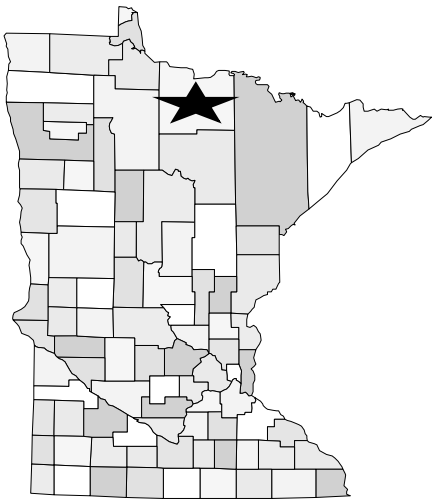

Koochiching County

Comprehensive Water Management Plan 2000 Update

ACKNOWLEDGEMENTS

The Koochiching County Board of Commissioners adopted a resolution to develop the first Comprehensive Water Management Plan (CWMP) in June 1990 and assigned the project to the Koochiching Soil and Water Conservation District (SWCD). SWCD efforts to complete the plan became frustrated due to personnel changes and a progressively more complex workload that included state-mandated programs. The plan was approximately half complete by the end of 1993. In spring 1994 the County Board of Commissioners re-assigned the project to the Planning and Zoning Department. Kate Foster was largely responsible for completing the 1994 – 1999 draft plan that was adopted by the Board.

CWMP's need to be updated at five-year intervals to re-assess old problems, consider new problems, edit or re-organize text and re-arrange or re-state priorities. The plan before you is not intended to be a complete re-write. While there are significant additions, appropriate portions of the '94 text needed editing, other portions were deleted completely and some stayed intact. An equal, if not greater, effort was directed at re-organizing the plan so the contents flowed more logically toward the Action Plan at the end. Perhaps my format can be used as a template for future five-year updates.

I wish to thank the following people for their confidence and help:

Koochiching County Commissioners
Koochiching County SWCD Supervisors
KSWCD staff Pamela Tomevi and Thomas Toratti
Environmental Services Director Richard Lehtinen (and staff)
NRCS Soil Survey Team

Edward A. Lombard, consultant
Rat Root River Enterprises

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(FIGURES)

I. Foreword

A. Scope of the Comprehensive Water Management Plan

This document is organized in an outline format. The effort has been made to make it simple to understand and easy to follow. We believe this is a "working" plan: one that everyone can refer to for local water resource information in Koochiching County.

There is a tremendous volume of information on the water resource of Minnesota. This plan only taps information that pertains to Koochiching County. We may have missed some sources or failed to consider some aspect of water quality improvement or degradation. In some situations we have short-term data but no analysis to suggest a realistic assessment.

This countywide Comprehensive Water Management Plan is updated every five years to monitor implementation progress and to provide current assessments of water resource problems. Any constructive criticism is greatly appreciated and can be voiced through County Commissioners, Soil & Water District Supervisors or Environmental Services Department.

1) What is the status of the water resource in Koochiching County?
2) If the water resource is threatened what changes need to be made so that water quality can be improved and sustained?
3) What steps need to be taken to implement the changes?

The Koochiching County Comprehensive Water Management Plan (CWMP) attempts to answer those three questions by, 1) gathering, studying and evaluating all available information related to water in Koochiching County; 2) setting management goals based on the conclusions and, 3) developing objectives by which those goals can be met.

The concepts are easily discussed but difficult to research, document, and implement. The effort has been made to include the intent of existing plans and laws that affect the use of natural resources. An accurate evaluation of the water resource considers surface and ground water, land-related resources, the economic environment, and the overall condition of natural resources in the county. This project is a dynamic, interactive and very complex process.

The CWMP does not attempt to duplicate existing plans. Other documented natural resource planning activity in Koochiching County has been site-specific focusing on pieces of the larger resource management picture. The CWMP is an attempt to create an all-encompassing (comprehensive) plan, incorporating many concerns and concepts found in other resource management plans but from a local, countywide standpoint. Coordination with plans in adjacent counties (Itasca, Beltrami, Lake of the Woods, St. Louis) and the province of Ontario will need to be considered more closely in the future because Koochiching County's watersheds include land within those statutory boundaries. Issues of water quality and quantity are a regional ecosystem management agenda and watershed planning will become more prevalent in the new millennium.

Koochiching County has also been involved in development of the Minnesota Water Plan 2000, an update of the State Water Plan to be in place until the year 2010. In 2001, MPCA will begin development of the Rainy Basin Plan that will involve all counties and Canada located in the Rainy Basin.

The climate of state government and availability of funding play a large part in implementing some of the objectives stated in the Action Plan. Assessing the water resource in Koochiching County is a necessary first step so that non-funded objectives can be teamed with the proper management vehicle to resolve water quality problems.

II. Introduction

A. The Need for a Water Management Plan

People who live in and visit Koochiching County probably have access to more unspoiled natural resources than most people on our entire planet. But trends in population can change that picture in the future. In the next twenty-five years, the population of Koochiching County is projected to decline or, at most, experience a moderate increase. The expected increases are more likely to be in transient population (tourists, business people, etc.) that could affect water quality. There is a need to plan for the future with regard to natural resources because future quality of life in Koochiching County will likely depend on effective natural resource planning and implementation. Water is one of those essential natural resources that must be monitored and managed for sustained availability. This plan deals with water quality and quantity and efforts to preserve both for the future in Koochiching County.

1. State Legislation

The severe drought of 1977 prompted legislators to assess the health of the state's water supply. By 1981 it became clear that action was needed to better manage and maintain the water resource. In 1985 the Comprehensive Local Water Planning and Management Act (Chapter 110B) was passed in response to poor management and monitoring of the state's water supplies. The Act was clarified and reorganized in 1990 and is now referred to in Chapter 103B, "Water Planning and Implementation".

Within Chapter 103B is a part titled "Comprehensive Local Water Planning and Management." It occupies Section 103B.301 to Section 103B.355 and is also known as "The Comprehensive Local Water Management Act of 1990."

Section 103B.311 discusses in detail "County Water Planning and Management." Subdivision 1 of that Section says: "County Duties. Each county is encouraged to develop and implement a comprehensive water plan. Each county that develops and implements a plan has the duty and authority to. . ."

There is no direct mandate by Minnesota legislators ordering counties to create a water management plan. But each county is "encouraged" to develop one. And without a water plan counties will be ineligible for state money for various projects. The legislature has sent a subtle but clear message to local government units that depend on state financial aid to assess and resolve water quality (and other natural resource) problems. In part, the message is: "No water plan, no money." With that, Minnesota legislators took a decidedly positive step toward prioritizing and targeting natural resource problems and research on a statewide scale. Koochiching County will continue to benefit by having a comprehensive water management plan.

B. The Planning Process

Section 103B.311, "County Water Planning and Management" and Section 103B.315, "Comprehensive Water Plan Review and Adoption" set guidelines for creating and adopting the water plan for every county.

The process of creating a water plan is designed to be interactive. Meetings are conducted to collect information and set priorities. When the draft of the water plan is completed or updated, at five-year intervals, the county board submits it to the public for review and comment under the guidance of a lead agency. The lead agency in Koochiching County is a cooperative effort between the local Environmental Services Department and the local Soil

and Water Conservation District overseen by the Minnesota Board of Soil and Water Resources. Public meetings are held to monitor progress and re-evaluate priorities established in the initial plan.

The planning process reflects major concerns by local people, their government units and elected representatives. The process also reflects considerable progress in Koochiching County toward protecting and conserving natural resources for the next millennium.

III. Koochiching County: General Natural Resource Information

A. Environment

Koochiching County lies along Minnesota's northern-most border, adjacent to Ontario, Canada. It is the state's second-largest county, covering 2,032,000 acres. Rainy River runs almost the full length of Koochiching County's jagged northern border and serves as an international border between the United States and (Ontario) Canada. Except for a small portion of the Red Lake watershed, all watersheds in Koochiching County flow north to the Rainy River that runs west to Lake of the Woods. Conservative figures show the county is about 68% wetland with approximately 98% of the pre-settlement wetlands still intact. About 90% of the county is wooded and classified as forest.

1. Climate

Koochiching County's northerly location and distance from the moderating effects of large water bodies produces extremes in seasonal temperatures. Fluctuations from -40^0F in January to 98^0F in August are not unusual. The mean annual temperature is 36^0F. On the average, temperatures remain on the cool side. The growing season is a short 90 days, and winter-like conditions extend well into spring, the last killing frost generally coming around the end of May. It is not uncommon to experience frost in every month of the year.

Rainfall is fairly uniform over the county, averaging 25.6 inches per year. A study by the Soil and Water Conservation District Precipitation Monitoring Network shows the heaviest rainfall located in the central and southern part of the county.

Snowfall in the county averages 61 inches per year and has been recorded during every month except July. Snow depth has a direct effect on depth of frost. Frost depths in years of low snowfall, particularly during the early winter, can reach as deep as 60 inches or more.

2. Topography and Geology

Koochiching County lies north of a geologic feature known as the Laurentian Divide, an ancient uplifting marked by the Mesabi Iron Range, extending approximately from Grand Rapids to Babbitt. This expanse of small, ore-laden mountains is a divide between two continental watersheds. South of the range, ground and surface water flows either toward Lake Superior or the Mississippi River headwaters. Areas north of the divide, including all rivers and streams in Koochiching County, flow north and then westward, eventually emptying into Canada's Hudson Bay.

Geologists feel that the topographical features and landscapes of Koochiching County result from thousands of years of glacial activity. They suggest that the Wisconsin Ice Age drew to a close 12,500 years ago and vast lakes were formed as ice melt was trapped between glacially formed moraines. Glacial Lake Agassiz, that spread over much of what is now Koochiching County, was formed in this manner. As the lake waters gradually seeped into the glacial till, silt and sediment stratified into a low, level plain. This plain makes up almost 80% of the county's soil, topography, and geologic features. Only in the eastern part and isolated areas

elsewhere in the county does the terrain differ from the dominant geologic features, consisting of moraines, outwash, and glacially scoured ridges.

Beneath the surface, groundwater flows through a network of aquifers. United States Geological Survey (USGS) data identifies the county's aquifers primarily as “Precambrian Undifferentiated.” In this type of aquifer, groundwater is found mainly in cracks and faults in the bedrock.

Overlying this bedrock aquifer, and created by the thousands of years of glacial activity, are drift aquifers. Surficial, or unconfined drift aquifers, are found along the Little Fork and Big Fork rivers. In this area, groundwater becomes a part of the river system, sometimes producing flowing wells. More difficult to locate surficially are the buried drift aquifers that exist throughout the county. These are confined, water-filled lenses of sand and gravel trapped within layers of glacial drift.

Because of the lack of specific aquifer location information for the majority of the county, areas of groundwater recharge and discharge are difficult to pinpoint. However, general areas can be summarized as they occur within the county's watersheds.

3. Soils and Vegetation

A detailed soil survey of Koochiching County is in progress and may be completed by 2006. **Figure 1** shows the most current general soils map of the County. Further information regarding specific soils is available from the USDA-Natural Resources Conservation Service Soil Survey Office at the courthouse in International Falls.

The glacial activities that produced the county's overall flat terrain also determined the soil types, and thus the vegetation of the county. Poorly drained silts and clays, stratified by glacial Lake Agassiz, dominate the soil types, broken up by moraines and outwash plains of sand and gravel.

In the eastern areas of the county, beyond the lakebed, other glacial activity determined the soil types. Gravel, sand, and exposed bedrock exist in areas untouched by the smoothing and sedimentation of the lake water.

Generally, infiltration and soil permeability varies according to soil type. The large areas of peat and peat-based soils allow very little water movement through these soils. Permeability increases as soil quality improves and more mineral material is found. **Table I** shows estimated permeability rates for the basic soil types in the county.

TABLE I

BASIC SOIL CLASSES AND PERMEABILITY
(Inches/hour)
Source: Natural Resources Conservation Service

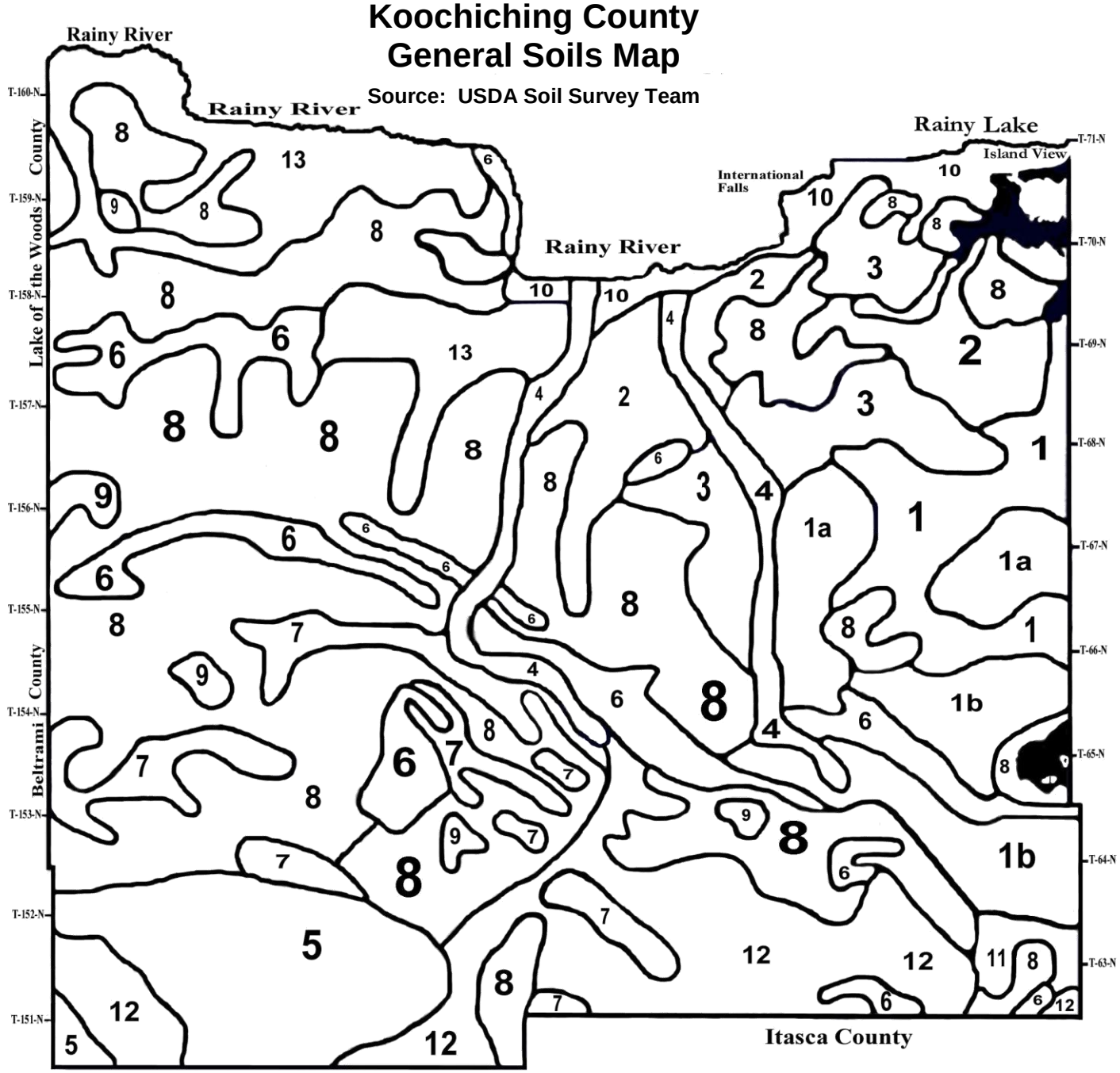
Soil Type	Acres	% of Total	Permeability
Clay	539,880	26.3	.06 – .60 Low
Loam	220,960	1.5	.60 – 6.0 Medium, Variable
Sand/Gravel	261,200	11.1	6.0 – 20.0 High
Bedrock	60,400	3.0	No Rating
Water	13,840	0.5	No Rating
Peat	972,040	47.6	No Rating

The remnants of the Glacial Lake Agassiz plain became extensive peatlands, covering nearly 1,150,000 acres. These areas produce lowland conifers and peat bogs. In the areas untouched by the lake, pine forests eventually covered the isolated sand and gravel deposits. Elsewhere, the predominant vegetation type consists of aspen, birch, black ash and balsam fir. The under-story is often hazelnut, dogwood and tag alder. **Figure 2** shows the original vegetation for Koochiching County.

FIGURE 1:

Koochiching County General Soils Map

Source: USDA Soil Survey Team



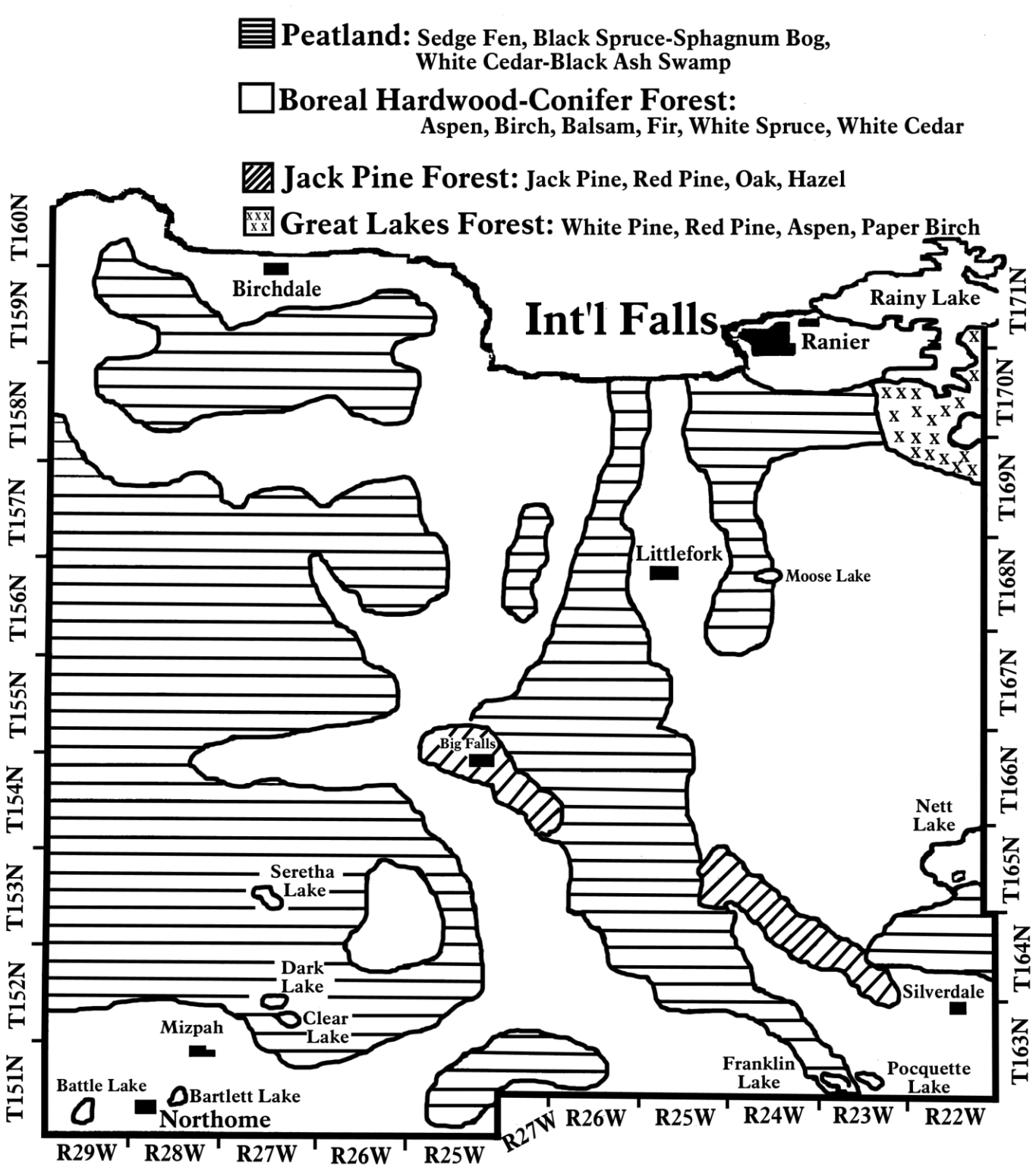
SOILS TYPES

1. Suomi-Bionditch-Quetico Association
1a. Suomi-Ashlake-Bionditch Association
1b. Unnamed loamy sand-Bionditch Association
2. Kooch-Kab Association
3. Kab-Ratroot Association
4. Fluvaquents and Histisols, frequently flooded
5. Nebish-Beltrami-Shooker Association
6. Graycalm-Meehan-Roscommon Association
7. Grygla-Enstrom Association
8. Greenwood-Mooselake-Tacoosh Assoc.
9. Lobo-Washkish Association
10. Brickton-Kooch-Quetico Association
11. Taylor-Indus Association
12. Suomi-Ashlake-Effie Association
13. Baudette-Spooner Association

FIGURE 2:

Koochiching County Original Vegetation

Source: MN DNR "Natural Vegetation of Minnesota"



4. Water

a. Watersheds and Aquifers

Figure 3 shows the approximate watershed boundaries within Koochiching County. The Rainy Lake, Little Fork, Big Fork, and Lake of the Woods watersheds flow into Rainy River, then west into Lake of the Woods. The Red Lake watershed, in the southwest corner of the county, flows west into Red Lake.

Minor watersheds in the county form an intricate network of streams and wetlands. For the most part, these areas are remote and undisturbed by any drainage activity.

The **Red Lake Watershed** is a sprawling network of lakes and streams that eventually empties into the Red River, on the Minnesota-North Dakota border. In Koochiching County, the Tamarack and Cormorant rivers and Battle Creek make up a part of the network's headwaters.

These rivers flow westward out of the county, into the reservoirs of Upper and Lower Red lakes. They mainly flow through level plains made up of a variety of organic and sandy soils with an elevation between 1100 and 1300 feet above sea level. Toward the southern county line the topography becomes characteristic of a till plain, with gently rolling hills, potholes, and small bogs. In this area the average elevation ranges from 1300 to 1500 feet above sea level.

The small area making up the Red Lake Watershed within Koochiching County is an area of groundwater recharge, flowing westward under the streams.

The **Rainy Lake Watershed** network of lakes and rivers flows northwest from the Boundary Waters Canoe Area toward Rainy River. In Koochiching County, the water bodies of Rainy Lake, Black Bay, and the east and west branches of the Rat Root River are part of the watershed.

In this corner of the county the topography, although glacially sculpted, differs from the low-level plains of Glacial Lake Agassiz. Here, scouring glaciers have exposed bedrock of hard igneous and metamorphic rock. Although slopes throughout the county average less than 2 percent, some of the county's few acres of high relief are found within this watershed. The topography varies between 1150 and 1250 feet above sea level, sloping slightly towards the north.

Groundwater in the Rainy Lake Watershed is found mainly in deep bedrock cracks, or in shallower areas where glacial drift has filled bedrock valleys. Such a valley is located south of International Falls. Most wells located in this region have a depth of 20-120 feet. Thin drift over bedrock makes up the remaining part of the watershed, an area of little groundwater development. Groundwater movement, minimal due to the presence of bedrock, is generally toward the north.

The headwaters of the **Little Fork Watershed** are found in St. Louis and Itasca counties. Topographical relief is highest in this area, averaging 1250 feet above sea level. The gradient tapers to 1000 feet at the discharge point, Rainy River. The Little Fork Watershed includes Nett Lake, Gardner and Beaver brooks, and the Little Fork, Nett Lake, and Valley rivers.

Within the watershed lies the Nett Lake Indian Reservation, surrounding Nett Lake in the southeastern corner of the county. At the point where the Nett Lake River flows out of the lake, a dam regulates the flow to facilitate wild rice production on the reservation.

The water resources of the Little Fork watershed are largely undeveloped. The region is primarily forest and wetland. The only areas of development are found from the village of Littlefork northward to the Rainy River, and in the extreme southeastern corner of the county around Silverdale, both of which are residential and agricultural areas.

Groundwater aquifers in these areas are of glacial drift, with well depths ranging from 20-150 feet in the Littlefork-Rainy River segment, and 80-180 feet in the Silverdale area. The primary groundwater recharge source is precipitation. The pattern is toward the river from the watershed boundaries. Discharge is also mainly to the Little Fork, although in areas of particularly deep glacial drift, the groundwater moves deeper into the ground and flows independently north towards the Rainy River.

Covering 2,063 square miles, the **Big Fork River Watershed** is the largest in Koochiching County. From its source in Itasca County, the Big Fork River travels roughly 75 miles to its mouth at the Rainy River.

In the headwaters of Itasca County, glacial moraines create a rolling, hilly landscape with the watershed's greatest variance in elevation. A complicated network of lakes and streams unify and flow northward.

The topography levels as the river flows into the Glacial Lake Agassiz bed and the vast wetland that covers it. Forest, peat bog, and wetland make up the landscape. Slope is negligible in this region, slowing the river's flow and creating a meandering pattern.

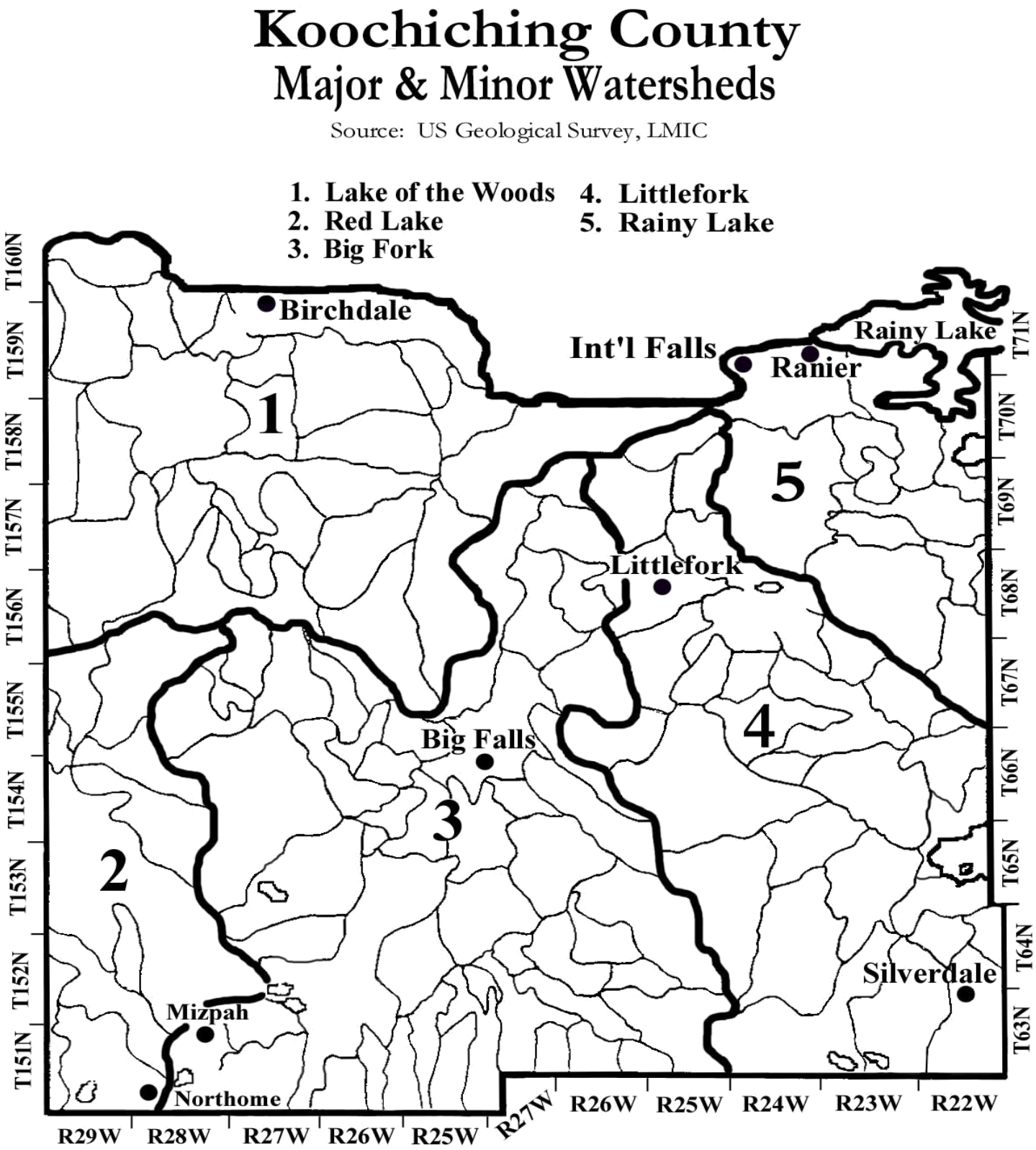
The Big Fork's groundwater system is similar to that of the Little Fork watershed, with little groundwater development except for the extreme north and south areas. In the north, well depths range from 20-100 feet in areas of mostly surficial glacial drift. In the southwestern corner of the county, the hilly moraines provide access to wells in the 20-200 foot range.

The region north of Big Falls is a natural groundwater recharge area, consisting of a glacial lake plain. This water is discharged at the river's mouth, around Rainy River. There is also a small area of recharge south of Big Falls, caused by a sudden rise in the bedrock to the surface. This "damming" effect causes an underground pooling of water. A portion of this water is discharged at the Grand Falls, in Big Falls.

Close inspections of the watershed systems in Koochiching County reveal that each individual river and its tributaries are, indirectly, a part of the **Lake of the Woods Watershed**. More directly, two of Koochiching County's rivers contribute directly to the Lake of the Woods system: the Black River and on the border of Lake of the Woods County, the Rapid River.

The topography of the watershed slopes gently northward with a very low relief. Features include vast areas of peatland and coniferous forests, with exposed bedrock on the banks of Rainy River. Groundwater recharge in this watershed occurs in the wetlands, and is discharged as the topography slopes toward the Rainy River corridor.

FIGURE 3:


Koochiching County
Major & Minor Watersheds
Source: US Geological Survey, LMIC
1. Lake of the Woods
2. Red Lake
3. Big Fork
4. Littlefork
5. Rainy Lake
Birchdale
Int'l Falls
Ranier
Rainy Lake
Littlefork
Big Falls
Mizpah
Northome
Silverdale
1
2
3
4
5
T160N
T159N
T158N
T157N
T156N
T155N
T154N
T153N
T152N
T151N
T71N
T70N
T69N
T68N
T67N
T66N
T65N
T64N
T63N
R29W
R28W
R27W
R26W
R25W
R27W
R26W
R25W
R24W
R23W
R22W

b. Protected Waters

The county's rivers make up the bulk of its surface water system. The Minnesota Department of Natural Resources (DNR) Division of Waters has designated these rivers as protected waters. This designation ensures that human activities such as dock construction, dredging, or filling will not alter the river or its flow.

Besides the protected rivers and streams, the county's water resource system includes isolated areas that have been set aside for the sole purpose of protecting the habitat and managing wildlife. The DNR Division of Wildlife, working within the Reinvest in Minnesota **(RIM)** program, has designated wildlife management areas, impoundments, and Scientific and Natural Areas in the county.

The largest dam existing within the protected waters of Koochiching County is a hydro-dam located on Rainy Lake (69-694) at the Boise Cascade Paper Mill. The other control structures are located at Nett Lake (36-1), Dark Lake (36-14), Clear Lake (36-11), and Evergreen Pond on Sturgeon River (36-50).

B. Natural Resource Use

1. Land Ownership and Land Use

Land use activity in the county is dictated by vegetation type, soils climate, and land ownership. **Figure 4** shows land use for Koochiching County. **Table II** shows estimates of land ownership in Koochiching County. The State of Minnesota is by far the largest landowner, with over 1 million acres. Other government landowners include, on the federal level, the National Park Service, Bureau of Land Management, and Bureau of Indian Affairs. On the local level, the county itself owns a large portion of the land. In contrast, private ownership makes up only a small part of the county. These owners include both forest industry and private landowners.

FIGURE 4:

Koochiching County Land Use

Source: LMIC

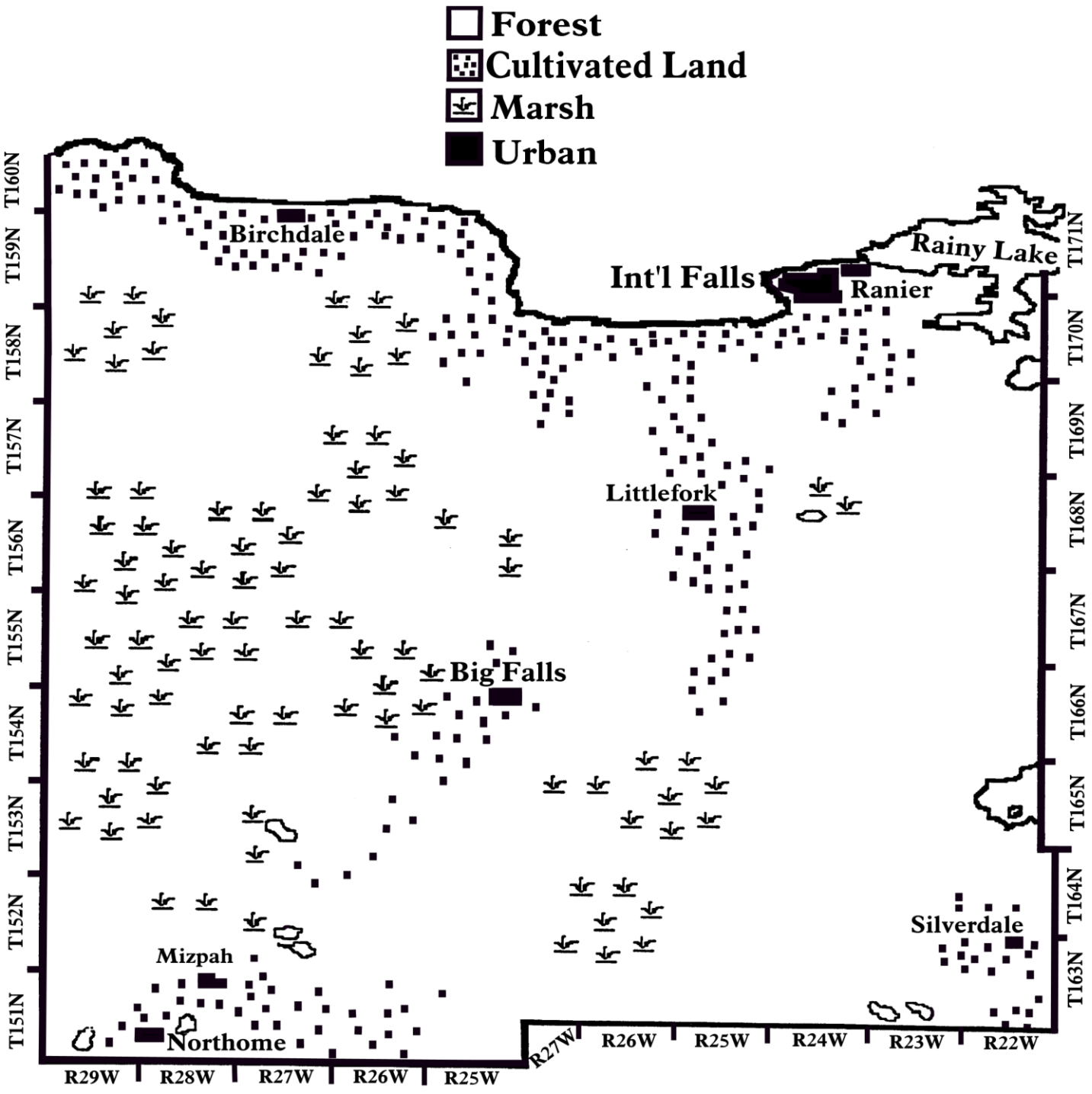


TABLE II

LAND OWNERSHIP IN KOOCHICHING COUNTY
Source: Koochiching County Assessor's Office

Owner	Acres	% of Public Land
National Forest	248	0.02
National Park Service	11,135	0.75
Bureau of Land Mgt.	36,082	2.42
Indian Lands	50,418	3.38
State of Minnesota	1,092,365	73.27
Koochiching County	283,685	19.03
City and R.O.W.	16,985	1.13
Total Public Land	**1,490,918**	**73.21 % of County**
Total Private Land	**502,116**	**24.66 % of County**
Land and Water	**2,036,394**	
Total Land Area	**1,993,034**	**97.87 % of County**
Total Water Area	**43,360**	**2.13 % of County**

Forestry dominates land use in Koochiching County. Because of the boggy soils on which much of the timber resource grows, timber harvest is a seasonal and strategically planned activity. The major part of the year's logging activity occurs during winter when the ground is frozen hard enough to support heavy equipment. With the onset of spring, timber harvest activity is curtailed as snow melt and rains turn the clay and silt soils into quagmires. Until late summer, many areas are inaccessible. Meanwhile, harvesting activities continue on better-drained sites.

The moraines and outwash plains, generally occurring near the major rivers, are well suited to pasture, small grains, and hay production.

2. Urban Areas

The county's 1990 population, according the Bureau of Census, totaled 16,299. Of this, 62% (10,086) lived in the municipalities. **Table III** shows the urban distribution among the county's largest municipalities.

TABLE III

POPULATION OF KOOCHICHING COUNTY CITIES
Source: U.S. Bureau of Census, 1990

City	Population
International Falls	8325
Littlefork	838
Big Falls	341
Northome	283
Ranier	199
Mizpah	100

The remainder of county residents are scattered among rural locations and smaller, unincorporated communities such as Birchdale, Gemmel, Ericsburg, Indus, Island View, Margie and Silverdale.

Most residents of the county's four largest municipalities have access to public water supplies and sanitary systems. **Table IV** shows the location and source of public water intakes**.** These systems vary in sophistication according to population and affordability. **Table V** shows the name and source of non-community systems in Koochiching County.

International Falls: Water is pumped from Rainy Lake. In 1991, city installed an independent intake treatment plant on Rainy Lake. The waste treatment plant is located in the western part of International Falls, on Rainy River.

Littlefork: Of the 838 residents, approximately 92% of residents are served by public water, sanitary and storm sewer. Public water is pumped from deep wells. The area of service is within city limits east of the Little Fork River. The sanitary system consists of lagoon treatment, with the effluent flowing into Beaver Brook, then into the Little Fork River. The remaining 8 to 9% of residents use well and septic systems. The City is not planning for expansion in the foreseeable future, due to cost and a stable population.

Big Falls: Public water is pumped from deep wells and the system is limited to the city limits. Residents within city limits are also served by a sanitary sewer system, consisting of lagoon treatment with the effluent discharged into the Big Fork River. No plans exist to extend service in the foreseeable future.

Northome: Public water is pumped from deep wells. The system is limited to the city limits. Residents within city limits are also served by a sanitary sewer system, consisting of lagoon treatment with effluent discharged into Caldwell Brook. No plans exist to extend service in the foreseeable future.

TABLE IV

LOCATION OF PUBLIC WATER INTAKES IN KOOCHICHING COUNTY
Source: Minnesota DNR

Community	Water Source	Township	Range	Section
Int'l Falls	Rainy Lake	71	24	35
Littlefork	Deep Wells	68	25	9
Northome	Deep Wells	151	28	30,21
Big Falls	Deep Wells	154	25	2

TABLE V
SURFACE WATER
NON-COMMUNITY SYSTEMS IN KOOCHICHING COUNTY
Source: Minnesota Department of Health

PWID	Name	Source
5360100	Camp Koochiching	Rainy Lake
5360035	Camp Idlewood	Rainy Lake
5360114	Island View Lodge	Rainy Lake
5360008	Rainy Lake Lodge	Rainy Lake
5360012	Sha Sha Resort	Rainy Lake
5360052	Thunderbird Lodge	Rainy Lake

3. Recreational Activities

The Minnesota Statewide Comprehensive Outdoor Recreation Plan **(SCORP)** predicts major increases in recreational activity within the county in the next few years. This activity is concentrated on and around Rainy Lake, and consists mainly of water-based activities and snowmobiling. SCORP also predicts the majority of use will come from non-county residents. This projected increase in use, both directly and indirectly through increased support services (resorts, motels, guides, all located near water), has required more stringent regulations regarding sewage systems, water supply, and other waste problems.

C. Other Natural Resource Plans

Due to previous federal and state resource management initiatives state and locally elected officials have become increasingly concerned about future control of natural resources within Minnesota. About half of Koochiching County's land base is state-owned and is subject to state resource management plans.

In 1971, Voyageurs National Park was created and, in 1987, was headquartered in International Falls. Most of Voyageurs is in St Louis County but many Koochiching County residents owned or leased land within the new park's boundaries. Procedures used to acquire

this land by some of the first park superintendents and real estate specialists gained a reputation for being unfair, heavy-handed and ruthless. So, in 1988 there was concern about National Park Service initiatives to designate 37 rivers in northern Minnesota as "Wild and Scenic". The Big Fork, Little Fork and Rainy Rivers in Koochiching County were on that list.

These events and others eventually provided the impetus for representatives of northern Minnesota's people to create the Northern Resources Alliance of Minnesota (NRAM) which, in turn, hired a contractor to evaluate northern rivers and suggest alternatives to the federal "Wild and Scenic" designation. The result of all this was a local river planning initiative referred to as "25 by 96".

The "25 by 96" initiative was to create Local River Boards to write 25 river management plans, (located in 24 counties), by 1996. These river plans were designed to prove to federal agencies and environmental lobbyists that state and local government are capable of managing and conserving natural resources within their borders without more federal initiatives to remove more land from the tax rolls.

Today, County Commissioners and other locally elected officials in Koochiching County continue to make a concerted effort to demonstrate the statement found in each of the county's river plans; ". . .local management is highly preferable to state or federal control and...decision-making is most effective when done by local people." The "**Big Fork River Local Management Plan (1992)," "A Local Management Plan for the Rainy and Rapid Rivers (1993)," and "A Local Management Plan for the Rat Root and Little Fork Rivers (1994)"** are all resource-specific plans which have been created by local river boards and adopted by Koochiching County Commissioners.

The statement regarding local management is not meant to be parochial. This CWMP recognizes the legitimate hierarchy of roles and functions played by federal, state, and local levels. It merely emphasizes that local management is closest to the resources and, therefore, more responsive to the nuances of the needs of the river resources. So, in developing the river management plans, "ex-officio" members were summoned from virtually every natural resource-oriented federal, state and local agency to provide guidance and technical support during the planning process. The goals and objectives of these local river plans are mutually inclusive in this Comprehensive Water Management Plan.

IV. Surface Water

(Surface water refers to all waters that are not considered ground water.
Lakes, streams and wetlands are all considered surface waters.)

A. Quantity

1. Stream Volumes and Velocity.

The United States Geological Survey (USGS) provides maps and information on the flows of the major watersheds and rivers in the county. In general, the flows of all these watersheds are highest in spring, during the April-May period and at their lowest in February. The following is a summary of the USGS data:

Rainy Lake Watershed - The Rainy Lake network of lakes and rivers flows northwest from the Boundary Waters Canoe Area towards Rainy River. Recharge originates from the surface lakes in this area. Ground water as a source of recharge is negligible, as the high concentration of bedrock stores water only in fractures and fissures. The quality of surface water is being monitored.

Area of Watershed:	14,900 sq. miles
High flow:	47,900 cubic ft. per sec.
Low flow:	40 cubic ft. per sec.
Average flow:	23,970 cubic ft. per sec.

Lake of the Woods Watershed - Ground water in this watershed is recharged in the southern reaches and discharged at or near Rainy River. The ground water quality is best in the south, becoming mineralized as it moves towards the north through peat lands, bogs, wetlands, and lowland forests. Flow is regulated by dams at Namakan and Rainy Lakes. In general, water quality is poor at International Falls, and improves as it flows westward.

Area of watershed:	29,000 sq. miles
Highest flow:	60,000 cubic ft. per sec.
Lowest flow:	5,800 cubic ft. per sec.
Average flow:	12,730 cubic ft. per sec.

Little Fork River Watershed - Flow in this watershed is generally in a northerly direction, from the area of lakes in the north-central region of the state. It is this area that supplies the watershed with its recharge. These lakes also sustain the higher flows during the year. As the river flows northward, tributaries and groundwater flow towards the Little Fork, carrying residues from peat and bog lands, staining the color of the water. Some parts of the watershed cover areas of glacial drift 0-200 ft, consisting of buried sand and gravel. These are the best areas to find ground water, where wells are most easily dug. The stream gradient decreases from falls and rapids in the headwaters of the southern regions to meanders in the north.

Area of watershed:	1,730 sq. miles
Highest flow:	2,000 cubic ft. per sec
Lowest flow:	7 cubic ft. per sec
Average flow:	125 cubic ft. per sec

Big Fork River Watershed - Streams with the highest unit of base flow are in the southern third of the watershed (Itasca County). In dry times, stream flow is sustained by groundwater discharge and release from lakes. It is a large drainage area and the lakes and wetlands have a regulating effect on the flow, sustaining it towards high levels. Stream gradient is lowest at the headwaters, where the watershed originates through a chain of lakes. It proceeds steeply, cutting through bedrock as it flows north.

Area of watershed:	2063 sq. miles
Highest flow:	14,800 cubic ft. per sec
Lowest flow:	35 cubic ft. per sec
Average flow:	694 cubic ft. per sec

2. Lakes: High Water Marks.

The level of Rainy Lake fluctuates due to dams situated in Namakan Lake and Rainy Lake. State water law designates the ordinary high water level to provide a uniform guide when planning any activity that may affect the protected water of the lake. The ordinary high water level on reservoirs, such as Rainy Lake, is the elevation of the summer pool.

Ordinary High Water Mark, Rainy Lake: 1108.1 ft.

3. Water Use Conflicts

There are no known water use conflicts in the county. The main user of surface water is the Boise Cascade paper mill in International Falls. Data from 1990 shows Boise Cascade reported pumping 16,038,800,000 gallons of water from Rainy River for the paper making process. Wild rice growers pumped a total of 107,500,000 gallons for irrigation in 1990. Surface water use is concentrated in the International Falls area.

TABLE VI

PERMITTED WITHDRAWALS FROM LAKES AND STREAMS IN KOOCHICHING COUNTY
Source: MN DNR Division of Waters (1990 Data)
(MILLIONS OF GALLONS PER YEAR)

Permit Holder	Location (T/R/Sec.)	Source	Use	Permitted Amount
Falls Country Club	70/24/05	Rainy River	Golf Course	6
Ronald Peterson	71/23/30	Pit	Construction	6
Boise Cascade	71/24/27	Rainy River	Paper/Pulp	17,500
Jerry Geerdes	154/29/21	Lost Lake	Wild Rice Irrigation	71
Jerry Geerdes	154/29/22	Lost Lake	Wild Rice Irrigation	
Jerry Geerdes	154/29/22	Lost Lake	Wild Rice Irrigation	16
Michael Nistler	154/29/30	Little Tamarac R.	Wild Rice Irrigation	159
Sulkra Inc.	155/29/32	J.D. #5	Wild Rice Irrigation	107
City of Intl Falls	70/24/35	Rainy River	Public Water Supply	400

B. Quality

1. Lake and Stream Classification

The following is an explanation of how streams and lakes are classified:

- Rainy River: Outlet of Rainy Lake to Dam in Int'l. Falls
  1B, 2B, 3A
- Rainy River: Dam in Int'l. Falls to Railroad Bridge in Baudette
  1C, 2B, 3A
- Moonlight Rock Creek: One mile south of Ranier
  2B, 3B-4AB, 5, 6
- Little Fork River: Bridge west of Pelland
  2B, 3B-4AB, 5, 6
- Big Fork River: Bridge 4 miles East of Loman
  2B, 3B-4AB, 5, 6
- All streams in Voyageurs National Park: 2B, 3B
- Rainy Lake: 1B, 2B, 3A
- All surface waters of the state that are not listed are classified as 2B, 3B, 4B, 5, and 6 class waters.

Explanation of Codes:

1B - With approved disinfection (simple chlorination) treated water will meet Public Health Drinking Water Standards. Ordinarily restricted to surface and underground waters with a moderately high degree of natural protection.

1C - With treatment consisting of coagulation sedimentation, filtration, storage, and chlorination, water will meet Public Health Drinking Water Standards. Ordinarily restricted to waters not adequately protected against surface or other pollutants.

2B - Quality of water will permit propagation and maintenance of cool or warm water fishes, and is suitable for recreation of all kinds. Not protected as drinking water.

3A - Waters such as to permit use without chemical treatment for most industrial purposes, except food processing. Generally comparable to 1B for domestic consumption.

3B - Quality of water is such as to permit use for general industrial purposes, except food processing, with a moderate degree of treatment.

4A - Quality of water shall permit use for irrigation.

4B - Quality of water shall permit use by livestock and wildlife without injurious effects.

5 - Suitable for aesthetic enjoyment and navigation.

6 - Uses to be protected may be under other jurisdictions, and may include any or all of the uses listed above.

2. Monitoring Data

Water quality data is available from the MPCA from STORET. The STORET System is operated and maintained by the U.S. Environmental Protection Agency for the storage and retrieval of water quality data. Data collected by the MPCA and other state and federal agencies is stored in this system. In addition, some data on border waters collected by Canadian agencies is stored in this system. There are 57 lake and stream stations in Koochiching County with data in STORET. Most of these stations have short-term data but some stations such as the Rainy River at International Falls and Ranier, and the Big Fork & Little Fork rivers have 10-30 years of data. The USGS has some long-term water quality sites on the Rainy River. The Ontario Ministry of Environment has collected water quality data, which is also in STORET, at four sites along the Rainy River for many years up until 1992 when the program discontinued.

There is one River Watch Program that has been active on the Big Fork River for six years. Additional River Watch Programs are planned for the Rainy River, which will commence in spring of 2000, and the Little Fork River. Another type of monitoring is the Citizen Stream Monitoring Program (CSMP) which is being conducted on the Rainy River. In spring of 2000, Rainy River First Nations plans to do CSMP reporting on the Little Fork, Big Fork, and Rapid Rivers as well as several rivers on the Ontario side.

SUMMARY OF LAKE AND STREAM WATER QUALITY MONITORING DATA

Water quality monitoring data originates from the following locations:

Rainy River, 2.9 miles east of Int'l. Falls Dam
Rainy River at the International Bridge at International Falls
Rainy River at railroad lift-bridge at Ranier
Moonlight Creek, 2.3 miles south of Ranier - data insufficient
Little Fork River, Bridge west of Pelland
Big Fork River, Bridge east of Loman
Bear River, 4 miles east of Lindford

Two lakes in Koochiching County have monitoring data:

DNR ID# 36-0001 Nett Lake
DNR ID#36-0018 Bartlett Lake

The citizen Lake-Monitoring Program (CLMP) is a simple, inexpensive program that provides a valuable source of lake data. Citizen volunteers take Secchi disk measurements throughout the summer and send the data to the MPCA for storage in STORET. Because of this program, a larger number of lakes throughout the state have more frequent and longer-term data. Bartlett Lake is the only lake in Koochiching County with CLMP data dating back to the 1970's.

The MPCA issues a biennial report that provides a summary of Minnesota's progress in meeting the goals of the Clean Water Act. The current version is called "Minnesota Water Quality Years 1992-1993: The 1994 Report to the Congress of the Unites States", otherwise known as the "1994 305(b) report" (305 (b) refers to the section of the Clean Water Act that mandates this report). This report contains assessments of the quality of state waters.

Locally, the Littlefork High School maintains a monitoring program of the Big Fork River. The Indus High School is developing a similar program to monitor parameters of Rainy River. SWCD continues to encourage and support these types of programs.

Although a lot of good water quality monitoring is being done, there is a lack of material describing the results of these efforts. Steps need to be undertaken systematically to reveal trends in water quality and follow up actions to identify sources of contaminants, or the potential for partnerships to pursue more vigorous sampling in areas of concern.

3. Fish Consumption Advisory

According to the MPCA Water Quality Report, there were no documented fish kills in Koochiching County lakes or streams between the years of the study, 1985-1987.

The 1999 Minnesota Fish Consumption Advisory issued by the Department of Health provides a summary of suggested guidelines of how often fish can be safely eaten based on the suspected effect of contaminants in people. Fish from 687 lakes and 77 locations on 46 rivers have been tested for contaminants. Concern for levels of Mercury and PCB's in Koochiching waters is reflected in the Advisory. **Table VII** is a summary for those waters and fish tested within Koochiching County with regard to Mercury and PCB's.

TABLE VII
FISH CONSUMPTION ADVISORY FOR KOOCHICHING COUNTY WATERS

LOCATION	SPECIES	FISH SIZE (inches) 5-15	15-20	20-25	25-30	30+
Big Fork River	Northern Pike				c	
	Walleye	b	c	c	c	
	White Sucker		b			
Rainy River	Northern Pike	b	b	b	b	
	Red Horse Sucker		a			
	Sauger	b	b			
	Small Mouth Bass	b	b			
	Walleye	b	b	c	c	
	White Sucker		b			
	Lake Sturgeon					e
	Yellow Perch	b				
Rainy Lake	Black Crappie	b				
	Northern Pike		b	b	b	c
	Sauger	c	c			
	Small Mouth Bass	b				
	Walleye	b	b	c	c	
	White Sucker		b			
	Yellow Perch	b				
Clear Lake	Bluegill Sunfish	a				
	Northern Pike	a	a	b	b	
Dark Lake	Bluegill Sunfish	a				
	Northern Pike	a	b	b	b	
	Walleye	b	b			

KEY FOR ADVISORY:

Mercury	a	b	c	d
Vacation	unlimited	unlimited	1meal/wk	1 meal
Season	unlimited	2 meals/wk	2 meals/mo	1 meal/mo
Annual	unlimited	1 meal/wk	1 meal/mo	do not eat

PCB's	e
All people	1 meal/mo

C. Problems and Assessments

With the presence of people come land uses with the potential to damage the natural environment. The higher the population density the more impact on the environment. Koochiching County is fortunate to have escaped many of the problems experienced by other areas of Minnesota. The county's small population limits possible pollution from such sources as sewage and solid waste systems. The land types and distance from markets discourages such potentially pollution-causing enterprises as intensive large-scale farming and industrial development.

These same features also create challenges. The population is small but scattered, making it difficult to keep abreast of problems and to reach residents with preventative or corrective programs. The remote, forested character of the county is a recreational draw, creating income for the county, yet potentially putting pressure on fragile land and water resources. The vast timber resource supplies a paper industry that, while it is the main source of the county's economy, also is its main source of pollution. These circumstances combine to make planning a challenge.

1. Pollution Sources

a. Erosion, Sedimentation and Runoff

Concentrated flow in river channels and their tributaries is the primary cause of erosion and sedimentation. Sedimentation in channels, flood plains and at the confluence of major rivers is largely a natural and dynamic process of river hydraulics and precipitation events. Out-of-bank flow almost never occurs on the Rainy River and rarely occurs on the other major rivers in Koochiching County. Although out-of-bank flow is rare, bank erosion, especially along the Rainy River, still occurs on outside bends as the rivers meander in their effort to find equilibrium. Where roads occur along rivers this meandering sometimes causes "slide areas" that create road maintenance problems. These road maintenance problems occur in the Silverdale area in particular, with other trouble spots located along the Little Fork and Big Fork Rivers.

There are three general agricultural regions in Koochiching County: northwest, central, and southwest. These regions are made up of land that was cleared for agricultural purposes many years ago. Much of this agricultural land (especially in the central region) has been abandoned and is being overtaken by shrubs and trees. There is potential for soil erosion and water quality degradation in these regions but actual erosion and sedimentation is insignificant on a large scale.

Most agricultural land is used either for forage production or grain production. The most common agricultural land use is forage production. Hayland is most generally a part of long crop rotations that include a year or two of grain crops and several years of cool season grasses and legumes (hay). This type of management helps protect soil and water resources. Soil erosion and sedimentation on such land is minimal although concentrated flow does create infrequent gullies. Much of the land that is used extensively for grain production (oats, wheat, barley, and corn) is generally flat and erodible more by wind than water.

The greater potential for soil erosion and sedimentation exists in the southwestern region of the county where topography is steeper. Once again, the crop rotations include several years of grass/legume hayland that helps protect soil and water resources.

Lakeshore development is also a potential source of erosion and sedimentation. The DNR's "Statewide standards for Management of Shoreland Areas help keep that potential in check by mandated construction setback distances. The standards also require permit reviews by the Soil and Water Conservation District prior to shoreland alterations.

Local, state and federal government agencies in the Arrowhead counties of Carlton, Cook, Itasca, Koochiching, Lake and St. Louis have developed fact sheets to explain best management practices to use on shoreland. A series of sixteen of these fact sheets have been distributed to the public in a folder entitled "Shoreland Best Management Practices".

Relatively, soil erosion and sedimentation seem to have a minimal effect on overall water quality or quantity in Koochiching County. The turbid brown color of floodwaters at the mouths of the Big Fork and Littlefork Rivers seem more a result of river hydraulics and bank scouring than run-off from agricultural fields or shoreland degradation. Localized erosion, however, does occur and has lead to a high demand for SWCD assistance in addressing erosion problems.

Point and Non-Point Considerations

Non-point pollution from agricultural fields due to run-off has not been identified as a serious water quality problem although it is occurring to some degree in all of the major watersheds in Koochiching County and bears monitoring. Non-point pollution from chemicals used in forestry and other agricultural-related activity has not been identified as a serious water quality problem although it also bears monitoring. Voluntary Site Level Forest Management Guidelines are promoted and used by the county's largest forest managers: DNR, Koochiching County and Boise Cascade. Agricultural chemicals associated with grain farming are applied by commercial, licensed applicators.

Point pollution due to run-off from feedlots and manure storage facilities is an environmental concern wherever it occurs. There are very few feedlots in Koochiching County and most of them are located more than a half mile from navigable waterways and on relatively flat topography. For the most part their environmental effect is more a threat to perched water tables (ground water) than surface water quality.

Several parameters of the county generally discourage erosion by water and subsequent sedimentation. Heavy clay soils, geography, topography and a relatively small population all serve to minimize degradation of the water resource.

Even though erosion and sedimentation do not occur at the intensity of the more southern, agricultural counties in Minnesota, there is a considerable demand for cost share dollars by landowners along waterways and lakeshores to treat natural shoreland erosion. There is also demand for cost share dollars to help treat slide areas which result from a combination of steep slope, low plasticity limits in subsoil slip joints and hydraulic action of the river undercutting banks. Some of these slide areas threaten county roads and are a maintenance problem. More cost share money is needed to meet the demand for these problems.

i. Storm Water

1991 legislation mandated local governments to require water retention devices for storm water runoff for all developments in Minnesota that create more than one continuous acre of impervious surface water. An impervious surface means a constructed hard surface that either prevents or retards the entry of water into the soil and causes water to run off the surface in greater quantities and at an increased rate of flow than prior to development. Examples include rooftops, sidewalks, patios, storage areas, and roads, streets, driveways and parking lots constructed of concrete, asphalt or compacted soils. Plans to manage storm water runoff must include technology and methods to: minimize off-site runoff, maximize overland flow over vegetated surfaces, replicate pre-developed hydrologic conditions, minimize off-site discharge of pollutants to ground or surface water and encourage natural filtration.

Koochiching County has several developments that create impervious surfaces measuring an acre or more in size. These include the International Mall, the Big Kmart Store, the Duluth Clinic, the MNDOT Truck Stations at International Falls & Little Fork, the Boise Cascade complex, International Falls Airport, Voyageurs National Park Headquarters and Rainy River Community College. All developments have their own storm water run off systems running into nearby wetlands or existing drainage systems.

Since January 1994, any activity that results in the disturbance of five or more acres requires an application for a "Storm Water Discharge Permit" from MPCA. The permit requires that an erosion and sediment control plan be developed for the project.

b. Irrigation

A total of 975 acres in Koochiching County are irrigated**. Table VIII** shows that, besides the International Falls golf course, rice production is the only irrigated activity. With the exception of the golf course, all the areas are within the Red Lake watershed.

TABLE VIII

PERMITTED IRRIGATED ACREAGE IN KOOCHICHING COUNTY
Source: MN DNR Division of Waters

PERMIT HOLDER	LOCATION (T/R/SEC.)	ACRES	SOURCE
Falls Country Club	70/24/05	90	Rainy River
Andrew Nistler	151/29/30	50	Cormorant R.
Jerry Geerdes	154/29/21	142	Lost Lake
Jerry Geerdes	154/29/22	32	Lost Lake
Michael Nistler	154/29/30	236	Little Tamarack R.
Sulkra Inc.	155/29/32	480	J.D. #5

c. Public Drainage Systems

Koochiching County has about 487 miles of public drainage ditches constructed prior to and through the 1930's in an effort to drain the vast wetlands for farming. Today, these ditches provide waterfowl habitat and act as seasonal flood control on county and state forest roads, increasing the surface water quantity in the county. There is no widespread maintenance done to these "judicial ditches" unless flooding due to beaver dams threatens nearby roads. Typically, the efforts to create farmland from Koochiching County's wetlands in the 1920's and 30's have merely enhanced wildlife habitat. Water quality is not available on these ditches because monitoring or testing has not been done.

d. Dumps and Landfills

Evidence of the county's widely scattered population was obvious when investigating the former landfills and dumps. Many of these dumpsites were established informally in the early 1900's as the county was opened to homesteading. There were no dumping restrictions or concern for careful placement, and materials often included household and agricultural substances banned from disposal today. As local governments and state laws were established most of these dumps were abandoned.

There is no record of contamination being traced to these former dumps. **Table VIV** shows a summary of dump/landfill sites and their status.

TABLE VIV

DUMPS AND LANDFILLS IN KOOCHICHING COUNTY

Name	Location (T/R/Sec.)	Comments/Status
Big Falls Dump	155/25/26	Closed/Canister
Birchdale	159/27/9	Closed/Canister
Boise Moonlight Rock	71/24/36	Closed/Monitored
Paint Waste Dump	71/23/29	Closed
Ericsburg Dump	69/23/29	Closed
Gemmell Dump	152/27/36	Closed
Koochiching Co. Landfill	70/24/9	Closed/Monitored
Littlefork Dump	68/25/20	Closed/Canister
Loman Dump	69/26/8	Closed/Canister
Margie Dump	154/25/31	Closed
Mizpah Dump	151/28/16	Closed/Canister
Northome Dump	151/28/31	Closed/Monitored
Sanitary Landfill	151/28/31	Closed
Page & Hill Wood Prod.	155/25/36	Closed
Pelland Dump	69/25/4	Closed
Rauch Dump	63/22/7	Closed
Silverdale Dump	64/22/35	Closed/Canister
South Int'l. Falls	70/23/5	Closed
Wildwood Dump	151/26/34	Closed

The majority of these dumps were located in wet regions of the county. It is possible that contaminants have been filtered and cleansed through these wetland systems. Currently, only the former landfill sites at Northome and International Falls are being monitored. Annual reports on the status of county landfills are available in the Environmental Services Office. There are no active public landfills or dumps in Koochiching County. All domestic waste products in Koochiching County are brought to a transfer/recycling station near International Falls and then transported to a central disposal location in Kittson County.

e. Industrial Waste Sites.

In 1991, the Minnesota Pollution Control Agency notified Koochiching County that its solid waste landfill was out of compliance with state safety regulations. The landfill was properly closed in 1994 and continues to be monitored. The closure of this landfill (which was also used for industrial waste from Boise Cascade Paper Company) brought major environmental changes to the community. Among those changes were the concept of recycling and the search for an alternate location for industrial waste from Boise Cascade that would help support the standard of living in Koochiching County.

Boise Cascade Corporation has since built a secondary clarifier to filter out wastewater discharge and has reduced solid waste by incinerating sludge. The net effect of these actions by Boise Cascade has been positive. In cooperation with the Koochiching Soil and Water Conservation District and the Minnesota Extension Service, Boise Cascade is allowing farmers to use the ash from incinerated sludge to help adjust the pH and increase levels of potassium and phosphorus to their soils.

Boise Cascade Corporation once had two active waste facilities, the Moonlight Rock landfill and the paint waste dump. Both were targeted by the MPCA as serious point and non-point sources for potential surface and groundwater pollution. Both of these facilities were located in densely populated areas within a mile of Rainy Lake. The Moonlight Rock landfill was located adjacent to a creek that flows through a residential area into Rainy Lake. Both of these landfills have been closed and continue to be monitored by MPCA and Boise Cascade.

A new industrial waste site has been established west of Ray, MN under the direction and approval of MPCA. “Remote Site #17” is a safer means of dealing with the volume of industrial waste created by the paper industry in International Falls. It is located in a remote area and is monitored by MPCA.

f. Feedlots

Agricultural activity in Koochiching County likely does not contribute significantly to water quality degradation. There was a time when small dairy farms and beef cattle were prevalent in Koochiching County. Today, however, there are just three dairy farms and several other cattle confinement operations that could be classified as feedlots by MPCA. These enterprises are located away from navigable waterways and use stock ponds as their water sources.

Manure accumulation can be a source of degradation to ground water quality if the soils are permeable enough and the water table is high enough. In recent years the Natural Resources Conservation Service has assisted dairy farmers with nutrient management plans and other technical services to ensure sustained use of natural resources. Terraces that divert liquid manure to a lagoon or “waste management system” usually handle runoff from these operations. It is then pumped into a tank and spread on cropland as a fertilizer supplement.

g. Industrial Runoff / Discharge

In the past, Boise Cascade Paper Company has been a major source of Point pollution and surface water degradation in Koochiching County. The company has made great strides in cleaning up its discharges in the last decade and continues to be monitored by the Minnesota Pollution Control Agency (MPCA) and federal agencies. A summary report of ambient water quality data was compiled for a period from January 1, 1992 through December 31, 1992. This report shows significant improvements in Rainy River water quality achieved over the past 25 years. Current efforts to eliminate the incidental production of chlorinated organic compounds in the paper mills are yielding additional benefits, including dramatic reduction of an effluent toxicity problem at the Fort Frances Mill. Above average rainfall produced strong stream flows

in the Rainy River and it's tributaries in 1992. These stream flows, combined with continuing reductions in waste load from the major industrial sources, have resulted in good water quality as measured by conventional parameters. Trace organic chemical monitoring demonstrated that total PCPs frequently exceeded detection levels. In 1992 they were detected 58% of the time at the two upstream sampling sites above and below Fort Frances, ON and International Falls, MN and 42% of the time downstream near Lake of the Woods. Atmospheric deposition is the suspected primary source, at least at the upstream station where there are no known point sources. Other trace organic compounds remained undetected, or present in trace amounts.

h. Septic Systems

Along with private industry, point source pollution due to obsolete or ineffective individual sewage treatment systems is, perhaps, the greatest potential source of water quality degradation in Koochiching County. The county's soils, geography, and low population have limited soil erosion and sedimentation. But the major human settlements and activity have taken place along shoreland. Sewage treatment systems are lacking or have been placed in poorly drained soils that cannot adequately filter and purify effluent. Each private system is a potential source of point pollution.

Because of its high-density development and shallow soils, the area near Rainy Lake is the most critical. It is estimated that about 90% of existing individual sewage treatment systems (ISTS) are malfunctioning. To address this problem, the Rainy Onsite Sewage Systems (ROSS) study was initiated in 1996. Various solutions to the ISTS problem have been identified and will be tested. Provision of centralized sewer to Jackfish Bay, the creation of a water quality cooperative, and the testing of alternative technologies may all play a role in addressing this problem on Rainy Lake.

i. Hazardous Waste Generators

Hazardous waste is generated by sources ranging from hospitals and landfills to service stations. A current list of hazardous waste generators is available through the MPCA. Since these entities are listed and monitored by the MPCA, it is unlikely that they pose a significant threat to water quality in Koochiching County. Most hazardous waste generators are aware of environmental laws and penalties for non-compliance.

j. Wastewater Discharge

Other than Boise Cascade, municipalities release the majority of wastewater releases into the county's surface waters, disposing of treated water used for city sewage systems. The MPCA monitoring stations located downstream from these facilities record chlorine levels, fecal counts, and other information on a regular basis. Data furnished by the agency shows that the municipalities have a good record for maintaining the quality of rivers on which they are located. Improvements at the North Koochiching wastewater treatment facility eliminated bacterial violations in that effluent.

Boise Cascade Corporation of the United States and Canada conducts industrial wastewater releases on a regular basis, as part of their papermaking process. This water contains chemical and organic residues that become part of the Rainy River/Lake of the Woods watershed. Pollution in this river affects not only Koochiching County, but Lake of the Woods County and Canada. The effluent discharged by Boise Cascade-USA is monitored on a monthly basis, or even more frequently for some parameters, by Boise Cascade and submitted to MPCA. **Table X** shows wastewater discharges under NPDES/SDS permit in Koochiching County.

TABLE X

PERMITTED WASTEWATER DISCHARGES IN KOOCHICHING COUNTY
Source: MPCA
(1993 Data)

Discharger	Affected Water
City of Big Falls	Big Fork River
Boise Cascade Corporation	Rainy River
ISD #363 - Indus School	Rainy River
City of Littlefork	Beaver Brook
City of Northome	Caldwell Brook
North Kooch. Sanitary Sewer Board	Rainy River
George St. Peter, Inc.	Unnamed State Ditch
Roberts Sand & Gravel	Unknown
Voyageurs National Park	Land

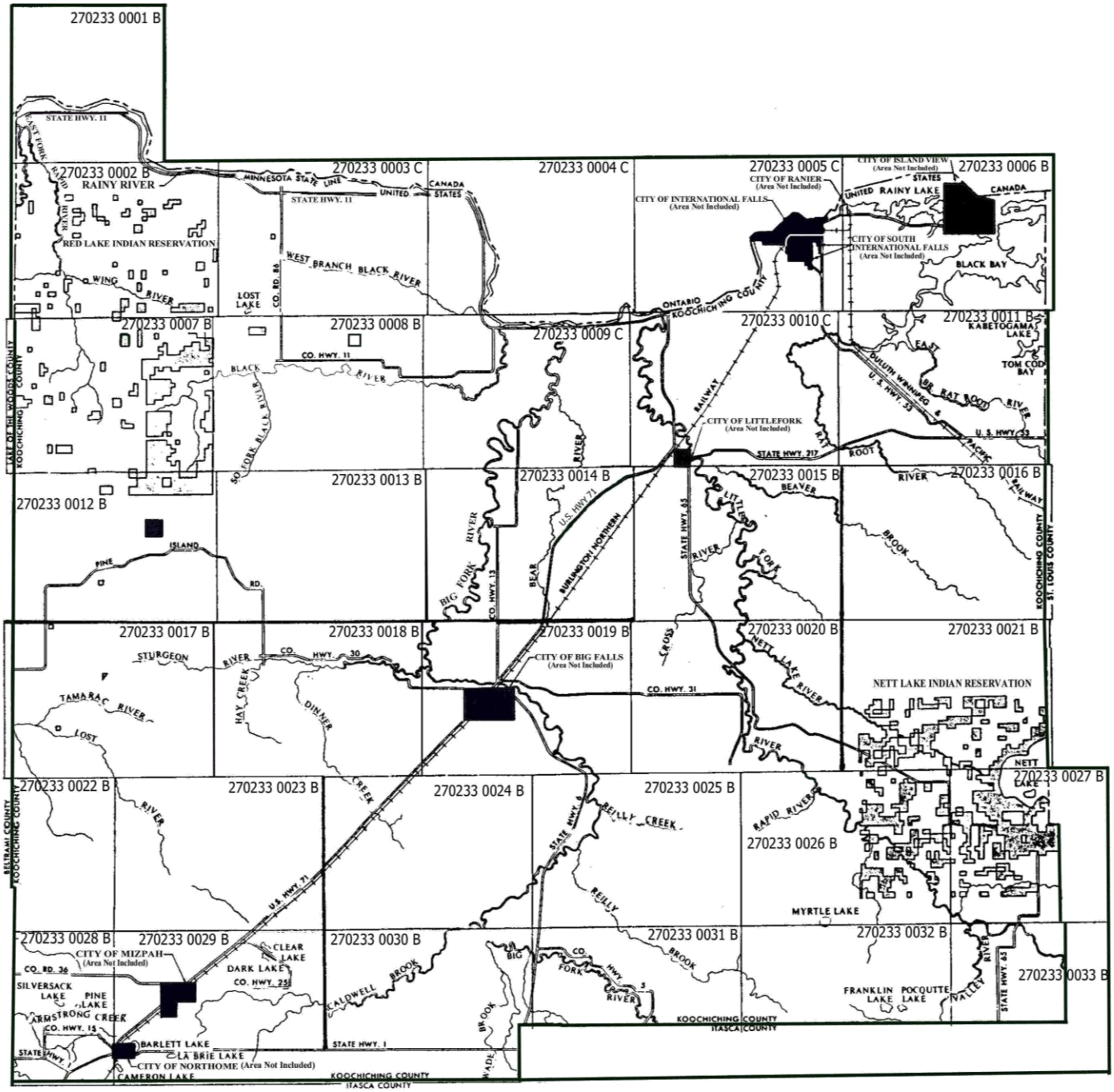
k. Flooding

Historically, flooding has not been a major problem in Koochiching County, and the damage caused by such events has been negligible. The county's extensive network of wetlands acts to moderate the runoff from spring thaw, lessening the impact on the rivers and streams.

The County Planning and Zoning Department has, as its guideline for floodplain areas, maps provided by the Federal Emergency Management Agency (FEMA) and published by Housing and Urban Development (HUD). The floodplain areas mainly consist of river corridors and lakeshores susceptible to seasonal changes in water depth**. Figure 5** shows the floodplain index for Koochiching County. Many rivers and streams throughout Koochiching County have approximate 100-year floodplains mapped. Detailed 100-year floodplain elevations are available only for Rainy Lake and that portion of Rainy River from International Falls to Manitou Rapids. The 100-year floodplain elevation of Rainy Lake is 1,112.42 feet.

FIGURE 5:

Koochiching County Floodplain Map Index



Flooding occurs mainly in the spring. The extent of flooding depends on the rapidity of snowmelt and the depth of frost in the soil. The Big Fork River, which has a steep gradient in the Big Falls area, occasionally has ice jams in the spring, causing the river to overflow its banks.

Any flooding that does occur has a minimal economic effect. The rivers flow through primarily forested or swamp land. The most heavily populated region susceptible to flood damage is along the Rainy River, where the riverbank is benched. Water levels may rise above the first, shallow bench but the upper bench is fifteen to twenty feet higher. Out-of-bank flow on Rainy River is unlikely due to the natural channel control at Ranier and the artificial control at the dam at International Falls. The International Joint Commission and the Rainy Lake Board of Control manage water flow at International Falls. Their responsibility is to ensure safe and productive water levels on the Rainy River, Namakan Lake, Kabetogama Lake and Rainy Lake.

I. Shoreland Use

The uncontrolled use of shorelands may adversely affect water quality, visual amenities, fish and wildlife habitat, and public recreational use. Shoreland ordinances are developed to prevent such damage and to ensure that the structural, utilitarian, and aesthetic qualities of a river or lakeshore are not destroyed by human activity. Ordinances regulate activities such as the location of dwellings in relation to a riverbank, installation of septic systems, and construction of boathouses and docks.

The municipalities of International Falls, Ranier, Littlefork, and Northome have shoreland ordinances that meet Minnesota DNR Division of Waters' requirements. In addition, the Koochiching County Planning and Zoning Commission, in conjunction with the DNR, adopted a countywide shoreline ordinance, in 1993.

As mentioned earlier in this document, Koochiching County Commissioners have adopted local river plans on the Rapid, Rainy, Big Fork, Little Fork and Rat Root Rivers. These plans serve to protect and manage shoreland in the best interest of water quality

All the major rivers in the county are classified as DNR protected waters. However, this designation applies only to activities that take place below the ordinary high water mark. The new countywide shoreland ordinance covers activities that occur along the bluffs and banks of rivers, and shores along all protected lakes and rivers.

Table XI provides a summary of protected waters and their shoreland classification in Koochiching County.

TABLE XI
PROTECTED WATERS AND SHORELAND CLASSIFICATIONS
IN KOOCHICHING COUNTY
Source: Minnesota DNR Division of Waters

NAME	LOCATION (T/R/SEC.)	AREA WATERSHED	ZONING ACRES	CLASSIFICATION
Seretha	152/27/3,4,10	Red Lake	58	Natural Environment
Unnamed	152/27/10	Red Lake	10	Not Available
Clear	152/27/21,22,27	Red Lake	82	Natural Environment
Miller	152/27/26,27	Red Lake	19	Not Available
Little Dawson	152/27/27	Red Lake	10	Not Available
Dark	152/27/27,28	Red Lake	99	Natural Environment
Unnamed	151/28/07	Red Lake	13	Not Available
Unnamed	151/28/08,17	Red Lake	26	Natural Environment
Bartlett	151/28/19,20,29	Red Lake	303	General Development
Unnamed	151/28/29	Red Lake	10	Not Available
Cameron	151/28/30,31	Red Lake	40	Natural Environment
Unnamed	151/29/5,6	Red Lake	10	Not Available
Battle	151/29/22,27	Red Lake	268	Natural Environment
Unnamed	68/21,22/31,36	Rainy Lake	27	Natural Environment
Rat Root	69/70/23	Rainy Lake	550	Natural Environment
Moose	68/24/9,16	Rainy Lake	50	Natural Environment
Lost	158/27/8,9	Upper Rainy	13	Not Available
Nett	65/21,22	Little Fork	7369	Natural Environment
Unnamed	64/22/06	Little Fork	11	Not Available
Pocquette	63/23/28,33	Little Fork	43	Natural Environment
Franklin	63/23/29,32	Little Fork	103	Natural Environment
Myrtle	63,64/24/2/3/34	Little Fork	168	Natural Environment
Tuefer	151/28/27	Big Fork	39	Natural Environment
L. Constance	151/28/36	Big Fork	37	Natural Environment
Pine	151/29/10	Red Lake	NA	Not Available
Silversack	151/29/49	Red lake	NA	Not Available
Evergreen Pd WMA	154/25/8, 17	Big Fork	NA	Not Available
Unnamed	158/28/31	Rapid	NA	Not Available
Big Constance	150, 151/27/6, 31	Big Fork	NA	Natural Environment
Moose	151/28/36	Big Fork	NA	Recreational Develop.
Rainy Lake	Various	Rainy Lake	NA	General Development
Kabetogama	Various	Rainy Lake	NA	General Development

m. Wetland Considerations

i. Assessment of Wetlands

A wetland may be defined as an area where saturation with water is the dominant factor determining the nature of soil development and the types of plants and animal communities present. Wetlands are important for flood and storm water storage, nutrient entrapment, and ground water recharge. Wetlands are used for a variety of recreational activities and are appreciated by many for their aesthetic and ecological values. Also, Koochiching County wetlands provide habitat for many plant and animal species, including several which are considered threatened or rare.

According to state and federal definitions, Koochiching County is about 68% wetland. For classification purposes, the State of Minnesota defines eight types of wetlands, all of which are present in Koochiching County:

Type 1. Seasonally Flooded Basins and Flats - These are well drained during much of the growing season. Vegetation varies greatly according to season and duration of flooding.

Type 2. Inland Fresh Meadow - Soil is usually without standing water during much of the growing season. The soil is generally waterlogged within a few inches of the surface. Typical vegetation includes sedge, rushes, and a variety of grasses.

Type 3. Inland Shallow Fresh Marshes - Soil is usually waterlogged early during the growing season. Often covered with as much as 6 inches or more of water, and often border deepwater marshes. In combination with Type 4 constitute the principal production areas for waterfowl. Common vegetation includes cattails, sedges, rushes, arrowhead, burrweed, and smartweed.

Type 4. Inland Fresh Deep Marshes - Soil is covered with 6 inches to 3 feet or more of water during the growing season. May border open water areas, or completely fill shallow lake basins or sloughs. Vegetation includes cattails, wild rice, reeds, arrowhead, and bulrushes. In open areas aquatic plants such as pondweeds, duckweeds, coontail, or waterlilies may occur.

Type 5. Inland Fresh Open Water - Shallow ponds, with water less than 10 feet and fringed by a border of emergent vegetation. Vegetation may include pondweeds, naiads, wild celery, watermilfoils, muskgrasses, waterlilies, and coontail. May sustain a permanent population of fish. Used extensively by waterfowl for feeding and resting areas during migration, as brood areas, and nesting areas.

Type 6. Shrub Swamps - Soil is waterlogged during the growing season. Occur along sluggish streams and floodplains, but many are isolated. Vegetation includes alders, willows, dogwood, and buttonbush, as well as some herbaceous growth. Valuable areas that provide food and cover for many wildlife species.

Type 7. Wooded Swamps - Soil is waterlogged during the growing season and is often covered with as much as 1 inch of water. Trees include tamarack, cedar, black spruce, balsam fir, and black ash. Northern evergreen swamps usually have a thick ground cover of mosses.

Type 8. Bogs - Soil is usually waterlogged and supports a springy covering of mosses. Vegetation is woody or herbaceous, or both. Typical plants include heath shrubs, sphagnum moss, sedges, carex, and cranberries. Scattered, often stunted black spruce and tamarack may be present. (2)

Wetland areas have been identified and mapped by the U.S. Fish and Wildlife Service as part of the National Wetlands Inventory. The Koochiching SWCD has a complete set of these maps.

ii. Federal Regulations

The Clean Water Act of 1974 gives the United States Army Corps of Engineers regulatory authority over all types of wetlands defined above, as well as navigable rivers. In Koochiching County, portions of the Big Fork, Little Fork, and Rainy Rivers are defined as navigable. The Army Corps of Engineers (ACOE) permitting requirements relate to the placement of fill material or excavated material, and to the building or extension of ditches on wetlands.

iii. State Regulations (WCA)

In 1991, the Minnesota legislature passed the Wetlands Conservation Act (WCA), a law which intends to maintain "no net loss" of wetlands by regulating wetland drain and fill activities. Activities in the county with the potential to alter the nature of a wetland or protected water require permission from a federal, state, or local government, or all three.

For years, wetlands were considered wastelands and were drained or filled to allow for development or agricultural production. Current estimates indicate that over 70% of Minnesota's original 12.5 million acres of wetlands have been drained and filled. Recently, an awareness of the ecological value of wetlands has arisen and resulted in the Wetland Conservation Act, passed by the Minnesota Legislature in 1991. The goal of the act is a net gain in the amount of Minnesota wetlands.

The Wetland Conservation Act, administered through local governments, supplements laws already in place in the Minnesota Department of Natural Resources, Army Corps of Engineers, and U.S. Department of Agriculture by creating a regulatory "net." The law requires that private landowners wishing to alter a wetland on their property work with the local government in obtaining the permits needed to complete the proposed project.

The Wetland Conservation Act also provides for the protection of unique peatland areas. Eighteen peatland areas in several counties, including Koochiching, were set aside as Scientific and Natural Areas (SNA's), causing certain restrictions in the use of these areas.

In Koochiching County, the Environmental Services Department is responsible for administering the Wetland Conservation Act. The department works with the SWCD and state and federal agencies to properly identify and protect wetlands in the county.

n. Water-based Recreation

Water-based recreational opportunities in the county are largely of an undeveloped nature. Most water-based recreational opportunities are located in and around Rainy and Kabetogama Lakes. Recreational activities associated with these lakes range from primitive canoe camping in Voyageurs National Park to full service resort living. Activities include year-round fishing, seasonal swimming, hiking, and boating. **Table XII** lists lakes with public water access.

TABLE XII

Lakes with Public Access

Lake	Access	Limitation (regular winter kill: rwk)
Bartlett	Ramp	rwk
Battle	road	rwk
Bottle	road	rwk
Cameron	none	
Clear	Ramp	rwk
Constance, Big	logging road	rwk
Constance, Little	logging road	
Dark	none	rwk
Dawson	none	rwk
Franklin	portage	rwk
Kabetogama	Ramp	
Lost	portage	rwk
Miller	portage	rwk
Moose	Ramp	rwk
Myrtle	none	rwk
Nett	road	
Pine	Ramp	
Poquette	portage	
Rainy	Ramp	
Rat Root	Ramp	
Seretha	Ramp	
Silver Sac	Ramp	
Tuefer	Ramp	rwk

The major appeal of Rainy and Kabetogama Lakes is their remote, forested character and the deep, clean water. Rainy and Kabetogama are part of the Rainy Lake watershed, which encompasses the Boundary Waters Canoe Area and Quetico Provincial Park in Ontario, Canada. Surface and ground water flow in the watershed is generally northwest, providing the lakes with high quality water, with high transparency, and low levels of algae and dissolved solids. Vehicles used on the lakes range from canoes to large resort-owned touring boats during the summer and snowmobiles, cars and trucks which venture onto the ice in winter. Some resorts are seasonal, closing for the winter, while a few remain open year-round for winter recreation. The other lakes in the county are relatively small and are used mainly by local people for fishing and boating.

The Little Fork and Big Fork Rivers are remote, with little development along their shores. Both are state-designated canoe routes with plentiful access and good fishing. There are no designated Wild and Scenic Rivers in the County.

i. Lakes and Rivers in Koochiching County

In Koochiching County there are 15 lakes and 14 waterways classified as rivers. The following is an inventory:

Rainy Lake - The portion of Rainy Lake that falls within Koochiching County is approximately 10 miles in length, to a point at the east end of Dryweed Island. Rainy Lake is one of the larger freshwater lakes in North America, and has importance for fishing, sightseeing, boating, and has international appeal as a vacation destination.

Lake Kabetogama - A small portion of the west end of the lake lies within Koochiching County, the entirety of which is within Voyageurs National Park boundaries.

Rat Root Lake - is actually a widening of Rat Root River. The lake is an important fish spawning area.

Moose Lake - 5 miles east of Littlefork. The lake is approximately 40 acres in size and is a spruce bog lake. It is used locally for recreational fishing (crappie, bass, and northern pike), canoeing and boating.

Nett Lake - located within the Nett Lake Reservation. Tribal approval and a reservation resident guide are required for non-resident fishing.

Seretha Lake - located 22 miles south of Big Falls off Highway 71. The lake is suitable for small boat use and is stocked with walleye by the Minnesota DNR. Koochiching County maintains a campground and boat access.

Clear Lake - located 2 miles east of Gemmell. The lake is fished for walleye, northern pike, and pan fish, and is suitable for small boat use. The county maintains a picnic site and boat access.

Dark Lake - located across the road from Clear Lake. The lake contains walleye, northern pike, and pan fish. The county maintains a picnic site and access.

Bartlett Lake - located just north of the city of Northome.

Cameron Lake - located 1-1/2 miles south of Northome.

Teufer Lake - located 3 miles east of Northome. The county maintains an access. The lake is good for pan fish.

Myrtle Lake - a bog lake in the midst of the Lake Agassiz Peatland National Monument. There is no vehicle access.

Franklin Lake - located in the southeast corner of the county.

Pocquette Lake - located in the southeast corner of Koochiching County.

Battle Lake - located 3 miles southwest of Northome, used for duck hunting.

****DESIGNATED TROUT STREAMS:**

Dinner Creek - located south and west of Big Falls
Hay Creek - located south of Big Falls
Trout Brook - located southeast of Big Falls
Valley River - located south of Silverdale in the southeast corner of the county.

****MAJOR RIVERS:**

Rainy River - flows 55 miles along the northern border of Koochiching County from Rainy Lake to Lake of the Woods. The river is used for fishing and boating.
Big Fork River - has State Canoe and Boating Route Status, and flows for 106 miles through the county. The river is good for fishing, canoeing and boating.
Little Fork River - also has State Canoe and Boating Status. It flows for 104 miles through Koochiching County and is good for fishing, canoeing, and boating.

****SMALLER RIVERS:**

Rat Root River - provides access to Rat Root Lake and Black Bay. The river serves as an important spawning ground for walleye.
Black River - enters Rainy River 1/2 mile north of Loman. The mouth of the river is used for sturgeon fishing. During dry summers the water level is too low for boating.
West Fork Black River - flows into Rainy River 1 mile west of Loman. The mouth is used for sturgeon fishing.
Bear River - flows into the Big Fork River at a point 5 miles south of Rainy River. It is popular opening weekend for bank fishing. There is a county-maintained access where the Bear flows into the Big Fork.
Nett River - flows from Nett Lake into the Little Fork River 12 miles south of the town of Littlefork. The mouth is popular for early season fishing.
Sturgeon River - flows into the Big Fork River 4 miles west of Big Falls. It is good for bank fishing, and there is a state-maintained campground.
Lost River - flows in the western part of Koochiching County. The river disappears underground for part of it's course, hence the name. No recreational fishing takes place because of the inaccessible location, but the river serves as a spawning ground for walleye and northern pike.
Rapid River - flows into Rainy River at Clementson in Lake of the Woods County, but the main part of the river lies within Koochiching County.
Cross River - feeds into the Little Fork River at a point 5 miles south of Littlefork. Fishing takes place at the mouth only. The river is too small for navigation.
Valley River - flows into the Little Fork River 4 miles west of Silverdale. Fishing takes place at the mouth only it is too small for motorized traffic.
Willow River - flows into the Little Fork River at a point 2 miles south of Silverdale. Fished only at the mouth, it is too small for motorized traffic.

ii. Assessment of Impact on Water Quality

The potential for direct water quality degradation by water-based recreation is not significant. Runoff and sedimentation from rural boat ramps and parking lots does not significantly affect water quality; nor does bank erosion due to the wake from motorboats. But indirectly, through peripheral services that support and facilitate water-based recreation, there is potential to contaminate. Resorts, motels and other recreational enterprises located on or near shoreland will need to be monitored. Ordinances and statutes will need to be enforced particularly with regard to Individual Sewage Treatment Systems.

Emissions and unintentional fuel discharge which occur during operation of boat motors is also a concern. Older two-cycle outboard motors are thought to be about 70% efficient. That means 30% of every gallon of gasoline burned in these motors is a by-product of combustion. Most of those emissions are discharged into the lake or river through the exhaust system. Newer, more efficient fuel injected motors will decrease emissions. It is not known to what extent these emissions affect water quality.

D. Surface Water Quantity and Quality for Present and Future.

The heaviest surface water use in Koochiching County occurs in the extreme northeast corner within the Rainy Lake watershed. Here, water from Rainy Lake is pumped for industrial and municipal use, and a dam regulates the flow from Rainy Lake into Rainy River at International Falls. International Falls, MN and Fort Frances, Ontario are connected by the dam and an International Port of Entry. Both cities use Rainy Lake for industrial and municipal use. Further west, the communities of Emo, Ontario and Baudette, MN also use Rainy River as a source for public water. In each case, used water is treated and released back into the surface water system.

The demand for surface water in other areas of Koochiching County is low. The smaller communities use deep wells for municipal water. Drought years and periodic excessive storm events will account for extremes in surface water quantity but, for the most part, Koochiching County has an ample supply of surface water for present and foreseeable future use.

Although there is a history of strained relations between Minnesota DNR and the Ontario Ministry of Natural Resources, the last few years have been characterized by productive collaboration. Interested in improving the aquatic ecosystem, these two agencies worked together to get changes to the Rainy Lake/Namakin water levels and were able to reach consensus in their recommendations to the International Joint Commission (IJC).

Rainy Lake and Rainy River are Border Waters shared by Minnesota and the Canadian Province of Ontario. The IJC is a bi-national Canada-US organization established by the Boundary waters Treaty of 1909. Its job is to assist in the management of boundary waters between the US and Canada for the benefit of both countries.

The IJC regulates the level of Rainy Lake by controlling the volume of water going through the dam at International Falls and at Kabetogama and Namakan Lakes (also boundary waters) which feed Rainy Lake. In 1999, after many months of review, the IJC formally changed the rule curve, which took effect on January 6, 2000.

The current strategy for water management through these dams is driven by the need for hydroelectric power. In dry years the water level on Rainy Lake can drop dramatically creating inconvenience for lakeshore residents who enjoy water-based recreation or who draw water from the lake. In excessively dry years most docks and some intakes are completely exposed.

The quality of water in Rainy River has been a source of controversy over the years. Older residents of the County remember when Rainy River had a foul smell to it. Fishing line and nets retrieved while fishing were coated with fibrous material and the fish tasted terrible. Much progress has been made since those days.

Rainy River is cleaner today largely because technology has provided the means for more effective filtering and monitoring of industrial effluent. But, more importantly, tighter restrictions on wastewater discharges and other emissions continue to compel companies to use these technologies.

Water quality in Rainy River is monitored regularly by the MPCA at the International Bridge at International Falls and at Baudette, MN, some 70 miles down stream. The International Joint Commission has also issued water quality standards for international waters.

Perhaps the greatest challenge to water quality in Koochiching County is the lack of effective individual sewage treatment systems along shoreland. The Individual Sewage Treatment System (ISTS) Act of 1994 addresses the need for septic system inspection and ordinance requirements for each Minnesota County. Chapter 7080 describes minimum design, construction and maintenance criteria for septic systems. Individual counties can upgrade those standards to be more restrictive or to include alternative standards after MPCA review. Koochiching County has accepted Chapter 7080 rules but does not have a septic system ordinance. However, construction of new or updated septic systems must comply with Chapter 7080. Further, certification of septic system compliance (or non-compliance) is required when applying for building permits for additions in shoreland areas and for the addition of bedrooms in other areas.

Since these new rules became effective the Environmental Services Department has targeted critical areas in the county where non-conforming septic systems are known to be an immediate and chronic problem. Non-conforming systems include cesspools, dry wells, seepage pits, those that discharge on the surface or directly into public water bodies, any system constructed within three vertical feet of the seasonal high water table and any system constructed within three vertical feet of bedrock. There are other criteria: setbacks from navigable waterways, minimum distances from property lines, wells and buildings. Chapter 7080 provides a more comprehensive description of requirements, with reference to the Ordinary High Water Level (OHWL) of public waters.

The Environmental Services Department has worked closely with contractors to help them attain MPCA certification to design, layout, construct and checkout ISTS's. As properties are transferred and residents are encouraged to update their systems the ISTS issue will progress.

A state or federally funded cost share program (similar to the Wisconsin Fund used in some watersheds in northern Wisconsin) would likely expedite the process of updating non-conforming systems.

V. Ground Water

A. Quantity

Ground water is water stored beneath the earth's surface in cracks, crevices, and pore spaces in the geologic materials that make up the earth's crust. Precipitation and surface water become ground water after seeping or infiltrating into the ground.

Koochiching County has three aquifers available for use. The first is the bedrock aquifer that underlies the entire county. This aquifer is locally productive but regionally unreliable because the water yields are dependent on the interconnection of fractures and amount of weathering in the rock.

The other two aquifers, the confined and unconfined glacial drift aquifers, are collectively known as the drift aquifers. These two aquifers are of variable thickness and extent and may not exist in parts of the county. They are the result of glacial moraines and outwash.

The confined glacial drift aquifer is known as the buried drift aquifer. This aquifer is the most commonly used in the county. The confined aquifers are sand or gravel lenses in glacial till and, therefore, do not form a continuous layer across the county. Confined aquifers are localized and vary considerably in yield.

The unconfined glacial drift aquifer is known as the water table aquifer. The water table aquifers exist in sandy glacial outwash that is found along rivers and in bedrock lows. The water table aquifers also are localized and vary considerably in yield.

Ground water may become contaminated by malfunctioning individual sewage treatment systems, air pollutants falling back to earth, or by animal wastes, pesticides, or fertilizers. As water seeps down it may become contaminated by waste materials such as those buried in old landfills. Once contaminated, an aquifer may remain so for a long time. There are no state observation wells in Koochiching County but **Table XIII** lists those wells with appropriation permits.

TABLE XIII

WELLS COVERED BY STATE APPROPRIATION PERMITS
Source: MN DNR Division of Waters
(MILLION GALLONS PER YEAR)

Permit Holder	Location (T/R/Sec.)	# of Instls.	Watershed	Use	Permitted Amount
City of Littlefork	68/25/09	5	Littlefork	Municipal	25
City of Northome	151/28/21	3	Big Fork	Municipal	12
City of Northome	151/28/30	4	Big Fork	Municipal	
City of Big Falls	154/25/02	6	Big Falls	Municipal	25

B. Quality

The largest and most readily available source of ground water information is water well records. Koochiching County Soil and Water Conservation District (SWCD) has been keeping well records since before 1974 and is currently tracking new well records on the County Well Index (CWI). CWI is a computerized data base system developed by the Minnesota Geological Survey as a part of their Ground Water Data Management Program. Besides the SWCD, copies of new well records are sent to Geologic Survey, DNR, the property owner and the Minnesota Department of Health (MDH). The CWI provides a means to make data collected at the state level available locally. It was designed to be used as a tool to collect and manipulate data from well records and chemical analyses at the local level.

Koochiching County Extension Service and the County Health Department routinely provide containers and water sampling directions to rural county residents who want to know the quality of their domestic water supply. These samples are tested for coliform, nitrates and hardness. Since 1996, Koochiching County Environmental Services Department has kept a summary of those test results. Of 496 tests done between 1996 and 1998, 37.7% did not meet state standards for potable water. The sources of contamination were either fecal coliform or nitrates, the most common being fecal coliform. Most of those water sources that did not pass the test were located in the rural areas around International Falls, Loman and Ray, MN. It is suspected that most of the samples were from wells, the lesser number from cisterns, rivers or lakes. While inconclusive, these results may indicate degradation of the ground water resource on a larger scale. More assessment is needed to further define the problem.

C. Problems and Assessments

1. Unused, Unsealed Wells

Because of the homesteading that flourished in the early 1900's, many unused, unsealed wells are scattered throughout the county with some located near unused dumps. These wells vary in depth, depending on the local soil profile and geologic conditions. There is limited information available but a concerted attempt needs to be made to locate these wells.

2. Underground storage tanks

MPCA maintains a list of old tanks removed and new tanks placed in the ground. There are certainly old tanks still buried in unknown locations. The impact of these tanks cannot be assessed since there is no record of their location. An attempt needs to be made to locate old buried tanks.

3. Special Geologic Conditions

The contamination potential of ground water is relative to the geologic materials and their ability to restrict the downward migration of contaminants to the saturated zone. The biggest potential groundwater quality problem in Koochiching County is shallow bedrock. The aquifer materials are metamorphic/igneous with very little recharge potential so the greatest potential for contaminants to enter the aquifer is through cracks in the bedrock.

4. Wellhead Protection

Part of groundwater protection focuses on public water supplies, or wellheads. Protecting these supplies from contamination is an essential part of the county's groundwater program. The Department of Health identifies, prioritizes and rates Wellhead Protection Areas (WPA's) in the state so that assessments and protection plans can be implemented. The WPA's are prioritized and numbered from 1-1600. Koochiching County has four WPA's identified by the Department of Health that could begin receiving assistance in the next five years.

Facility Name	Priority Rank	PWS ID
Indus School	254	5360010
Littlefork	519	1360004
Northome	547	1360005
Big Falls	554	1360001

Many activities that occur in and around municipalities may contribute to groundwater contamination. Runoff, which can carry salt, pesticides and other contaminants, can enter aquifers rapidly where bedrock is exposed or shallow.

The number of people served by public wells in Koochiching County is relatively small. A greater number of people would likely increase the degree of activities that might contribute to groundwater contamination. Continued assistance from the Department of Health will be appreciated.

D. Ground Water Quantity and Quality for Present and Future.

The aquifers which supply ground water to Koochiching County can be generally located and defined but specific information regarding volume, recharge rate, contaminants, etc. is not yet available on a dynamic, comprehensive scale. Although the over-all status of the aquifers is largely unknown, monitoring and conservation efforts continue to move forward.

Continued future correlation of the County Well Index parameters with well-water sampling results will create a more accurate picture of the health of the aquifers and perhaps regionalize similar quality and quantity findings within the county. And the concept of Wellhead Protection Areas (mentioned earlier) is good insurance for the future of ground water quality even though specific data may be inconclusive as to the status of the aquifers.

There are not a great number of wells being drilled in Koochiching County and the depth to “good” water is not predictable from one quarter section to another. The largest volumes withdrawn from the aquifers are municipal wells at Northome, Littlefork and Big Falls. Homebuilders have begun considering buried 1000-gallon fiberglass reservoirs for their potable water needs as opposed to expensive and unpredictable well drilling.

There is much to be learned about the status of ground water in Koochiching County but there are obvious sensitive areas where human activity is likely causing damage to the aquifer. The northeastern corner of the county (east of International Falls) is heavily populated. Homes and old septic systems are built on shoreland and very near bedrock. At least some of the effluent from these systems finds its way through cracks in the bedrock. With the adoption of standards and specifications for individual sewage treatment systems (Chapter 7080) these systems will eventually be updated or eliminated along with many other inadequate systems on shoreland in other parts of the county.

Groundwater contamination from agricultural enterprises remains un-assessed. It is thought to be minimal because very few farms remain in Koochiching County and most subsoils are of a dense, clayey texture which slows infiltration.

In summary, ground water quality and quantity has been identified as a concern in Koochiching County even though much is unknown. The major problem, which continues to be dealt with by local government units, is that of old septic systems.

VI. Other Information Pertaining to Water Resources

A. Fish and Wildlife Habitat

Wildlife and fish are economically and recreationally important to the citizens of Koochiching County. Tourism is second in importance only to forest industry in the economy of the county.

The vast areas of undeveloped land in the county provide abundant habitat for many species of wildlife. Prior to the arrival of Europeans in the late 1800's, woodland caribou and moose were more common than white-tailed deer in Koochiching County. Timber harvesting

and land clearing by early settlers served to increase populations of white-tailed deer, causing the extirpation of the caribou and the near-elimination of the moose. White-tailed deer are carriers of a parasitic brain worm that does not adversely affect the deer. The brain worm is, however, fatal to moose and caribou.

The major game species found in Koochiching County today include white-tailed deer, black bear, ruffed grouse, sharp-tailed grouse, woodcock, and waterfowl. Moose are present in small numbers but hunting is not permitted. Beaver, muskrat, mink, fox, raccoon, otter, fisher, marten, bobcat, and coyote are the main fur-bearing species. Non-game wildlife present includes many species of raptors, shore birds, songbirds, reptiles, amphibians and small mammals. Also considered as non-game wildlife are those on the threatened or endangered species list. These species include the bald eagle and the eastern timber (gray) wolf.

1. Wildlife Management Areas

As mentioned earlier in this document, Koochiching County retains the majority of its pre-settlement wetlands along with the associated wildlife species. Most of these wetlands are bogs and forested areas that do not contain open water. The largest number of wetlands with open water are created by beaver and there are hundreds of beaver ponds that provide habitat for muskrats, mink, river otter, assorted waterfowl, reptiles and other wildlife. These beaver ponds are protected by law unless they are doing damage to private property or roads.

MNDNR wildlife management projects directed at wetlands or water-related wildlife species have been few due to the abundance of natural wetlands in Koochiching County. However, the MNDNR does maintain an extensive network of nesting boxes for various species of waterfowl. MNDNR and other state and federal agencies that provide funding for wetland projects have traditionally concentrated their efforts in areas that do not have open water or in areas adjacent to large bodies of water (for waterfowl).

The future of wetland management for wildlife in Koochiching County will likely not change a great deal in the future. Nor will the quality of wetlands since most wetlands are on state land and will be protected through state laws and policies.

MNDNR Division of Wildlife has designated the areas listed in **Table XIV** as Wildlife Management Areas in Koochiching County. Some of these areas are actively managed by fire and other means of succession control to encourage certain species.

TABLE XIV

WILDLIFE MANAGEMENT AREAS
Source: DNR Division of Wildlife

NAME	TWP.	RANGE	SEC.	ACRES	NOTE
Evergreen WMA	154	25	8	312	Waterfowl imp.
Gold Portage WMA	70	22	12	706	Located in VNP
Wald Billing WMA	69	26	30	158	Big Fork River
Littlefork WMA	67	24	5, 6	633	Sharptail Grouse
Area	68	24	31		
	67	25	1		

2. Fish Habitat

Table XV lists the sections of Koochiching County streams designated as trout streams by the DNR. Such designation restricts the taking of fish from these waters except during state-set seasons. Designation also provides greater protection under DNR's Division of Waters rules and regulations and under the Voluntary Site Guidelines for Timber Harvesting. The county has no state-designated trout lakes.

TABLE XV

STATE-DESIGNATED TROUT STREAMS IN KOOCHICHING COUNTY
Source: DNR Division of Waters

STREAM	TOWNSHIP	RANGE	SECTIONS	WATERSHED
Dinner Creek	153	26	4,9,10,12, 13,14,15, 23,24	Big Falls
	154	26	7,18,19,29, 30,32,33	
	154	27	1,12	
	155	26	30,31	
	155	27	25,35,36	
Hay Creek	153	26	4,8,9,17,20	Big Falls
Trout Brook	66	26	19,30	Big Falls
	66	27	24,25	
Valley River	63	22	6,7,8,9,16, 17,18,19,20, 21,28,29,30	Little Fork
	63	23	24,25,26,35	

Dinner, Hay, and Hoover Creeks, located in the southwestern part of the county, flow primarily through state lands, including Pine Island State Forest. Trout Brook, east of Big Falls, is a small, short-lived creek that flows through an area more heavily affected by human activity. The Valley River, in the southeast corner of the county, flows through a relatively unpopulated area.

In years past the Rainy River fishery has been subjected to major pollution from paper mills on both sides of the river. Consumption advisories continue to list most fish species in the river and some people still object to the their taste. Dioxin has been found in all fish species in Rainy River. Although there are unanswered questions about the degree of health risk associated with dioxin contamination, the Minnesota DNR states that it may increase cancers in people eating a large quantity of contaminated fish over an extended time period.

3. Critical Fish Habitat

Fish habitat is a complex web of living and dead components. Good fish habitat requires a reliable source of good quality water, adequate spawning conditions, appropriate cover or bottom structure and an adequate forage base. Some fish species are more sensitive to poor water quality and unstable habitat than others. It seems that fish species most preferred by

anglers are most often adversely affected by habitat degradation than less desirable species. For example, rough fish (suckers, carp, bullheads) can survive in warmer water with less oxygen than walleye, northern or trout. The eutrophication of small and shallow water bodies limits the number and kind of fish that can adjust to those conditions.

Aquatic plants are important in a variety of ways both to fish habitat and water quality. They release oxygen into lake water and produce carbohydrates that fuel an immense food web. Plants provide cover for fish and other organisms. They provide a surface for algae and bacteria, which in turn break down polluting nutrients and chemicals and are an important food source for organisms higher in the food chain. They also help prevent erosion and reduce turbidity and nutrient cycling in lakes.

The lakes and rivers of Koochiching County provide a diverse array of fish habitat for the many species and stages of life. Large fish kills due to habitat contamination are unheard of. The Rainy Lake Sport Fishing Association maintains a program that periodically creates habitat for game fish by submerging man-made structures of wood and rock. Sport fishing and the tourism it generates is a huge asset to Koochiching County. Reasons for the imminent recovery of the walleye fishery include elimination of commercial fishing, controlling angler harvest through slot limits, voluntary catch and release, and regulation changes in Ontario.

4. Lake Classification

As part of lake habitat study and management, the DNR has classified the county's lakes relative to their present condition, and the potential use if active management techniques were to be applied. **Table XVI** lists the lakes included in the management classification.

"Ecological Class" describes the basic lake type, described in terms of the characteristic fish populations which are best adapted to the physical, chemical, and biological makeup of the lake. "Management Class" indicates the important species, or combination of species, which could exist in the lake should active management methods be applied.

Presently, the lakes included in the classification are classed as borderline eutrophic. Active management techniques would only stall the lakes' natural aging process.

TABLE XVI

STATE ECOLOGICAL AND MANAGEMENT CLASSIFICATIONS FOR LAKES IN KOOCHICHING COUNTY
Source: Minnesota DNR

LAKE NAME	ECOLOGICAL CLASS	MANAGEMENT CLASS	AREA (ACRES)	WATERSHED
Moose	Centrarchid	Centrarchid	50	Rainy Lake
Seretha	Centrarchid	Walleye Centrarchid	58	Red Lake
Clear	Centrarchid	Centrarchid	82	Red Lake
Dark	Centrarchid	Centrarchid	99	Red Lake
Bartlett	Bullhead	Regular winter-kill	303	Red Lake
La Brie	Bullhead	Gamefish	39	Big Fork

NOTES:

Centrarchid - Medium and small-sized, weedy, fertile, hardwater lakes. Usually no large open areas. May also contain moderate to substantial populations of carp and/or buffalo, and/or bullheads.

Centrarchid/Walleye - This type of management is designed to furnish a walleye fishery of moderate size, without displacing largemouth or smallmouth bass or panfish populations.

Bullhead - Shallow lakes, in which frequent winter kills promote the dominance of bullheads.

Gamefish - This classification is designed to cover those lakes in southern and central Minnesota where roughfish removal and stocking of rescued fish are common management procedures. They include lakes that occasionally winter kill where management is aimed at building up a desirable fish population in as short time period as possible.

Regular Winter Kill - Management of lakes in this classification is usually confined to rescue work and/or walleye fry stocking. Fishing is usually of the "boom or bust" type.

5. Studies and Management Plans

a. Fisheries & Lakes

The DNR Divisions of Wildlife and Fisheries conduct routine species studies in Koochiching County. Wildlife studies include waterfowl breeding pairs, brood ducks, and loon population. The MN DNR Fisheries division conducts lake and stream surveys, angler surveys, and various types of special investigations to monitor fish population status and fish habitat on lakes and streams in Koochiching County. This information is used to develop and implement a comprehensive Fisheries Management Program that provides for optimum and sustained use of fisheries' resources while protecting and enhancing aquatic habitats and fish populations.

Of particular concern for the fish and wildlife populations in Rainy Lake are water levels regulated by the International Joint Commission at dams located at Kettle Falls and International Falls. The current regulations, established in 1970, take into consideration navigation, dock access, flood control, and the availability of hydroelectric power.

A joint fisheries study conducted by the DNR, the Ontario Ministry of Natural Resources, and Boise Cascade Corporation discovered that a healthy fish population depends on certain fluctuations in the water levels, a component not included in the existing regulations. Because healthy fish populations are vital to both the ecological chain and the recreational economy of Canada and the United States, several organizations proposed changes to the existing regulations.

Between 1991 and 2000 the IJC engaged in a process to issue a Supplementary Order to its 1970 rule curve. Public hearings were held in 1994 and again in 1999 to review its Draft Final Report. Further amendments were considered and on January 6, 2000 the Supplementary Order came into force.

b. Wildlife

In 1981, the Fish and Wildlife Service developed the Recovery Plan for the Easter Timber Wolf, designating northern Minnesota as primary wolf range, due to the low human population, few roads, little livestock, and forest and swampland. The plan established two recovery zones within Koochiching County**:**

Zone 1, in Voyageurs National Park, classifies wolves as totally protected. The species population fluctuates naturally. **Zone 2** covers over half the county, including Pine Island State Forest, Koochiching State Forest, and the southwest corner of the county. In this zone, the wolf population is controlled only by federal trappers, and only after a verified livestock or domestic animal loss because of predation.

The wolf is likely to be taken off the endangered list soon. The management of this animal is still controversial.

B. Unique and Scenic Areas

Koochiching County has a number of unique and scenic areas, including gold mines, peat bogs, and Indian mounds.

There are several sites listed in the National Register of Historical Places, including the Gold Mines Site Historical District and Little American Mine on Rainy Lake, Finstead's Auto Marine Shop in Rainier, and the Grand Mound Site west of International Falls on Rainy River.

The Minnesota Historical Society maintains the Grand Mound Interpretive Center. The site is a Chippewa burial ground, made up of large mounds of earth reaching up to 30 feet high. Their age is evident by the mature trees growing on their surface.

From the days of the Voyageurs (1600-1800) until the 1960's, these mounds were vandalized, robbed, and some were entirely destroyed. Now their remnants are preserved through the efforts of the Historical Society.

In 1991, a joint effort by the Historical Society and the Army Corps of Engineers resulted in a major erosion control structure on Rainy River, preventing bank erosion and protecting the Grand Mound, highest and most well preserved burial site, only a few steps from the riverbank.

Many archeological sites have been identified in the county, mainly along the rivers and on the shores of Rainy

There is one waterfall of note in the county, Little American Falls south of Big Falls on the Big Fork River. The Koochiching County Land and Forestry Department maintains a low-development picnic and camping site near the falls.

Minnesota's Natural Heritage Program has developed an extensive list of rare natural plants that exist in Koochiching County **(Table XVII).** The majority of these rare plants occur in wetlands, bogs, or marshes. Animals listed as threatened by the Federal Endangered Species Act and Minnesota Statute are the bald eagle and grey wolf. Noted by Minnesota Statute for special concern are the osprey, marten, northern bog lemming, and snapping turtle. These species represent all levels of the ecological hierarchy and, either directly or through predation, rely on the natural wetland areas of northern Minnesota for survival.

Also listed by the Natural Heritage Program are sensitive natural communities represented in the county. Conifer swamp and forested bogs, although common in this area, remain as remnants of communities that once flourished in other parts of the state. The Caldwell Brook Cedar Swamp Scientific and Natural Area is a wetland area given the strongest protection possible by the DNR, in order to preserve its unique plant and animal ecosystem.

TABLE XVII
Source: Minnesota DNR (1993 Data)

RARE AND ENDANGERED SPECIES IN KOOCHICHING COUNTY

SPECIES	STATUS
Plants	
Arethusa bulbosa (Dragon's-mouth)	SPC
Botaurus Lentigunosus (American Bittern)	SPC
Carex exilis (species of Sedge)	SPC
Cladium mariscoides (Twig-rush)	SPC
Cypripedium Ariethinum (Ram's-head Lady's Slipper)	END
Drosera anglica (English Sundew)	THR
Drosera linearis (Linear-leaved Sundew)	THR
Elocharis rostellata (Beaked Spike-rush)	THR
Juncus stygius var. americanus (Bog rush)	SPC
Rhynchospora capillacea (Hair-like Beak-rush)	THR
Rhynchospora fusca (Sooty-colored Beak-rush)	SPC
Tofieldia glutinosa (False Asphodel)	SPC
Tomenthypnum falcifolium (species of Moss)	SPC
Triglochin palustris (Marsh Arrow-grass)	SPC
Viola novae-angliae (New England Violet)	SPC
Xyris montana (Yellow-eyed grass)	SPC
Birds	
Bartramia Longicauda (Upland Sandpiper)	SPC
Colonial Waterbird	THR
Haliaeetus leucoephalus (Bald Eagle)	THR
Pandion haliaetus (Osprey)	SPC
Mammals	
Acipenser Fulvescens (Lake Sturgeon)	SPC
Synaptomys borealis (Northern Bog Lemming)	SPC

Key: END = Endangered
THR = Threatened
SPC = Special Concern
PSC = Proposed Special Concern

The Wetland Conservation Act of 1991 established several scientific and natural peatland areas, including nine that are in all or part of Koochiching County and are listed in **Table XVIII.**

Table XVIII
Scientific and Natural Areas
Designated in Koochiching County
By the Wetland Conservation Act of 1991
Source: Minnesota Dept. of Natural Resources

Peatland	SNA Core Area	WPA	Total
East Rat Root River	2,732	5,023	7,755
Lost River	11,848	49,289	61,137
Myrtle Lake	22,630	12,614	35,244
North Black River	1,220	31,559	32,779
Red Lake	10,000	17,000	27,000
South Black River	5,992	8,577	14,569
West Rat Root River	1,430	2,550	3,980
Total			**182,464**

C. Potential Changes that Affect Water Resources

Federal regulations dealing with water quality have been in place since the Clean Water Act of the 1970's. Industry, agriculture, and private individuals have become more aware of regulations due to enforcement by various agencies and local government. A positive result of the Clean Water Act is the noticeable improvement of Rainy River water quality due to a reduction of waste emissions from the paper mills since the 1980's.

Boise Cascade is proposing internal improvements that will increase its lumber processing capacity. This will result in an increased amount of waste that could go into the river unless the waste stream is diverted elsewhere. Boise Cascade is working with MPCA to assure that wood processing wastes do not adversely impact Rainy River water quality.

In 1991, the Minnesota legislature passed the Wetlands Conservation Act. Any activity in the county that alters wetlands or protected water requires permission from a federal, state, or local government, or all three. In a county where nearly 100 percent of pre-settlement wetlands are still intact there will need to be mitigation. The Wetland Management Plan for Koochiching County is scheduled for completion in 2000.

Demand for lakeshore property has increased all across Minnesota. Future development of riparian areas in Koochiching County has the potential to degrade water quality, increase erosion through the loss of shoreline vegetation, and increase run-off due to the creation of impervious surfaces. Setbacks from the shoreline or ordinary high water level (OHWL) are required by the County's Shoreland Ordinance and are reinforced by the three River Management Plans. These setbacks help protect the shoreline vegetation from being disturbed.

VII. The Water Management Action Plan

This part of the CWMP focuses on resolving water resource problems within Koochiching County. Some data needed to realistically develop goals and objectives are either non-existent or insufficient. The most that can be done under those circumstances is to provide the available information to the public and to continue to use any available means to gather more data. Education and data gathering become objectives where definitive information is in short supply.

Priority goals are based on assessments of water resource problems. The first CWMP was drafted in 1994. The goals listed in that Action Plan are almost the same as in this one. That would seem to indicate a lack of progress in implementation. But natural resource management goals are long-range goals. They are often on-going activities that sustain efforts at conserving the resource and to keep people aware that progress is being made. A comparative summary of progress shows encouraging results in CWMP implementation.

**In 1994 Koochiching County did not have an Environmental Services Department and the Assessor's Office was largely responsible for completion of the CWMP. In 2000 the Environmental Services Department (ESD) is the lead agency assigned to oversee implementation of the CWMP.

**The 1994 plan listed inadequate septic systems as a high priority. Since 1994 the ESD has initiated the Rainy On-Site Septic Solutions (ROSS) program that effectively targets the worst-case, site-specific out-dated systems in the county. The septic system issue remains a high priority item in 2000.

**In the1994 plan the last remaining landfills had been closed. That plan indicates an attitude transition toward waste products. In 2000 the ESD oversees a waste transfer facility and a well developed recycling program.

**In 1994 Boise Cascade was listed as having been cited for unlawful industrial discharges into Rainy River by MPCA. In 2000, many improvements to the plant have been made, not the least of which is a new, remote industrial waste site and a constructive use for wood ash.

**In 1994 many feedlots were listed as potential sources of contaminated runoff. In 2000 there is only a hand full of small feedlots remaining in Koochiching County and most are not close enough to lakes or rivers to be a serious threat to surface water quality. Federal and state cost share dollars have been allocated since 1994 to help the few remaining dairies in the county to apply waste management and nutrient management systems.

**In 1994 erosion and sedimentation were listed as low priority items. In 2000 they are listed as high priority. The category change comes as a result of public demand for cost share dollars to stabilize banks and shoreland areas along lakes and rivers. The SWCD's educational objectives have been successful in encouraging environmental awareness among local residents. Consequently, the demand for funding of grade stabilization practices has increased since 1994.

**In 1994 Wellhead Protection for Northome, Indus and Littlefork was a moderate priority item. In 2000, programs that will help protect those wells are projected to be available in two to five years.

**Best Management Practices (BMPs) were being encouraged in 1994 as a relatively new resource conservation concept. In 2000 the BMPs have been upgraded to the "Voluntary Site Level Forest Management Guidelines Program." These guidelines are locally understood and implemented by loggers and foresters.

**In 1994 the local Soil and Water Conservation District (SWCD) was under-staffed and will remain so into the next millennium. However, objectives in the 1994 CWMP and subsequent state mandates (WCA, etc.) have strengthened the roll of SWCD in natural resource conservation. SWCD staff has since been increased to two full time positions but the agencies' responsibilities continue to outgrow its budget.

The fore-mentioned items are significant examples of how local people at the local level have implemented some major components of the 1994 plan. The CWMP is a progressive plan and is clearly being implemented in Koochiching County. The Environmental Services Department and the Soil and Water Conservation District have recommended the following sequence of priorities to the Koochiching County Commissioners and the Minnesota Board of Soil and Water Resources. In order to effectively act on many of these goals and objectives, collaboration with and monetary help from state and federal agencies will, in many cases, be required. The Water Planning Task Force will meet annually, beginning in September 2000, to formulate a work plan with timelines to implement the Water Plan.

A. High Priority Goals

Goal #1: To administer and implement the CWMP

Agencies responsible for implementing the CWMP are the Soil and Water Conservation District, the Community Health Department, the Minnesota Extension Office and the Environmental Services Department. The lead agency for implementation is the Environmental Services Department. ESD is responsible for cost accounting, staff training and coordination of the CWMP.

Objective 1. Re-establish and define the Water Planning Task Force (WPTF) so it is recognizable to local government units and the public. Hold quarterly meetings. ESD, SWCD, Ext., HD

Objective 2. Establish a Water Resources Advisory Committee (WRAC) to review progress and direct implementation of the CWMP. Hold two meetings per year. ESD, KCC

Objective 3. Delegate tasks and responsibility to appropriate agencies or individuals to accomplish the high, medium and low priority sequence. ESD

Objective 4. Work with Water Plan Committee, SWCD Board, and County Board to develop a project priority list. ESD, SWCD

Goal #2: To encourage people to update their ISTS's

Objective 1. Continue the ROSS study & pilot project. ESD

Objective 2. Continue to enforce the local ISTS ordinance and to implement Chapter 7080 countywide. ESD, Assessor, Recorder

Objective 3. Continue to develop the Water Quality Cooperative as an administrative and maintenance tool to manage ISTS systems.

Comments: Most septic systems in Koochiching County do not meet 7080 standards. These systems will continue to be updated at a very slow pace because there is no incentive for homeowners to spend $7000-$10,000 on a new septic system. If watershed planning is to be effective with regard to septic systems, there needs to be some form of cost share program available. Low interest loan programs are available but do not seem to provide the incentive of a 50% cost share program. For example, the demand for cost share money to solve erosion problems has increased due to SWCD and Extension's educational efforts. Cost share money for septic systems would likely have the same public response.

Goal #3: To administer the WCA

Objective 1. Continue to work with County Commissioners and the Wetland Rule Committee on the Wetlands Flexibility Plan. ESD, SWCD, BWSR, MPCA, DNR, COE

Objective 2. Provide technical assistance to county residents, municipalities, local businesses and other units of government. SWCD

Objective 3. Assist the Technical Evaluation Panel in wetland identification and wetland management. SWCD

Comments: The first draft of the Koochiching County Wetland Plan was completed August 1999 and will be finalized in 2000.

Goal #4: To reduce erosion and sedimentation

Objective 1. Work with landowners on lake and river shoreland to implement grade stabilization and erosion control practices. ESD, SWCD, Ext., NRCS

Objective 2. Protect and improve water quality through use of riparian buffers. ESD

Comments: SWCD's and Extension's educational programs have created a high degree of environmental awareness among landowners. This has prompted a greater demand for services. Landowners are recognizing problems and are seeking ways to fix them. Consequently, SWCD continues to devote considerable resources to working with landowners on erosion control projects. The demand for state cost share exceeds dollars available. ESD, SWCD, NRCS

Goal #5: To extend sewer service to the Jackfish Bay area on Rainy Lake

Goal #6: To attempt to improve land use practices

Objective 1. Use Best Management Practices for agriculture, industry, and development along lakes and streams.

Objective 2. Follow the Minnesota Forest Resource Council's voluntary site guidelines for timber harvesting.

B. Moderate Priority Goals

Goal #1: To attempt to monitor ground water quality

Objective 1. Inventory and monitor ground water quality. ESD, SWCD, Ext. KHD, MPCA

Comments: SWCD maintains the County Well Index that will eventually provide a comprehensive picture of chemical analysis of new wells in the county. The Koochiching County Health Department and Extension Service provide low cost water sampling services to rural residents. Data from this service could be a potential source for more extensive local information about ground water quality. A process needs to be developed which will separate well water data from other water sources.

Goal #2: To assist in protecting wellheads

Objective 1. Monitor wells that serve as public water supplies for Northome, Big Falls, and Littlefork. KDH

Objective 2. Provide a wellhead protection plan for these municipalities. KDH

Objective 3. Provide a wellhead protection plan for any public water supplier adding a well to their system or that would voluntarily want to develop a wellhead protection plan. ESD, KDH

Comments: Northome, Big Falls and Littlefork are on KDH's list to receive planning assistance in approximately five years.

Goal #3: To do an unused, unsealed well assessment

Objective 1. Inventory known and suspected unused, unsealed well sites with the intention of capping them.
SWCD, ESD

Comments: No work has been done on this project due to shortage of staff. It will be a very time-consuming and possibly expensive project with logistical complications.

Goal #4: To continue to monitor closed landfills

Objective 1. Continue to implement monitoring facilities on critical, closed Landfill sites. ESD

Comments: Closed landfill monitoring is being fully implemented by ESD.

Goal #5: To assist in the removal of underground storage tanks.

Objective 1. Continue to monitor progress by MPCA as it oversees removal of tanks and treatment of contaminated soils.

Comments: This item is almost exclusively MPCA-implemented due to the severe nature of contaminants (fossil fuels). However, there may be tanks that are not covered by MPCA policy.

Objective 2. Attempt to assess the location and nature of other buried tanks in the county. ESD, SWCD, Ext., DH

C. Low Priority Goals.

Goal #1: To maintain balance between recreational use and environmental quality

Objective 1. Continue to provide interpretive and environmental information along trails, rivers, on boat ramps to inform the public of natural resource conservation efforts. ESC, SWCD, Lands & Forests

Comments: This is an on-going activity that will help improve public awareness.

Goal #2: To establish reasonable flood plain limits

Objective 1. Revise county's floodplain ordinance to make it more reasonable to administer. ESD, DNR, Assessor

Comments: The current ordinance meets federal standards but falls short in providing adequate tools to administer the ordinance. Maps do not provide flood elevation levels.

Goal #3: To safely manage storm water

Objective 1. To prevent erosion, sedimentation and surface water pollution from large-scale construction projects.

Comments: This item is included here to ensure any future large projects are subject to guidelines developed by BWSR in ESD's permitting process.

Goal #4: To continue to monitor industrial pollution (Surface water quality)

Objective 1. To reduce or prevent levels of industrial pollution. MPCA

Comments: This item is included to acknowledge the presence of the Boise Cascade Paper Mill and the potential for industrial pollution. MPCA is primarily responsible for monitoring emissions and discharges from the mill. Boise Cascade has made great environmental improvements to its facility in International Falls since 1994. Due to these improvements and MPCA monitoring, industrial pollution is now listed as a low priority item in the CWMP.

VIII. Administration of the Water Plan

A. Recommended Changes

No changes are recommended in this second generation Water Plan. It should be noted, however, that some of the changes recommended in the 1995 plan have been or are being implemented. An environmental department was created called the Environmental Services Department. Coordinated efforts to monitor water quality of the Rainy River between the U.S. and Canada are being undertaken by Indus School on the Minnesota side and Rainy River First Nations on the Canadian side. The Wetland Conservation Act was modified to allow greater flexibility to counties with 80 percent or more of their historic wetlands. Koochiching County is taking advantage of this change by developing a Wetland Flexibility Plan.

B. Adoption and Implementation

This plan shall be effective from its adoption date by the Board of Commissioners in July or August 2000 to the end of December 2005. Prior to the December 31, 2005 expiration date, the County should update the plan to be in effect from January 2006 to December 31, 2010.

C. Amendment Procedures

Any member of the public, County staff, County Commissioners, or Soil and Water Conservation District (SWCD) Board may request an amendment to the Water Plan. The determination of whether or not an amendment is required and of the amendment form shall be made by staff of the designated Local Unit of Government, as of this writing, the Koochiching County Environmental Services Department (ESD).

D. Conflict Resolution

The goals and objectives of the action plan do not conflict with those of adjacent counties or state or federal agencies. If conflict arises between this Water Plan and the plan of other jurisdictions, Koochiching County would first seek informal conflict resolution proceedings with the chair of the Board of Soil and Water Resources (BWSR).

Should said conflict not be resolved through the informal process, a formal request for hearing may be filed with BWSR. BWSR shall hold the hearing within 60 days of receipt of the request for hearing. The subject of the hearing may include any unresolved issue between or among jurisdictions but may not address the need for the Water Plan itself. BWSR shall render its decision within 60 calendar days of the hearing. Any appeal of the BWSR decision shall be made to the Court of Appeals.

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Glossary of Acronyms

BMP – Best Management Practices
BWSR – Board of Water and Soil Resources
CWMP – Comprehensive Water Management Plan
ESD – Environmental Services Department
Ext. – Koochiching County Extension Service
ISTS – Individual Sewage Treatment System
KCC – Koochiching County Commissioners
KDH – Koochiching Department of Health
MDH – Minnesota Department of Health
MNDNR – Minnesota Department of Natural Resources
MPCA – Minnesota Pollution Control Agency
NRCS – Natural Resources Conservation Service
RIM – Re-invest in Minnesota program
ROSS – Rainy On-Site Septic Solutions
SWCD – Soil and Water Conservation District
VSLMG - Voluntary Site Level Management Guidelines
WCA – Wetland Conservation Act
WPTF – Water Planning Task Force
WRAC – Water Resources Advisory Committee