water resources. However, the City of Granite Falls, which is 15 miles downstream from the confluence of the Chippewa and the Minnesota, does depend on the Minnesota for some of its drinking water supply and the Chippewa does have a major influence on the health of the Upper Minnesota River.

Agriculture -- The landscape within the Chippewa River Watershed is presently dominated by intensive agricultural practices. Corn, soybeans, and sugar beets are the predominant row crops of the lower 1/3 of the watershed. The primary use by agriculture in the watershed is drainage. Agriculture depends on the river and an extensive network of drainage ditches and tile systems to move water off the land and make it suitable for row crop farming. Pasture-based agriculture operations along riparian areas are also found, though they are becoming less prevalent.

The breakdown of land uses is as follows:

60%	Agriculture
~76.7%	Drained/Tiled
.7%	Urban/Suburban
~1.2%	Impervious Surface

4.5%	Forest
3.1%	Wetland
6.2%	Water
10%	Pastureland

Recreation --A wide variety of recreational activities take place in the watershed. Fishing, canoeing, snowmobiling, birdwatching, nature walks, camping and cross country skiing, along with duck and geese hunting, deer and pheasant hunting are all very popular activities throughout the watershed.

C. Hydrologic Monitoring Data

There are several scattered reports and studies relating to the water quality of certain portions of the watershed, but it has not been compiled or assembled into one place.

The MPCA's MRAP study focused only on collection data at or near the mouth of the Chippewa (which was largely impacted by Montevideo's aging sewage treatment plant) and in the channelized portions of the river, thus the data that it presented was not representative of the watershed as a whole. However there is data that has been collected by the MPCA for several years at certain points along the river that still needs to be compiled and interpreted. The MPCA is also the keeper of lake monitoring records gathered for several Lake Assessment Project studies and Citizen Lake Monitoring Program (CLMP's) in the watershed. They need to be gathered together and studied in the context of the watershed wide project.

The USGS has historical flow data and limited water quality data from its permanent station along Highway 40 that needs further interpretation and analysis. Recently, the USGS conducted fish habitat surveys on Dry Weather and Shakopee creeks, the results of which have yet to be published.

The DNR has conducted several fish habitat surveys in the watershed that need to be studied and integrated with studies listed above. In addition, an old and incomplete study of the east branch of the Chippewa River several years ago may inform this new watershed-wide initiative. More recently, the DNR has conducted extensive two year monitoring project of the Upper Shakopee Creek watershed. The results will be compiled and published in the spring of 1999.

The US Army Corp of Engineers (USCOE) also has water quality information relating to the Chippewa which they have made available to the U. S. Geological Survey. In 1997 the USCOE dredged 8,000 cubic yards of sediment out of the river bed above the dam control structure at Watson Lion's Park on the lower end of the Chippewa River.

The U. S. Fish and Wildlife Service has been working in the Upper 2/3rds of the Chippewa Watershed for more than 20 years. Dozens of wetlands have been restored with their supervision and guidance. Their records and inventories need to be brought together in this project.

Local County Water Plans have collected extensive information pertinent to the watershed. They need to be surveyed and compiled.

Last but not least, **the anecdotal stories and testimonies of elders** living in the watershed need to be gather and recorded.

D. Additional Assessment Tools

A basin-wide monitoring and assessment of water quality is needed to determine present water quality conditions and identify stream segments that are not supporting designated uses. As part of this assessment, the following tasks will be completed during the diagnostic study: streambank survey, level 2 feedlot inventory and Tailored Integrated Stream/Watershed Assessment (See Appendix D and E). A land use assessment of the Chippewa River Watershed using GIS will be completed by the Minnesota River Data Center, MPCA, and the CRWP staff.

E. Modeling

The FLUX model will be used to predict water flow and nutrient/sediment loading from selected representative subwatersheds of the Chippewa River Watershed. Since the evaluated areas were selected in terms of modeling and monitoring needs, the analysis component will integrate the output from the modeling and monitoring activities.

F. Selection of Priority Management Areas

The Level 1 (automated sites) data collection will provide information to calculate loadings of sediment and nutrients from major subdivisions of the Chippewa River Basin (See Appendix F) such that the relative significance of the load from each can be evaluated. This will be useful to evaluate the impact each of these sub-basins relative to the total load transported by the Chippewa River at its lower end. The load measured at the lower end of the Chippewa River, furthermore, will allow assessment of the impact of the Chippewa River Basin on the Minnesota River. Loading data also makes possible calculation of yields so that the various regions of the study area can be compared based on their contribution per square mile. Such calculations applied to the results of the additional assessment tools (TISWA, GIS land use, etc.) will identify problem areas within the watershed.

Level 2 (manual sampling) data collection will provide information from within each of the major subdivisions, further isolating locations that are sources for sediment and nutrients. It is expected that unusually high loading, if it is present, can be detected by this approach. Level 2 data collection, done during steady flow conditions, will be especially valuable for detecting and evaluating point source inputs. It will also serve to identify those reaches that have good water quality that perhaps could support a higher use, such as an enhanced fishery or water-contact recreation.

Once identified, problem areas can be prioritized so that Best Management Practices (BMP's) and other appropriate solutions can be directed efficiently and effectively. Assessment also will identify those stream segments that currently support designated uses so that appropriate measures can be taken to protect and enhance those segments.

Data analysis and assessment will be completed through a cooperative effort between the CRWP, USGS, county water planners, SWCDs, and Prairie Country RC&D. The project will also seek to include representatives from agricultural organizations (i.e. Farm Bureau) and a communications specialist, such as Tom Cheverny from the Willmar West Central Tribune, to help the technical team organize and present the findings in a way that will be meaningful and useful to citizens of the Chippewa River Watershed. From this analysis and assessment, the technical team will create a preliminary ranking of priority areas and develop best management practices to fit the need in the watershed.

The next step will be to gather input from watershed residents. The quarterly *Chippewa Current* newsletter will be the initial means for presenting the findings to the public. After that, a series of public open houses will be held to present the results and answer any questions that watershed residents may have. These meetings will also give residents the opportunity to respond to the preliminary ranking of priority areas and best management practices developed by the technical team. Using both the results of the diagnostic study and input from watershed residents, a special committee, comprised of representatives from SWCDs, County Water Planners, and the Chippewa River Watershed Committee; will select best management practices for implementation in the priority areas of the Chippewa River Watershed. The time frame for these activities is specified in the Milestone Schedule (Section 5).

SECTION 8: QUALITY ASSURANCE PLAN

A. Introduction

Field work for this project, including the collection and delivery of water samples to the Agricultural Research Laboratory (monitoring year 1998), Eco-Agri Laboratory in Willmar (monitoring years 1999-2000) and the Benson Wastewater Treatment Plant (monitoring years 1998-2000) will be conducted by the Chippewa River Watershed Project personnel and the US Geological Survey. Analysis of these samples will be conducted by the ARS in 1998, Eco-Agri Laboratory in 1999 and 2000, and the fecal coliform analysis by the Benson Wastewater Treatment Plan in 1998-2000.

B. Sampling Procedures

For each round of sample collection there will be a minimum of one field duplicate for every 10 samples taken. If more than one team collects samples, there will be a field duplicate for each team. All samples will be collected using pre-approved (USGS or EPA methods and sampling devices). All samples bottles will be pre-cleaned by washing with phosphate free detergent, acid rinsed with 10% hydrochloric acid and rinsed three times with distilled water. Bacteriological samples will be collected in sterile glass, polypropylene or polycarbonate bottles and taken to the Benson Wastewater Treatment Plant in Benson within 8-12 hours of collection. After collection, all samples will be placed immediately into an ice chest and delivered to the ARS, Eco-Agri Laboratory or Benson Wastewater Treatment Plant. The ARS will provide bottles for their ISCO sampling devices that will be used by the project. The Chippewa River Watershed Project will provide bottles for manual collection and for bacteriological sample collection.

C. Storm Event Monitoring

Storm event samples will be collected at the five primary sites using a CR10 and ISCO 3700 or similar sampling device at each site. During storm events, water samples will be collected as the stream water level increases, peaks and decreases. All sample bottles will have the site identification, date, time, water stage and type of automated sampler on the labels. After collection, all samples will be placed in an ice chest. The sampling team will adhere to the Chippewa River Watershed Project chain of custody sheet.

The CRWP Citizen Monitoring Coordinator or other CRWP personnel will collect and deliver the bacteriological samples to the Benson Wastewater Treatment Plant within 8-12 hours of collection. Water samples for all remaining parameters will be delivered to ARS or Eco-Agri Laboratory within 24-36 hours of collection. Field duplicates and field blanks will be submitted with each round of samples collected (both bacteriological and water chemistry samples).

D. USDA-Agricultural Research Service QA/QC

See Appendix I

E. Eco-Agri Laboratory QA/QC

See Appendix J

F. Benson Wastewater Treatment Plant QA/QC

See Appendix K

G. Laboratory Analyses Procedures: