

Polk County Local Water Plan



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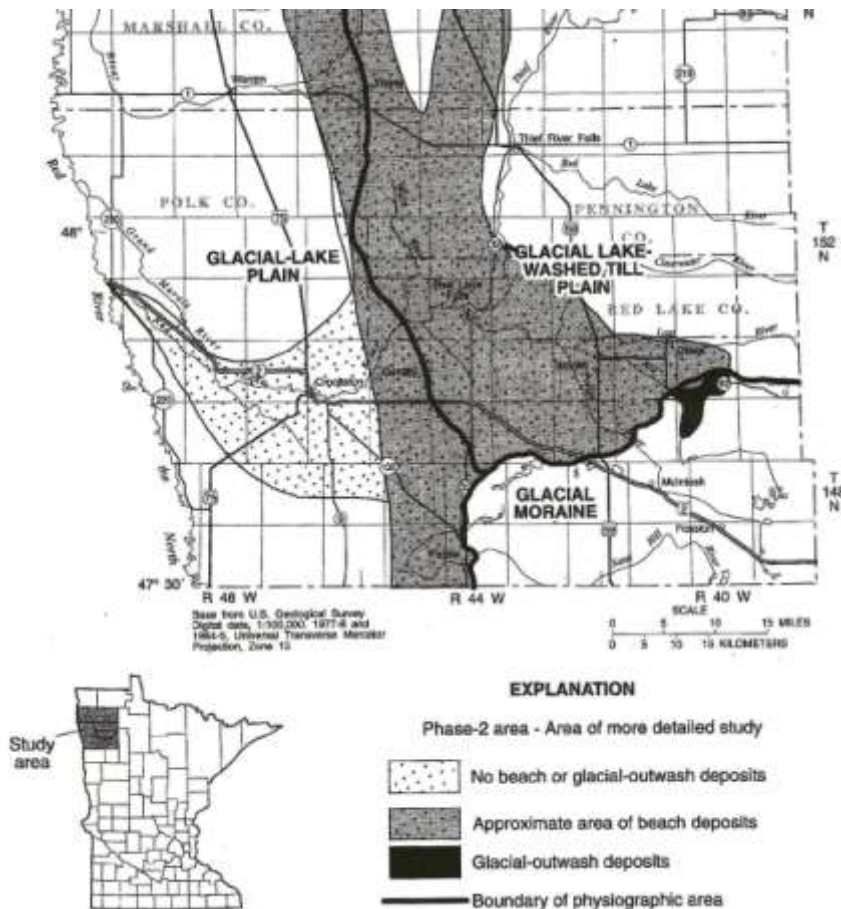
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I. Executive Summary

Introduction

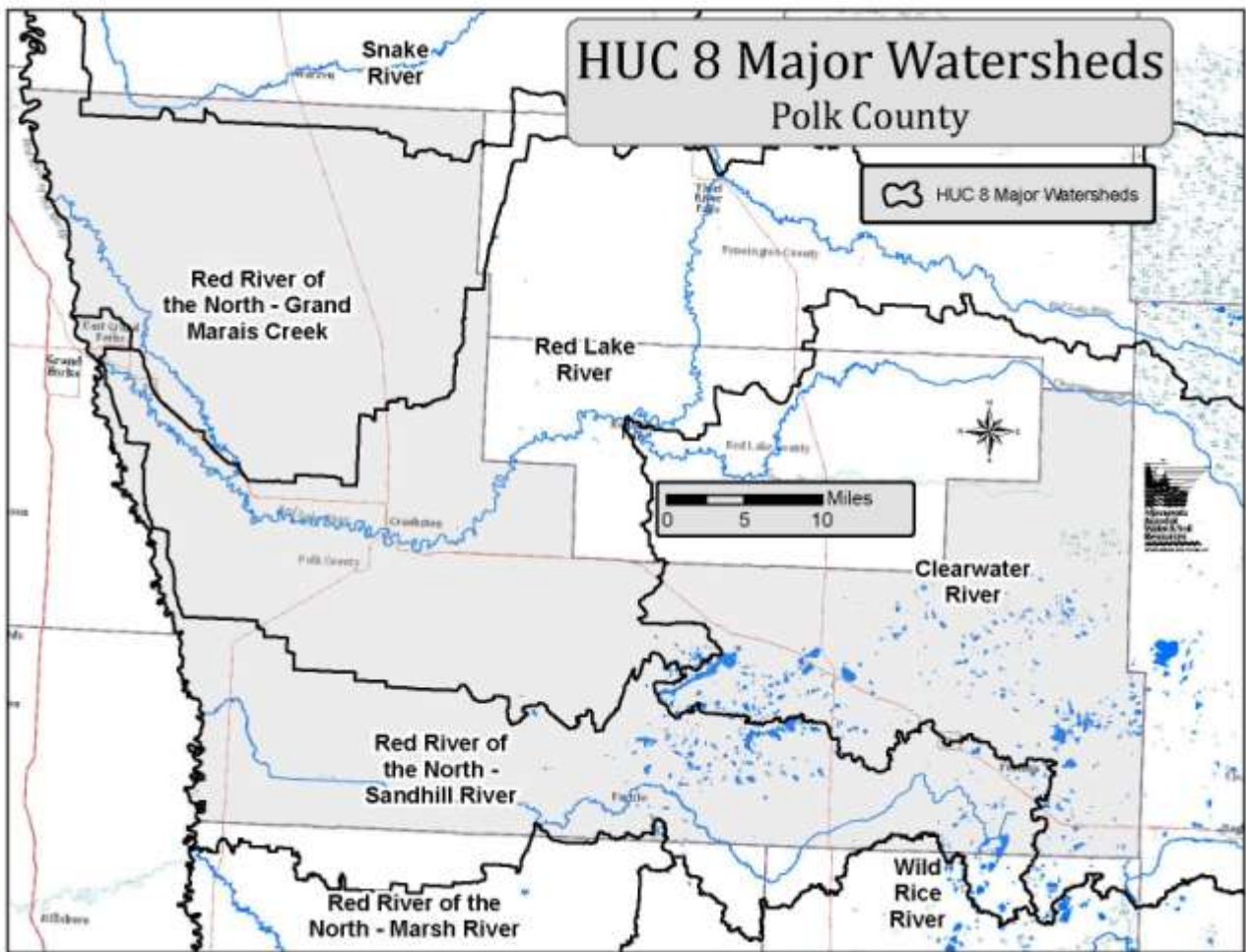
Polk County is located in northwest Minnesota. According to the U.S. Census Bureau, the county has a total area of 1,998 square miles, of which 1,971 square miles are land and 27 square miles are water. According to the April 1, 2010 census, the population of Polk County was 31,600. Projected population change as reported by the Minnesota Demographic Center, (June, 2007) show the population increases slightly (32,610) by the year 2015. The County seat is located in Crookston and the largest community is East Grand Forks. There are 58 townships and 15 cities within the county.

Polk County includes three general physiographic areas; glacial-lake plain, glacial lake-washed till plain, and glacial moraine area. The western third of Polk County is glacial-lake plain. This area is extremely flat, sloping only a few feet per mile. At one time it was the floor of glacial Lake Agassiz. The silty loam sediments that accumulated there formed fertile soils making one of North America's most fertile farming regions. The glacial lake-washed till plain is flat to gently rolling area that has local relief up to 15 feet and is located mid-county. The western part of the glacial lake-washed till plain is traversed by north-south and northeast-southwest trending long, narrow beach ridges, some are as much as 20 feet high. The glacial moraine is an area of hills and depressions that has local relief up to 150 feet and is present in the eastern part of Polk County. (U.S. Geological Survey, *Water-Resources Investigation Report 95-4201*, 1996).



Polk County lies within the Red River of the North Basin Watershed. Due to the unique lake/river basin soils left by Glacial Lake Agassiz the primary land use of Polk County is agriculturally based, approximately 78%. The 2007 Census of Agriculture County Data from the USDA National Agriculture Statistic Service shows the number of farms in Polk County is 1,609 with the average farm size at 684 acres. The total cropland acres are 976,367, 10,439 acres are irrigated land. Land use practices in the beach ridge areas have previously been gravel mining and agriculture. These areas are now trending toward the restoration of pre-settlement conditions.

Four major watersheds are predominant within the jurisdictional boundaries of Polk County. They include the *Grand Marais Creek*, *Red Lake River*, *Sand Hill River* and the *Clearwater River Watersheds*. Three other major watersheds have small acreage within the County. They are the *Wild Rice*, *Snake*, and *Marsh Watersheds*.



Purpose of the Local Water Management Plan:

The purpose of this updated Local Water Management Plan (LWMP) is to identify existing and potential problems and opportunities for protection, management and development of water resources and related land resources in Polk County. Pursuant to the requirements of Minn. Stat. 103B311 subd.4, the five requirements of this plan are as follows:

1. The plan must cover the entire county.
2. The plan must address problems in the context of watershed units and groundwater systems.
3. The plan must be based upon principals of sound hydrologic management of water, effective environmental protection, and efficient management.
4. The plan must be consistent with local water management plans prepared by counties and watershed management organizations wholly or partially within a single watershed unit or ground water system.
5. The plan will cover a ten year period (2012 – 2022) with an implementation plan that will cover a five year period (2012 – 2017) and will then be update for the remaining five years.

Polk County Local Water Management Plan's Update Process

The Polk County Water Plan focuses on water and related land resource issues. The county has gathered and studied available information relating to the physical environment, including, but not limited to, the surface and ground water resources, and their related land use.

Concerns were identified, analyzed, and prioritized by the Polk County Water Plan Task Force Committee within the context of the watershed units and ground water systems where appropriate. The plan applies to the entire area within the county.

The Polk County Water Plan is coordinated and administered by the East Polk Soil and Water Conservation District and the West Polk Soil and Water Conservation District.

The Polk County Water Plan (previously known as the Polk County Comprehensive Local Water Plan) was first developed and approved by the Minnesota Board of Water and Soil Resources in 1990. It was developed as a five year plan and was updated in 1997 (the 1990-1995 Plan was granted a two year extension). The 1997-2002 Plan was granted a two year extension. The 2005 to 2009 plan was also granted a two year extension which expired December 31, 2011.

Priority Concerns of Polk County

Priority Concern #1

The Polk County Local Water Management Plan will focus on protection and enhancement of surface water quality. Specific areas of focus will be:

- Lake Region in the eastern part of the county, with specific focus on the human impacts.
 - Increases in development around smaller, non-recreational lakes and larger wetland complexes should be assessed to determine if adverse impacts have affected the water quality of these smaller bodies of water.
 - For nearly all of the lakes in this ecoregion phosphorus is the limiting factor. Major management efforts related to water quality are directed at limiting the amount of phosphorus loading into the lakes.
 - Sediment loading has also become a major concern to the water quality of the lakes. Proper land use management and implementation of Best Management Practices needs to be analyzed and addressed.
- Surface water and ground waters in the western part of the county.
 - The City of East Grand Forks receives its public water supply from the Red Lake River.
 - The Red Lake River is impaired for turbidity and management efforts should focus on sediment loading into the Red Lake River and its tributaries.
- In addition to the above mentions specific areas of concern for Polk County, The County Board, Watershed Districts and SWCD's will actively pursue efforts to address surface water quality concerns within the county.
- Although surface water is of primary concern for Polk County we will be responsive to the need to monitor and protect our groundwater resources. We will participate to our fullest capacity but state and federal agencies such as Minnesota Department of Health (MDH) and United States Geological Survey (USGS) will need to be the primary source for groundwater protection and management.

Priority Concern #2

Due to the fluvial geomorphic characteristics of the Red River of the North Basin, Polk County is subject to frequent flooding. Some factors such as topography and increase precipitation are unmanageable, but other factors such as flood plain encroachment, channelization of waterways, land use practices and effective private drainage into public systems, are factors that can be assessed for *Best Management Practices*.

- Polk County Local Water Management Plan will focus on the quantity of water passing through the County and its associated watersheds by inventorying, assessing and evaluating the drainage infrastructure.

Priority Concern #3

Polk County is concerned with the preservation and enhancement of its natural resources. The geology of Polk County is divided into 3 distinct areas; the glacial-lake plain, glacial lake washed till plain and glacial moraine region. These major areas, because of their size, unique geographical features, and wide diversity of natural resources are of significant benefit to the area and citizens.

- Polk County in cooperation with other local, state, and federal agencies will work to restore, enhance and protect these areas through programs and projects that accomplish this; cautious it is not done at the expense of the local economy.

Priority Concern #4

Polk County Local Water Management Plan will identify any new or yet to date undiscovered exotic and invasive species for prevention and management practices.

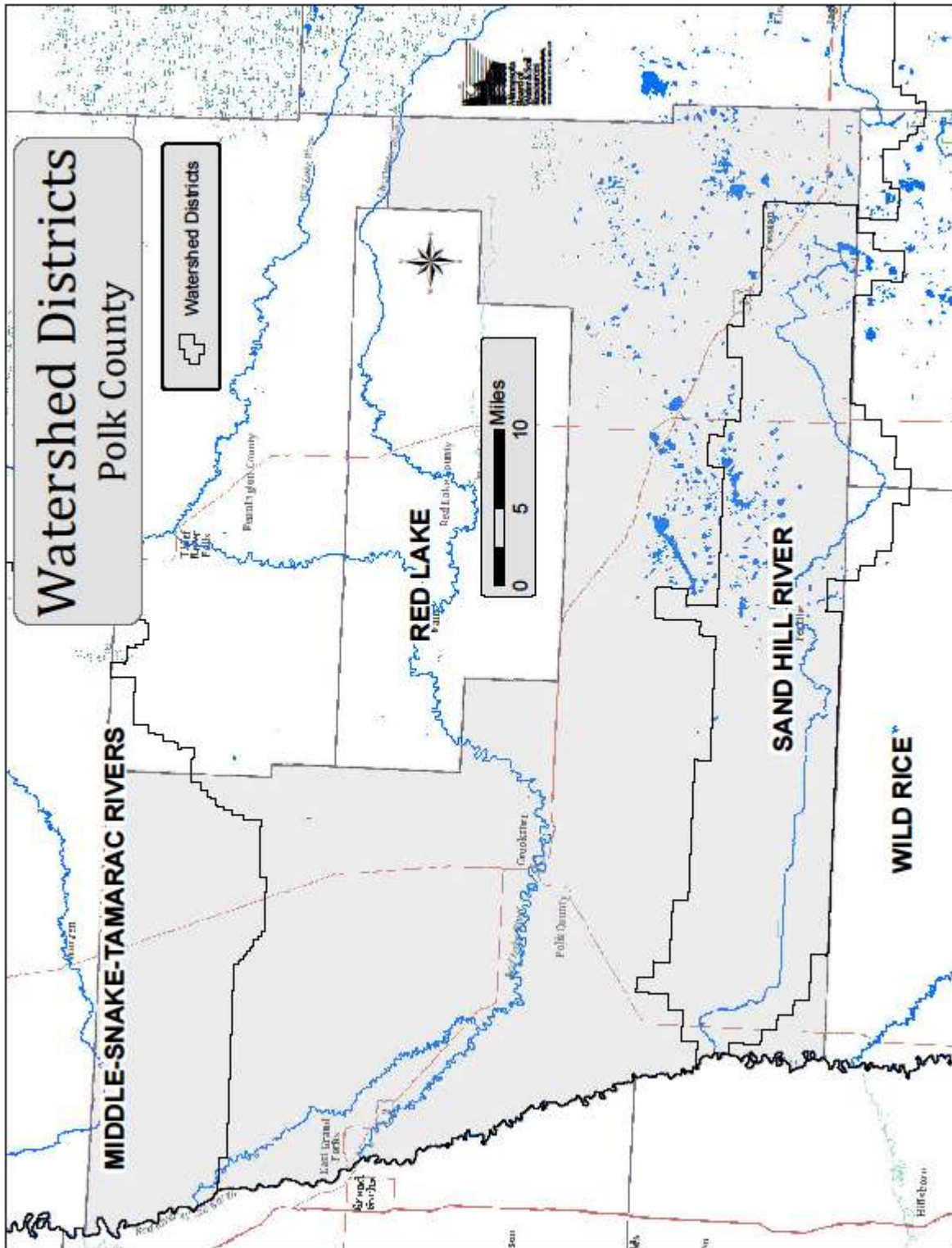
Consistency with Other Plans

In preparation of the Polk County Local Water Plan the most recent plans from several entities were examined to ensure consistency with their concerns. Major plans reviewed were the Sand Hill Watershed District Draft Watershed Management Plan and the Red Lake Watershed District Comprehensive 10 Year Plan. Local plans include Local Water Plans from adjacent counties, and local annual plans from SWCD's and Polk County Environmental Services. The Polk County Local Water Management Plan Update has utilized appropriate action items to support these plans and is consistent with goals and objectives presented in these plans.

The plan is also based on key economic and environmental principles, and is consistent with other plans that exist for Polk County, including Watershed Districts, Soil and Water Conservation Districts, Environmental Service agencies, Red River Valley Basin organizations, and appropriate state and federal agencies.

The plan also takes into consideration the adjacent County Local Water Management Plans in its water management strategies. All the river systems flowing through Polk County are influenced by watersheds that go beyond the jurisdictional boundary of Polk County, therefore to manage water on a watershed bases coordination with adjacent counties with common watersheds to Polk County will be required.

The four major watersheds that have drainage areas within the boundaries of Polk County include the *Grand Marais Creek*, *Red Lake River*, *Clearwater River Watersheds*, which are within the boundaries of the Red Lake Watershed District and the *Sand Hill River* which is the boundary for the Sand Hill River Watershed District. Having been an active participant in the updating processes of the Red Lake Watershed District Overall Plan, which was updated in 2006, and the Sand Hill River Watershed District Overall Plan in 2011 it is the intentions of Polk County Board of Commissioners and the Board of Supervisors for the West and East Polk SWCDs to recognize these Watershed District overall plans as a major reference documents for the implementation strategies for the priority concerns identified in the Polk County Local Water Management Plan. We support this approach based on the principles that water management is best managed on a comprehensive watershed basis. We realize we only make up portions of four of the sub-watersheds addressed in these 2 Watershed overall plans. We intend to reference these frequently as we proceed to implement local water management in our county.



Watersheds in Polk County

Under legislative mandate, revisions to County Water Plans must be written within a watershed context. The purpose of this requirement is to ensure that counties look beyond the jurisdictional boundaries when making assessments and goals for water quality issues. By doing this, the county will be able to identify trends, problems and opportunities that are specific to a watershed rather than assuming the problem or issue is confined to political boundaries.

For the County to have an enduring impact on water management issues on a watershed basis, be it for water quality or quantity Polk County will need to implement actions that are in concert with those of other jurisdictions within a watershed such as other counties, SWCDs, or in the case of Polk County, Watershed Districts.

Four major watersheds are predominant within the jurisdictional boundaries of Polk County. They include the *Grand Marais Creek, Red Lake River, Sand Hill River and the Clearwater River Watersheds*. Three other major watersheds have small acreage within the County. They are the *Wild Rice, Snake, and Marsh Watersheds*.

Grand Marais Creek Watershed



The Grand Marais Watershed lies in the northwestern portion of Polk County. It totals 466 square miles including portions in Polk, Marshall and Pennington Counties in Minnesota; North Dakota, counties include Walsh and Grand Forks. In Polk County the watershed includes 358 square miles, making up 76.9 percent of the watershed. Polk County communities within this watershed are: Angus, Euclid, Sherack, and Tabor.

In Polk County the majority of the watershed lies within the Agassiz Lake Plain. Beach ridge areas of the watershed can be found in Helgeland, Brandt, Belgium and Parnell Townships. No lakes are located in within this watershed. Land use is primarily agriculture production and is extensively drained. Few wetlands remain in the Agassiz Lake Plain. Wetlands can be found in the beach ridge areas, and the potential for calcareous fens exists in these areas.

The main resource concerns in the watershed are wind and water erosion, nutrient management, wetland management, surface water quality, flood damage reduction, and wildlife habitat. Many of the resource concerns relate directly to flooding and increased sediment and pollutant loadings to surface waters.

The following information is taken from the RLWD 10 Year Comprehensive Plan. The Grand Marais watershed is dominated by private lands in agricultural production and a series of ditches that drain into the Grand Marais Creek. The portion of this watershed west of

U.S. Highway 75 is almost 100 percent agricultural land. West of U.S. Highway 75, narrow bands of natural lands are found along the Red River and along the Grand Marais Creek. East of U.S. Highway 75, there is a mix of grasslands and agricultural lands with some wetlands. Two WMAs in this area also provide some quality habitats; however, CRP lands provide the majority of grassland and wetland habitats. This area east of U.S. Highway 75 lies along the Campbell Beach Ridge.

Quality habitats in the western portion of this subwatershed are limited to the areas adjacent to Grand Marais Creek and the Red River. These habitats provide seasonal and permanent homes to a variety of species including game species such as white-tailed deer and waterfowl. Quality habitats in the eastern portion of the subwatershed include grasslands, wetlands and some brushlands. These areas provide seasonal and permanent habitats to a variety of species including game species such as white-tailed deer, prairie chicken and sharp-tail grouse. The prairie chicken population has increased dramatically in recent years.

The Grand Marais Creek is the primary waterway in this subwatershed. The waterway provides limited seasonal habitat to a few fish species. The alignment of most of this creek has not been significantly changed but adjacent land use and its hydrology have significantly changed. Large drainage system ditches outlet directly into the Grand Marais at almost every mile and roads cross the waterway almost every mile. The natural outlet of the Grand Marais was bypassed and the waterway now flows straight west to the Red River. This outlet is unstable and has likely altered fish passage between the Red River and the Creek. The hydrology of this subwatershed has been modified due to drainage and land use changes (flashy flows extended periods of low flow). Historically, there is anecdotal evidence that the waterway and its corridor provided quality habitats for waterfowl nesting and production.

The Grand Marais subwatershed consists of an approximately 317 square mile area. The watershed outlets into the Red River approximately nine miles north of East Grand Forks and begins just west of the Goose Lake Swamp area. The watershed is located mainly within the Red River Valley ecoregion with the extreme eastern portion entering the Glacial Lake Agassiz/Aspen Parklands ecoregion. Soil textures range from fine in the western two-thirds of the watershed to sandy-loam/fine-loam in the eastern third of the watershed. The area consists largely of agricultural land (94 percent), but is also made up forest, wetlands, urban and grassland. Elevations range from 1,000 mean sea level (msl) in the east to 800 feet msl along the Red River of the North.

Red Lake Watershed



This watershed lies in the west central portion of Polk County and into western portions of Red Lake and Pennington Counties. The Red Lake Watershed totals 1,420 square miles with 480 square miles included in Polk County. The river flows southwesterly through the towns of Thief River Falls, Red Lake Falls, and Crookston before converging with the Red River of the North in East Grand Forks. Polk County communities within this watershed are: Crookston, Fisher, Gentilly, and Mentor. This river is of great importance for recreation, wildlife habitat and drinking water. The river supports a healthy diversity of fish species as well as retaining a quality vegetative riparian buffer zone in the glacial moraine and glacial moraine-washed tilled plain (beach ridge) physiographic areas of the watershed. It is

used as a source for public water supply for the cities of East Grand Forks and Grand Forks.

In Polk County the watershed lies within the Agassiz Lake Plain to the west with beach ridge areas in the eastern portion. Land use is primarily agricultural production in the Agassiz Lake Plains area with main crops being small grain, sugar beets and soybeans. This area is extensively drained; few wetlands remain in the western portion of the watershed. Land Use in the beach ridge area is primarily agricultural consisting of crops, cattle production and temporary restoration (CRP) of native habitat. Sand and gravel mining are significant natural resources that are mined on the beach ridges. Glacial Ridge National Wildlife Refuge, the United States' largest tall grass prairie and wetland restoration project is located in the beach ridge area of the watershed.

The main resource concerns in the watershed are wind and water erosion, nutrient management, wetland management, surface water quality, flood damage reduction, and wildlife habitat. Many resource concerns relate directly to flooding and increased sediment and pollutant loadings to surface waters.

The following information is taken from the RLWD 10 Year Comprehensive Plan.

The Lower Red Lake River basin includes the Heartsville Coulee, Burnham Creek and Lower Red Lake River minor subwatersheds. The Heartsville Coulee and most of the Burnham Creek watershed areas are dominated by lands in agricultural production. Small patches of woodland and grassland habitat exist near waterways and along the Red River. These areas provide limited habitat to some species including game species such as white tailed deer. The Lower Red Lake River watershed (generally east of U.S. Highway 9) and eastern portions of the Burnham Creek watersheds have more diverse habitats including agriculture, grasslands, wetlands, brushlands and woodlands. Included in these areas are numerous WMAs, waterfowl protection areas (WPAs).

CRP lands are also common along State Highway 102 (until about 8 miles west of U.S. Highway 9) and in areas along and east of U.S. Highway 9. These lands provide seasonal and permanent habitats to a variety of species including game species such as white-tailed deer, sandhill crane, waterfowl, prairie chicken and sharp-tail grouse. The prairie chicken population has increased dramatically in recent years.

Burnham Creek and Heartsville Coulee provide some seasonal habitat for fish. The Lower Red Lake River provides a diversity of habitats year round. Many tributaries to these streams (natural and ditches) are unstable with large amounts of active erosion. A Dam on the Red Lake River at Thief River Falls limits fish passage and the potential for this watershed to produce fish. An important historical lake sturgeon spawning bed is located at the confluence of the Lower Red Lake and Clearwater rivers.

The Lower Red Lake River watershed consists of an approximately 874 square mile area. The watershed outlets into the Red River of the North at East Grand Forks, and begins just downstream of the dam in Thief River Falls. The watershed is located mainly within the Red River Valley and Glacial Lake Agassiz/Aspen Parklands ecoregions. Soil textures range from fine in the western portion of the watershed to sandy loam in the east portion of the watershed. There are two sand ridges west of Thief River Falls along what is commonly termed the Pembina Trail. The area consists largely of agricultural land, but is also made up of forest, wetlands, urban and grassland.

This subwatershed is also comprised of two minor subwatersheds which outlet into the Red Lake River. They are the Heartsville Coulee and Burnham Creek minor subwatersheds. The Lower Red Lake River subwatershed is bordered along its north side by the Grand Marais subwatershed. The drainage from within the smaller minor subwatersheds ends up in the Red Lake River in the western half of the watershed. The Thief River and Upper Red Lake River subwatersheds are tributaries to the Lower Red Lake River subwatershed in Thief River Falls. The Clearwater River subwatershed is a tributary to the Lower Red Lake River in Red Lake Falls.

There are no lakes in this subwatershed. Wetland areas are scattered throughout the area. These wetland areas are somewhat denser in the extreme southeastern portion of the subwatershed, generally south of U.S. Highway 2 and east of State Highway 102. Many of the wetlands in this watershed have been altered by farm drainage for the purpose of agricultural production. Drainage systems in this subwatershed are a complex network of natural streams and legal ditch systems. Generally the ditch systems are under the administration of the county or watershed district in which they reside.

The subwatershed is located in the Lake Plain physiographic area of the RLWD. The surficial geology of the area consists of mainly clay with small regions of silt, sand, sand and gravel ridges and lake-washed till. Clay deposits dominate the Lower Red Lake River subwatershed and are characterized as being very dense, uniform and of low permeability. Thicknesses can range from a few feet in the eastern part of the watershed to more than 120 feet in the western portions. Nearly level topography in this region also relates to poor drainage. Sand and gravel ridges, known as beach ridges from Glacial Lake Agassiz, occur in mainly north-south trending

ridges that range in thickness from a few feet to 30 feet in some areas. Drainage is good within the ridges, but can be poor in the inter-ridge areas where deposits of peat are evident. The fine sand or silt deposits in the area are fairly uniform and are underlain by till and clay. Thicknesses for both deposits are generally less than 20 feet. Lake-washed till deposits are described as sandy, clay-silt loam that contains fine to medium gravel with a scattering of boulders. The deposits are generally not well drained.

Glacial aquifers in the region only provide moderate amounts of groundwater. Suitable yields of 5 gpm, or more for domestic use, are mainly found in sand and gravel deposits in the till. Beach ridge deposits are limited in aerial extent and saturation is limited to a few bottom feet. Groundwater supplies from the smaller beach deposits are unreliable due to periods of limited precipitation. Groundwater supply for industrial use and irrigation is generally poor. Quantities and quality for such uses are inadequate. Hardness of the groundwater is commonly greater than 180 mg/l.

Paleozoic sediments consisting of shales and limestones are discontinuous and underlie the glacial lake deposits along the western side of the subwatershed. The western tip of the subwatershed near East Grand Forks contains Paleozoic limestone and sandstone that is thin and discontinuous. Paleozoic deposits contain highly saline groundwater. Precambrian crystalline rocks underlie most of the subwatershed, forming the base of the groundwater reservoir for most of the watershed. The fractured surface of crystalline rocks may provide an adequate supply of groundwater for limited domestic use.

Clearwater Watershed



The Clearwater Watershed is approximately 1,385 square miles in size with 493 square miles located in the eastern portion of Polk County. The Clearwater River begins in western Clearwater County and flows to the northwest and southwest, eventually emptying into the Red Lake River near Red Lake Falls. Polk County communities within this watershed are: Erskine, Gully, Lengby, McIntosh, and Trail.

In Polk County this watershed contains beach ridge areas in the western portion and moraine areas in the eastern portion. Landforms in this area contain hill and depressional areas. Rydell National Wildlife Refuge is located on the beach ridge prairie to forest transition zone. Polk County land use in this watershed is

agricultural production, gravel mining, recreation, forest, and residential/commercial development. Many wetland areas remain throughout the watershed. Calcareous fens exist in this area as do rare and endangered plants.

The main resource concerns in the watershed are wind and water erosion, nutrient management, wetland management, surface water quality, flood damage reduction, and wildlife habitat. Many of the resource concerns relate directly to flooding and increased sediment and pollutant loadings to surface waters.

The following information is taken from the Red Lake Watershed 10 Year Comprehensive Plan. The Clearwater basin includes Upper and Lower Badger creeks, Clearwater River, Hill River, Lost River and Poplar River minor subwatersheds. The landscapes in these subwatersheds provide a diversity of habitats with farmlands, grasslands, woodlands, wetlands, riparian areas and lakes. Public lands with quality habitats include numerous WMAs, WPAs and Rydell NWR. The majority of these lands are in the beach ridge areas. These include a mix of uplands and wetlands with some woodland areas. These lands provide seasonal and permanent habitats to a variety of species including game species such as white-tailed deer, sandhill crane, waterfowl, prairie chicken and sharp-tail grouse. CRP lands are present throughout the watershed with a concentrated band running east to west generally along the southeast border of Red Lake County (along a beach ridge area). These CRP lands are primarily grasslands. Several wild rice operations also provide some migratory wildlife habitat.

Lakes are prominent and important resources in this watershed. In particular, a number of small lakes are found throughout the southern half of the watershed. These include a mix of fishing and natural environment lakes that provide seasonal and migratory habitat for a variety of species.

Six natural waterways and their tributary networks are also important natural resource features of this watershed. These streams provide a variety of permanent and seasonal habitats for a variety

of fish species. The Clearwater River is a trout stream from Clearwater Lake to the east Clearwater county line. The stream is somewhat degraded upstream from this area. From lake to confluence with Ruffy brook the stream is in good shape. Pasture and woodlands form its corridor. Some wild rice production is present near its confluence with Ruffy Brook and there is an ongoing USACE project in the reach from Ruffy Brook to about five miles east of Plummer. The Poplar River, Hill River, Lost River and Upper and Lower Badger Creek are smaller systems than the Clearwater and primarily provide spawning and rearing habitat for fish. In most areas they have intact corridors that include some pasture areas. Portions of some streams have been dredged in the past but have become naturalized (e.g., Lost River between Oklee and Gully).

The watershed outlets into the Red Lake River at Sportsman's Park in Red Lake Falls, MN. The Lost, Hill and Poplar rivers are minor tributaries to the Clearwater River. The watershed is located mainly within the Glacial Lake Agassiz/Aspen Parklands and Glacial Moraine ecoregions, but is bordered by the Northern Minnesota Drift and Lake Plains ecoregion. Soil textures range from loamy-skeletal in the southeastern portion of the watershed to sandy in the west portion of the watershed. The area consists largely of agricultural and forest land, but is also made up of wetland, urban and grassland.

This subwatershed is also comprised of five smaller subwatersheds which outlet into the Clearwater River. These five subwatersheds include the Beau Gerlot Creek, Badger Creek, Hill River, Lost River and Poplar River subwatersheds. The Clearwater River subwatershed is bordered along its north side by the Upper Red Lake River subwatershed. All of the drainage from within the smaller subwatersheds ends up in the Clearwater River. All of the water comes together in the Clearwater River and outlets at the confluence with the Red Lake River in Red Lake Falls.

There are many lakes in the Clearwater River subwatershed. There are 28 lakes larger than 100 acres and 107 lakes smaller than 100 acres. Major lakes for recreation include Maple, Cameron, Badger, Clearwater, Pine, Oak, Cross, Turtle, Buzzel and Whitefish. The larger lakes typically support a fishery, with the majority of smaller lakes only supporting waterfowl hunting as a recreation. Much of the shoreline is developed on the larger lakes, and the majority of small lakeshores are undeveloped.

Wetland areas are scattered throughout the area. These wetland areas are considerably denser in the extreme northeastern portion of the subwatershed, especially within the Red Lake Reservation, where the original wetlands are intact. Many of the wetlands have been altered by farm drainage, and many wetlands have been drained for the purposes of agricultural production.

Sand Hill River Watershed



The Sand Hill River Watershed lies in the southern portion of Polk County and comprises an area of 483 square miles. Norman and Mahanomen counties comprise the remaining small areas 5 percent and 6.4 percent respectively. The watershed map shows the Sand Hill-Wilson watershed including the North Dakota portion. The total area of the Sand Hill-Wilson watershed is 1,107 square miles.

The Sand Hill River is relatively unbranched as it traverses the district. One notable exception is Kittleson Creek. Kittleson Creek is located in the north central part of the district and joins the Sand Hill River between Fertile and Beltrami. These watercourses consist of an intermingling of natural streams and public and private drainage systems. Most of the land traversed by the Sand Hill River is characterized by low relief and is in agricultural production. The Sand Hill River flows to the west from Sand Hill Lake south of Fosston towards Winger, Fertile, Beltrami and Nielsville to the confluence with the Red River of the North near Climax. Other watersheds bordering the SHRWD are the Wild Rice River (south and east), and Red Lake River (north and east). The western boundary is the Red River of the North. Polk County communities within this watershed are Beltrami, Climax, Fertile, Fosston, Nielsville, and Winger.

In Polk County the watershed lies within the Agassiz Lake Plain to the west with beach ridge area of the watershed in the south/central portions and moraines to the east. Land use is primarily agricultural production in the Agassiz Lake Plain area and is extensively drained. Very few wetlands remain in the western portion of the watershed. Wetlands are common in the glacial moraine region as well as in low areas between the beach ridges. There are many small lakes within the north-central portion of the SHRWD between Fertile and Winger. All of the lakes are in Polk County. Most of these lakes tend to be closed basins or have poorly developed outlets. Union and Sara Lakes are the largest and most heavily developed in the District. Cable, Sand Hill, Union and Sara Lakes are considered Recreational Development Lakes on the DNR Protected Waters Inventory. Kittleson Lake is also a recreationally important lake in the District.

The main resource concerns in the watershed are wind and water erosion, nutrient management, wetland management, surface water quality, flood damage reduction, and wildlife habitat. Many of the resource concerns relate directly to flooding and increased sediment and pollutant loadings to surface waters.

The following information is taken from the Sand Hill Watershed District Watershed Management Plan (Draft, May 2011). The geology of the Red River Basin and the SHRWD, as a microcosm, consist of glacial lake deposits, lakeshore deposits, till and a small amount of ice-contact deposits overlying the bedrock. Bedrock in the east part of the basin consists of Precambrian, undifferentiated igneous, and metamorphic rock. Bedrock in the west part of the

basin consists of a small band of Cretaceous, fine grained sandstone and shell. Clay and silt lake deposits dominate the Lake Agassiz plain bordering the Red River of the North. A transition zone between the lake plain and the glacial moraine areas is formed by lakeshore deposits, delta sand, and gravel.

Species of wildlife hunted in the area include whitetail deer, waterfowl, pheasants, and ruffed grouse. The hunting of waterfowl is attractive because many ducks and geese are produced locally in the SHRWD's numerous prairie potholes, and the watershed lies in the path of the Mississippi flyway. Geese, mallards, wood ducks, and blue-winged teal are most common in the pothole area.

The primary watercourse within the District is the Sand Hill River. A number of tributaries with differing channel size, slope and drainage area join the Sand Hill River as it flows west toward the Red River of the North. Kittleson Creek outlets into the Sand Hill River in the north central portion of the District. Few additional discrete tributaries join the Sand Hill River within the western part of the District. Rather, individual legal drainage systems serving agricultural land outlet into the Sand Hill River in the extreme western portion of the District.

The parent material for the soils in the western portion of the District is comprised of lacustrine sediments formed by glacial Lake Agassiz. Typical soils in this area vary from fine-silty clays along the western edge to very fine clay. In the central portion of the District soils range from clay loams and sandy loams mixed with sands and gravels. Soils in the eastern portion of the region consist of rolling and hilly areas of dark colored medium texture soils characterized as fine-loamy.

II. Priority Concern Assessments

Priority Concern 1: Surface Water Quality

A) The Polk County Local Water Management Plan will focus on protection and enhancement of surface water quality. Specific areas of focus will be:

- Lake Region in the eastern part of the county, with specific focus on the human impacts.
 - Increases in development around smaller, non-recreational lakes and larger wetland complexes should be assessed to determine if adverse impacts have affected the water quality of these smaller bodies of water.
 - For nearly all of the lakes in this ecoregion phosphorus is the limiting factor. Major management efforts related to water quality are directed at limiting the amount of phosphorus loading into the lakes.
 - Sediment loading has also become a major concern to the water quality of the lakes. Proper land use management and implementation of Best Management Practices needs to be analyzed and addressed.

The Lakes region of the County has a direct impact on the economy of not only the county but the region. Lakes in this region are used for recreation, including boating, fishing, waterfowl hunting, swimming, and camping. They are used by permanent residents, summer home residents, and tourists who are attracted to this area from all over the United States and Canada. Public access and campgrounds are available for public use on many lakes. Many year-round residences and summer residences have been built in part because of the recreational and aesthetic appeal of the area. Fishing is popular in these lakes. Common fish found in these waters include bass, northern pike, and pan fish. To maintain this it is vitally important to have good water quality in and around the Counties lakes. That is why the County has identified this specific area so that these valuable natural resources may be preserved.

Lake Water Quality Data

The Minnesota Department of Natural Resources Lake Water Quality Data Summary for lakes in Polk County indicates that lakes are categorized by trophic status. Trophic status is the level of growth or productivity of a lake as measured by phosphorus content, algae abundance, and depth of light penetration. Eutrophic lakes are defined as nutrient rich lakes, usually shallow, “green” and with limited oxygen in the bottom layer of water. Mesotrophic lakes are defined as midway in nutrient levels between the eutrophic and oligotrophic lakes. Oligotrophic lakes are relatively nutrient poor, clear and deep with bottom waters high in dissolved oxygen. No lakes in Polk County are considered oligotrophic. The Minnesota Department of Natural Resources Lakefinder Website offers information on 60 lakes in Polk County. Lake information, maps, water levels, water quality, topography and more can be found at: www.dnr.state.mn.us/lakefind/index.html .

MN DNR Lake Water Quality

Waterbody	Trophic Status
Badger	Mesotrophic
Breeze	Mesotrophic
Cable	Eutrophic
Cameron	Eutrophic
Hill River	Eutrophic
Maple	Eutrophic
Poplar	Eutrophic
Sand Hill	Mesotrophic
Sarah	Eutrophic
Store	Eutrophic
Turtle	Eutrophic
Union	Mesotrophic
Whitefish	Eutrophic

Sand Hill River Watershed

The following information is taken from the Sand Hill River Watershed District Management Plan. In the mid 1990's, the MPCA evaluated the ability of lakes within the Sand Hill River Watershed to meet the goal of being swimmable and aesthetically pleasing. The MPCA based the assessment primarily on the trophic status of lakes with the Sand Hill River Watershed through the use of actual lake water quality data. This analysis showed "good" water quality for Union, Sarah, Cable, and Sand. This determination of good water quality was based on comparison to other similar lakes within the ecoregion.

Increased demands on these water bodies, however, also leads to a risk of water quality degradation. While there are varying degrees of reduced water quality, impacts can already be seen on some of the SHRWD lakes. Twenty-four lakes in the Sand Hill River Watershed District have been identified as priority lakes for management. More information on the SHRWD lake management framework can be found in the Sand Hill River Watershed District Watershed Management Plan (Draft, May 2011).

General Characteristics of Lakes in the Sand Hill River Watershed District

Lake Name	ID	Lake Area	Quality	Sensitivity to Disturbance
LaDuc	03030400	101	high	Moderate
Ketchum	03064800	170	high	Moderate
Frethem	03064600	65	marginal	High
Allen	03031300	156	high	Moderate
Eastland	03065900	41	high	Moderate
Simonson	03065700	137	high	Moderate
Sand Hill	14009900	598	marginal	High
Labrie	14002100	193	high	Moderate
Hilligas	14001900	130	marginal	High
Strand	03061900	28	impaired	High
Clydes	03029200	47	moderate	Moderate
Newton	03052800	46	moderate	High
Matson	03030200	42	moderate	Moderate
Union	03052600	910	moderate	Moderate
Sarah				
Bungum	03029300	67	moderate	Moderate
Halverson	03043000	161	moderate	Moderate
Maltrod	03024100	20	moderate	Moderate
Rindahl	14008900	54	moderate	High
Cable	14003000	82	moderate	Moderate
Arthur	14010000	123	moderate	Moderate
Lundby	14007800	33	moderate	Moderate
Kittleson	03035200	304	moderate	Low
Chicog	03057900	113	moderate	Low

Fisheries in Polk County

The Minnesota Department of Natural Resources fisheries managers stock walleyes in several Polk County lakes. Stocking levels are adjusted up and down as necessary. The goal of these manipulations is to find appropriate stocking levels that increase or maintain healthy walleye populations. The following chart shows fish stocking rates for the previous three years. More information on fish stocking can be found on the MN DNR website: www.dnr.state.mn.us

MN DNR Stocking Rates in Polk County

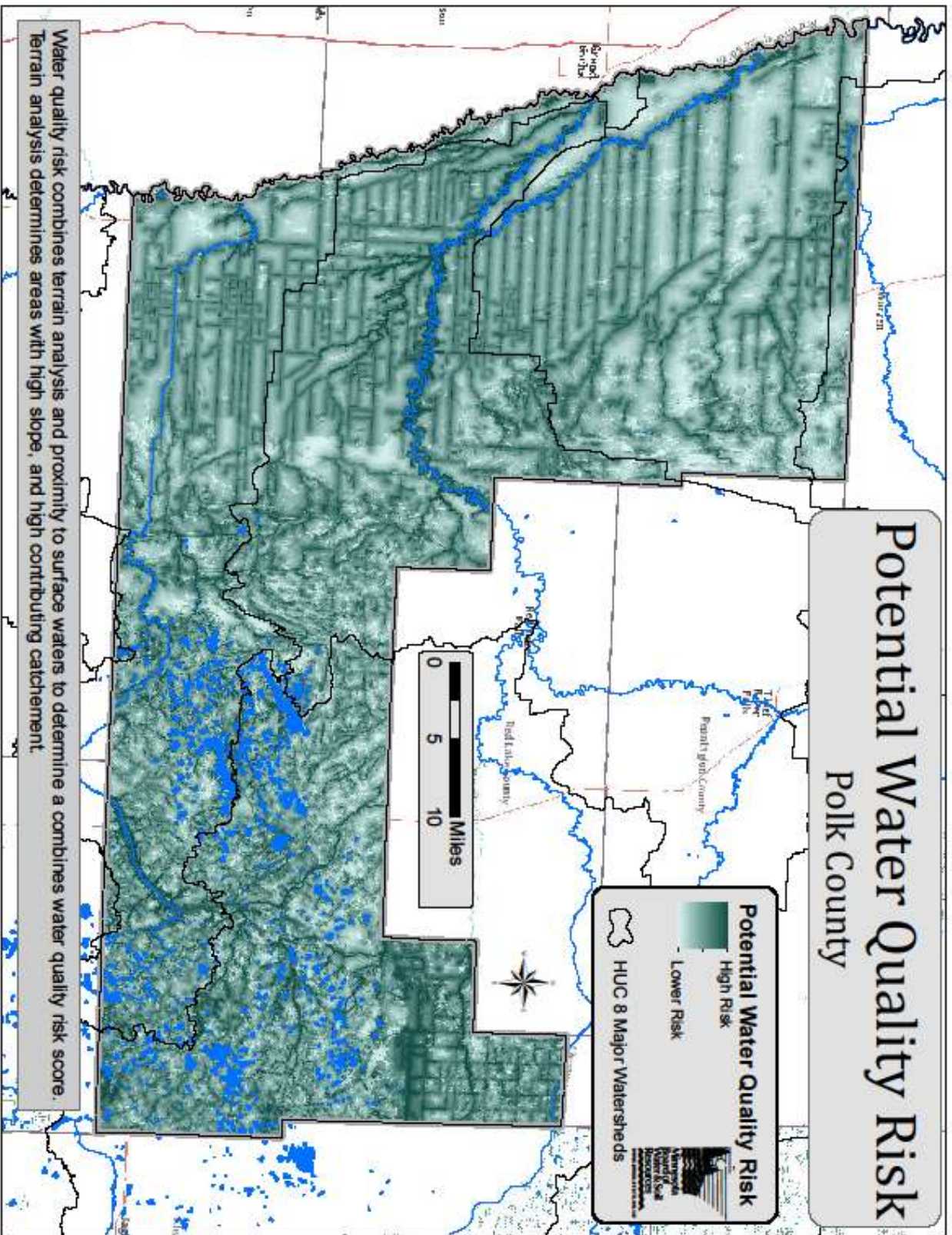
Lake	Year	Species	Fry	Fingerling	Yearling	Adult	Total LBS
Erskine Kid's Pond	2010	Bluegill Sunfish	0	0	0	715	300
Maple	2010	Walleye	0	19,750	605	0	1,451
Sarah	2010	Walleye	180,000	0	0	0	1.6
Spring	2010	Walleye	0	732	0	0	44
Union	2010	Walleye	591,000	0	0	0	5.3
Cross	2009	Walleye	303,000	0	0	0	2.8
Erskine Kid's Pond	2009	Bluegill Sunfish	0	0	0	1,200	300
Hill River	2009	Walleye	67000	0	0	0	0.6
Maple	2009	Walleye	0	17,228	1,620	0	1,477
Sarah	2009	Walleye	0	3,780	0	0	180
Store	2009	Walleye	50,000	0	0	0	0.5
Whitefish	2009	Walleye	183,000	0	0	0	1.7
Erskine Kid's Pond	2008	Bluegill Sunfish	0	0	0	570	285
Maple	2008	Walleye	0	35,739	386	0	1,475
Spring	2008	Walleye	0	1,496	0	0	44
Union	2008	Walleye	591,000	0	0	0	5.4

Shoreland Development

The Annual Shoreland Report from the Polk County Planning & Zoning Administrator reports 45 Shoreland permits were approved in 2008. In 2009, 70 Shoreland Permits were granted and in 2010 the number of building permits approved was 64. The 2011 list data for building permits located within shoreland area (1000 feet lakes/ 300 feet rivers) reports 97 permits granted. This data indicates an increasing pattern of shoreland development around the lakes in Polk County. Development pressure has been increasing steadily on Natural Environment lakes, posing potential concerns of water quality risks. There is a need to determine what and how much this increased development impacts these smaller basins.

Potential Water Quality Risk in Polk County

The following map will be used to estimate areas of potential water quality risk in Polk County.



B) Surface water supplies in the western part of the county.

- The City of East Grand Forks receives its public water supply from the Red Lake River. City Municipal Waterworks are permitted the use of 700 MG/ 5,600 GPM for domestic water supply.
- The Red Lake River is impaired for turbidity and management efforts should focus on sediment loading into the Red Lake River and its tributaries.

The City of East Grand Forks obtains its drinking water exclusively from the Red Lake River. The City of Grand Forks, North Dakota, also uses the Red Lake River as a drinking water source. The MDH tests all public water supply systems for a variety of constituents. The testing is completed on “finished” water after any treatment processes. Large industries, such as power generating plants, sugar and potato processing plants rely on rivers for their water supply. It is necessary to filter and disinfect all river water used for municipal and industrial purposes. During high spring run-off, water purification problems are increased. Naturally occurring organics, sediment, micro-organisms, and turbidity are the most common issues.

Permittee	Use Name	Resource Name	Permit Volume (MG)	Permit GPM	Use 2010
GRAND FORKS, CITY OF	Municipal Waterworks	Red Lake River	3,500	13,900	22,01.62
EAST GRAND FORKS	Municipal Waterworks	Red Lake River	700	5,600	373.52

City of East Grand Forks Source Water Assessment

The 1996 Amendments to the federal Safe Drinking Water Act (SDWA) require the Minnesota Department of Health (MDH) to complete source water assessments for public water systems. The contaminants of concern are the contaminants regulated under the federal SDWA. They are divided into organic chemicals, inorganic chemicals, radionuclides, and microorganisms. A listing can be found at: <http://www.epa.gov/safewater>. Of greatest concern are naturally occurring organics, sediment, free ammonia, microorganisms, and turbidity. The cities of East Grand Forks and Grand Forks have also identified pharmaceuticals and endocrine disrupting chemicals as emerging issues. These types of potential contaminants are not well understood at this time.

Typical draw from the river by the East Grand Forks Water and Light Department is 1.3-1.5 million gallons per day with the plant rated to a 4 million gallon per day capacity. Typical draw for the Grand Forks system is 8 million gallons per day (76 percent from the Red Lake River and 24 percent from the Red River) with the facility rated to a maximum volume of 16.5 million gallons per day. Because of an interconnection, the cities have the ability to transfer approximately 2 million gallons of finished water per day between the two systems. The current agreement allows either mayor to request water from the other in an emergency. River flow averages 918 million gallons per day.

Water Use in Polk County

Water use in Polk County as determined by United States Geological Survey provides estimates of public supply deliveries for domestic use. The population of Polk County served by a public supply of groundwater or surface water is 14,437. The domestic, self supplied population utilizing groundwater withdrawals and deliveries from public supply totals 8,927 residents. Polk County estimates the following public supply population served by ground water and surface water.

Estimated Domestic Supply Water Use In Polk County in 2005, USGS

Total Population Served By Groundwater	Total Population Served by Surface water	Self Supplied Population	Total Population of County
14,437	7,769	8,927	31,133

USGS estimates that the total groundwater withdrawals in Polk County are 5.53 Millions of gallons per day (Mgal/d). The total surface water withdrawals total 19.14 Mgal/d. Below are several estimates of water demand by use. Other uses not included on the chart below but contribute to the total demand are aquaculture, irrigation, mining, and livestock use.

Water Withdrawn for use in Polk County in Millions of Gallons per day

USGS Data, 2005

Source of Withdrawal	Public Supply Ground-water	Public Supply surface-water	Domestic ground-water	Domestic Delivery from Public Supply	Industrial Ground-water	Industrial Surface-water
Mgal/d	0.82	7.82	0.62	1.24	0.04	0.01

Impaired Waters and Total Maximum Daily Loads

The MPCA is the state agency responsible for protecting Minnesota's water quality. Every two years an updated list of impaired streams and lakes is published. This list can be found on the MPCA Website at www.pca.state.mn.us/water/tmdl/index.html. The Clean Water Act requires the Minnesota Pollution Control Agency (MPCA) to identify and restore impaired waters.

Polk County 2012 Impaired Rivers and Lakes

Assessment Unit	ID	Impaired Use	Impairment Cause	Impairment Status
Burnham Creek: Unnamed cr to Red Lake R	09020303-515	AqLife	Turbidity	TMDL Required
Clearwater River: Ruffy Bk to Lost R	09020305-510	AqRec	Fecal Coliform	Removal From Inventory Proposed to USEPA
Clearwater River: Ruffy Bk to Lost R	09020305-510	AqCons	Mercury in Fish Tissue	TMDL Approved
Clearwater River: Ruffy Bk to Lost R	09020305-510	AqLife	Oxygen, Dissolved	TMDL Required
Clearwater River: Ruffy Bk to Lost R	09020305-510	AqLife	Turbidity	TMDL Required
Grand Marais Creek: CD 2 to Red R	09020306-512	AqLife	Turbidity	TMDL Required
Grand Marais Creek: Headwaters to CD 2	09020306-507	AqLife	Oxygen, Dissolved	TMDL Required
Grand Marais Creek: Headwaters to CD 2	09020306-507	AqLife	Turbidity	TMDL Required
Grand Marais Creek: Headwaters to CD 2	09020306-507	AqLife	pH	TMDL Required
Lost River: Anderson Lk to Hill R	09020305-507	AqRec	Fecal Coliform	Removal From Inventory Proposed to USEPA
Lost River: T148 R38W S17, south line to Pine Lk	09020305-529	AqLife	Oxygen, Dissolved	TMDL Required
Poplar River Diversion: Unnamed ditch to Badger Lk	09020305-543	AqLife	Oxygen, Dissolved	TMDL Required
Poplar River: Spring Lk to Highway 59	09020305-518	AqLife	Oxygen, Dissolved	TMDL Required
Red Lake River: Black R to Gentilly R	09020303-502	AqCons	Mercury in Fish Tissue	TMDL Approved
Red Lake River: Black R to Gentilly R	09020303-502	AqLife	Turbidity	TMDL Required
Red Lake River: Burnham Cr to Unnamed cr	09020303-501	AqCons	Mercury in Fish Tissue	TMDL Approved

Red Lake River: Burnham Cr to Unnamed cr	09020303-501	AqLife	Turbidity	TMDL Required
Red Lake River: Crookston Dam to Burnham Cr	09020303-506	AqCons	Mercury in Fish Tissue	TMDL Approved
Red Lake River: Crookston Dam to Burnham Cr	09020303-506	AqLife	Turbidity	TMDL Required
Red Lake River: Gentilly R to Crookston Dam	09020303-512	AqCons	Mercury in Fish Tissue	TMDL Approved
Red Lake River: Gentilly R to Crookston Dam	09020303-512	AqLife	Turbidity	TMDL Required
Red Lake River: Unnamed cr to Red R	09020303-503	AqCons	Mercury in Fish Tissue	TMDL Approved
Red Lake River: Unnamed cr to Red R	09020303-503	AqLife	Turbidity	TMDL Required
Red River of the North: Buffalo Coulee (ND) to Cole Cr (ND)	09020301-502	AqCons	Mercury in Fish Tissue	TMDL Required
Red River of the North: Buffalo Coulee (ND) to Cole Cr (ND)	09020301-502	AqCons	PCB in Fish Tissue	TMDL Required
Red River of the North: Cole Cr (ND) to Red Lake R	09020301-501	AqLife	Oxygen, Dissolved	Proposed Impairment Under USEPA Review
Red River of the North: Cole Cr (ND) to Red Lake R	09020301-501	AqCons	Arsenic	TMDL Not Required - Caused By Natural Sources
Red River of the North: Cole Cr (ND) to Red Lake R	09020301-501	AqLife	Turbidity	TMDL Required
Red River of the North: Cole Cr (ND) to Red Lake R	09020301-501	AqCons	Mercury in Fish Tissue	TMDL Required
Red River of the North: Cole Cr (ND) to Red Lake R	09020301-501	AqCons	PCB in Fish Tissue	TMDL Required
Red River of the North: English Coulee (ND) to Grand Marais Cr	09020306-502	AqCons	Mercury in Fish Tissue	TMDL Required
Red River of the North: English Coulee (ND) to Grand Marais Cr	09020306-502	AqCons	PCB in Fish Tissue	TMDL Required
Red River of the North: Grand Forks Dam to English Coulee (ND)	09020301-503	AqCons	Mercury in Fish Tissue	TMDL Required
Red River of the North: Grand Forks Dam to English Coulee (ND)	09020301-503	AqCons	PCB in Fish Tissue	TMDL Required

Red River of the North: Grand Marais Cr to North Marais R (ND)	09020306-501	AqCons	Arsenic	TMDL Not Required - Caused By Natural Sources
Red River of the North: Grand Marais Cr to North Marais R (ND)	09020306-501	AqCons	Mercury in Fish Tissue	TMDL Required
Red River of the North: Grand Marais Cr to North Marais R (ND)	09020306-501	AqCons	Mercury in Water Column	TMDL Required
Red River of the North: Grand Marais Cr to North Marais R (ND)	09020306-501	AqCons	PCB in Fish Tissue	TMDL Required
Red River of the North: Marsh R to Sand Hill R	09020301-506	AqCons	Mercury in Fish Tissue	TMDL Required
Red River of the North: Marsh R to Sand Hill R	09020301-506	AqCons	PCB in Fish Tissue	TMDL Required
Red River of the North: Red Lake R to Grand Forks Dam	09020301-504	AqLife	Turbidity	TMDL Required
Red River of the North: Red Lake R to Grand Forks Dam	09020301-504	AqCons	Mercury in Fish Tissue	TMDL Required
Red River of the North: Red Lake R to Grand Forks Dam	09020301-504	AqCons	PCB in Fish Tissue	TMDL Required
Red River of the North: Sand Hill R to Buffalo Coulee (ND)	09020301-507	AqLife	Turbidity	TMDL Required
Red River of the North: Sand Hill R to Buffalo Coulee (ND)	09020301-507	AqCons	Mercury in Fish Tissue	TMDL Required
Red River of the North: Sand Hill R to Buffalo Coulee (ND)	09020301-507	AqCons	PCB in Fish Tissue	TMDL Required
Sand Hill River: Headwaters to Kittleson Cr	09020301-509	AqLife	Turbidity	Proposed Impairment Under USEPA Review
Sand Hill River: Headwaters to Kittleson Cr	09020301-509	AqLife	Oxygen, Dissolved	TMDL Required
Sand Hill River: Unnamed cr to Red R	09020301-537	AqLife	Turbidity	Proposed Impairment Under USEPA Review
Snake River: CD 7 to CD 3	09020309-503	AqLife	Fishes Bioassessments	TMDL Required
Snake River: CD 7 to CD 3	09020309-503	AqLife	Oxygen, Dissolved	TMDL Required
Snake River: S Br Snake R to CD 7	09020309-504	AqLife	Fishes Bioassessments	TMDL Required

Snake River: S Br Snake R to CD 7		09020309-504	AqLife	Turbidity	TMDL Required
Unnamed creek: Eighteen Lk to Bee Lk		09020305-541	AqLife	Oxygen, Dissolved	TMDL Required
Unnamed creek: Mitchell Lk to Badger Lk		09020305-542	AqLife	Oxygen, Dissolved	TMDL Required
Assessment Unit	ID	Impaired Use	Impairment Cause		Impairment Status
Cameron	60-0189-00	AqRec	Nutrient/Eutrophication Biological Indicators		TMDL Required
Maple	60-0305-	AqCons	Mercury in Fish Tissue		TMDL Approved

C) In addition to the above mentioned specific areas of concern for Polk County, The County Board, Watershed Districts and SWCDs will actively pursue efforts to address surface quality concerns within the County.

The following assessment has been taken from the RLWD 10 Year Comprehensive Plan.

Grand Marias Creek Watershed

The Grand Marais subwatershed is dominated by private lands in agricultural production and a series of ditches that drain into the Grand Marais Creek. There are no lakes within this subwatershed. Wetlands are scattered throughout the area. Many of these wetlands in this watershed have been altered by farm drainage for agricultural purposes. Water quality is very poor in the Grand Marais Creek. Caused by predominately agricultural watershed and highly modified hydrology have had an impact on water quality in the river.

RLWD monitoring data has found that the Grand Marais Creek has high levels of turbidity, total suspended solids TSS, nitrates and nitrites and low levels of dissolved oxygen. Officially, the MPCA's Draft 2006 303(d) List of Impaired Waters lists the Grand Marais Creek as being impaired by high turbidity and low dissolved oxygen from the headwaters to County Ditch 2 based upon RLWD monitoring data. This list also identifies a turbidity impairment from County Ditch 2 to the Red River that is based upon Red River Basin Monitoring Network (RRBMN) data.

Water quality monitoring has been done by the RLWD at one site associated with streams within the subwatershed, on the Grand Marais Creek at State Highway 220. Monitoring has been done since 1985 for several parameters, including field measurements for dissolved oxygen, pH, temperature, turbidity, transparency and conductivity. Laboratory analysis is performed on stream samples for fecal coliform, TSS, total dissolved solids, chemical oxygen demand, total phosphorus, orthophosphorus, nitrates and nitrites, ammonia, total Kjeldahl nitrogen, alkalinity,

dissolved oxygen, pH, temperature, turbidity, transparency, alkalinity and conductivity.

Additional monitoring sites are operated by the MPCA and River Watch.

Site 826 is the current RLWD long-term monitoring site on Grand Marais Creek, a tributary of the Red River of the North. The site is located at the State Highway 220 crossing. There is a primary monitoring site for the RRBMN located downstream of Site 826 that is monitored by the MPCA.

Water quality is very poor in Grand Marais Creek. In fact, it is normally one of the worst water quality sites within the RLWD. This muddy-looking river frequently has high conductivity, high total dissolved solids, high TSS and low dissolved oxygen readings. A predominately agricultural watershed and highly modified hydrology have had an adverse impact on water quality in the river. The altered hydrology consists of a high concentration of drainage ditches entering the river from the east and an actively eroding ditch downstream of Site 826 that diverts water from Grand Marais Creek's natural ditch. Although there are farming operations within the watershed that maintain windbreaks, buffers and other BMPs to minimize erosion, there are many that do not. This is highly evident in the winter when fields are barren and the ditches next to fields without windbreaks are filled with soil from wind erosion while fields with windbreaks, cover crops or crop residue have little erosion. The high turbidity and low transparency of the water prevents the passage of light, so vegetation next to the river is killed whenever the river rises over its banks.

Erosion due to storm runoff and wind is another serious problem in the subwatershed. During periods of high runoff, channel erosion causes bank stabilization concerns for this subwatershed. The severity depends on the land cover, duration and volume of water. Erosion is often worse in the spring due to the lack of vegetative cover on the fields. Additionally, wind erosion is of concern in this area, especially during the winter. It is the RLWD's goal to address the following top priority issues with the Grand Marais subwatershed:

- Bank failures on County Ditch 2
- Wind and water erosion
- Loss of windbreaks
- Conservation tillage
- Extreme erosion in the ditched portion where the river is diverted directly into the Red River

Lower Red Lake Watershed

The lower Red Lake planning basin includes Burnham Creek which is dominated by lands in agricultural production but there are numerous WMA's, WPA's and the Glacial Ridge National Wildlife Refuge. There are two impaired stream reaches as identified by the MPCA in this subwatershed as of 2004. They include:

- Red Lake River, Burnham Creek to Unnamed Creek (near East Grand Forks)
- Red Lake River, Unnamed Creek to Red River

Water quality monitoring has been done by the RLWD at six sites associated with streams within the subwatershed. Monitoring has been done since as early as 1984 for several parameters, including field measurements for dissolved oxygen, pH, temperature, turbidity, transparency and conductivity. Laboratory analysis is performed on stream samples for fecal coliform, TSS, total

dissolved solids, chemical oxygen demand, total phosphorus, orthophosphorus, nitrates and nitrites, ammonia, total Kjeldahl nitrogen, alkalinity, dissolved oxygen, pH, temperature, turbidity, transparency, alkalinity and conductivity. The RLWD periodically prepares a water quality report and results are available upon request in the RLWD office.

The MPCA has identified the Lower Red Lake River as an impaired water body due to high levels of turbidity. The watershed will continue to assess the problem and the data available for the next 303D assessment will likely extend the impairment upstream through Crookston. It is the RLWD's goal to address the following issues with the Lower Red Lake River subwatershed:

- Turbidity and 303D impairment.
- Source water protection (East Grand Forks).

Erosion due to storm runoff and wind is another serious problem in the subwatershed. During periods of high runoff, channel erosion causes bank stabilization concerns for this subwatershed. The severity depends on the land cover, duration and volume of water. Erosion is often worse in the spring due to the lack of vegetative cover on the fields. Additionally, wind erosion is of concern in this area; however, it is dependent on conditions. It is the RLWD's goal to address the following issues with the Lower Red Lake River subwatershed:

- Tributary bank instability at the outlets into the river.
- Erosion on Judicial Ditch 60 south of CR 11.
- Bank sloughing in Crookston and Red Lake Falls.
- Erosion on the last mile of Polk County Ditch 1 west of Crookston.
- Ditches outletting into natural streams and contributing sediment.

Clearwater River Watershed

The MPCA has identified the Clearwater River as an impaired water body due to high levels of turbidity, TSS, fecal coliforms and low dissolved oxygen during periods of low flow. Water quality monitoring has been done by the RLWD at 19 sites associated with streams since 1984 and more recently at four other sites on lakes within the subwatershed. Lakes being monitored include Clearwater Lake (1993), Cameron Lake (2003) and Maple Lake (2004). The parameters measured included field measurements for dissolved oxygen, pH, temperature, turbidity, transparency and conductivity. Laboratory analysis is performed on stream samples for fecal coliform, orthophosphorus, nitrates and nitrites, ammonia, total Kjeldahl nitrogen and alkalinity. Lakes monitoring data includes Secchi depth readings, as well as total phosphorus and chlorophyll-a analysis. The RLWD periodically prepares a water quality report. Results are available upon request in the RLWD office.

The RLWD also sponsors River Watch programs for nine schools. The goals of the program are to develop baseline water quality data, provide hands on "real world" science opportunities for students and promote greater citizen awareness and understanding of watersheds and the role of watershed districts. Senior high students from participating schools perform the monitoring, including field collection and lab analysis. Field measurements of dissolved oxygen, water temperature, pH, conductivity, transparency, turbidity, stage, water depth and stream width are collected at each site along with appearance and recreational suitability observations. Each

school collects data at least once per month. River Watch groups prepare reports based upon monitoring results. These reports are then presented at area River Watch forums. In addition to the schools listed below, Bagley started a River Watch program in 2004. Some schools plan on adding or changing monitoring sites as well.

The watershed will continue to assess the problem and the data available for the next 303D assessment. It is the RLWD's goal to address the following issues with the Clearwater River subwatershed.

- Turbidity, TSS, fecal coliform and low dissolved oxygen 303D impairment.
- Potential impacts of TMDLs on wild rice operations.
- Maple Lake water quality.

Erosion due to storm runoff is another serious problem in the subwatershed. During periods of high runoff, channel erosion causes bank stabilization concerns for this subwatershed. The severity depends on the land cover, duration and volume of water. Erosion is often worse in the spring due to the lack of vegetative cover on the fields. It is the RLWD's goal to address the following issues with the Clearwater River subwatershed:

- Tributary bank instability at the outlets into the river.
- Lost River channel and streambank erosion.
- Ditches outletting into natural streams and contributing sediment.

Sand Hill River Watershed

This assessment has been taken from the SHRWD Management Plan.

The Minnesota Pollution Control Agency is continually updating their list of impaired water bodies in the State of Minnesota, as required by the U.S. Environmental Pollution Agency. There are some bodies within the Sand Hill Watershed that are listed as being impaired. The main stressor for the riverine impairment is due to turbidity and the excessive sediment being carried by these waterways.

The Sand Hill River Watershed District (SHRWD) has contracted with Houston Engineering to conduct a multi-parameter, watershed wide TMDL Study and develop the Restoration and Protection Plans. The goals of the plans are to provide protection where conditions meet standards and restoration where conditions are impaired. The plans are intended to supplement the SHRWD 10 year plan, and eventually will become a chapter, identifying water quality management activities in the watershed. The plans will also identify the roles of the state and local resource management organizations within the watershed.

The Watershed Approach applies to the Total Maximum Daily Load (TMDL) Study system for impaired waters, to the watershed as a whole. In addition to the reach- by- reach or lake-by -lake method used to restore impaired waters, the Watershed Approach assesses complaint water bodies for their likelihood to become impaired or possibly contribute to impairments further downstream in the watershed. The goals of the Watershed Approach are to use the TMDL Study system to conduct a multi-parameter, watershed -wide assessment of the watershed and develop

and implement restoration plans for the impaired waters and protection plans for the complaint waters that will guide surface water quality management throughout the watershed.

The SHRWD has contracted with RMB Environmental Labs to conduct the civic engagement work associated with the Watershed Approach. The Minnesota Pollution Control Agency will develop, calibrate and validate the Hydrologic Simulation Program.

Erosion and sediment is a serious water quality issue throughout the SHRW's river and tributaries. Excessive erosion occurs in the beach ridge area where the land naturally has excessive slopes and the soils light and erodible from water and wind. In the lake plain area of the SHRW, agricultural activities contribute to erosion susceptibility.

Top issues in the Sand Hill River Watershed area:

- Flood damage reduction, rate of runoff and volume of runoff
- agricultural drainage
- water quality
- erosion and sediment control
- flood plain management

Water Quality in the Sand Hill River Watershed

The following is an overview of the stream sediment content at selected sites based on turbidity measurements taken in the Sand Hill Watershed District for the years 1995 through 2010 by Danni Halverson, River Watch Environmental Scientist. Turbidity data for the given Regional Assessment Locations (RALs) was analyzed with turbidity values being compared to annual ecoregion values for minimally impacted streams from the work of McCollor and Heiskary (1993). Turbidity data values were then plotted in an attempt to show sediment trends for the RALs. Data used in this analysis was collected by Red River Watershed Management Board staff, River Watch schools, and Minnesota Pollution Control Agency (MPCA) staff. The data used in preparation of this report was mined from the River Watch Website, <http://riverwatch.umn.edu/> and is also available through the MPCA's Environmental Data Access website, <http://cf.pca.state.mn.us/data/eda/index.cfm>. Data outlier's exceeding 3 standard deviations from the site mean were removed for each site prior to use in this analysis.

Sites and Water Quality Variables

The sites used in this assessment are listed in the following table. Sites are listed from upstream to downstream within the table and for reference geo-spatial and planning region information is included. This list does not contain all of the water quality sites within the Sand Hill Watershed but rather a subset based on those sites that were identified as RALs. Also, not all of the RALs are identified here only those with enough data to use in analysis.

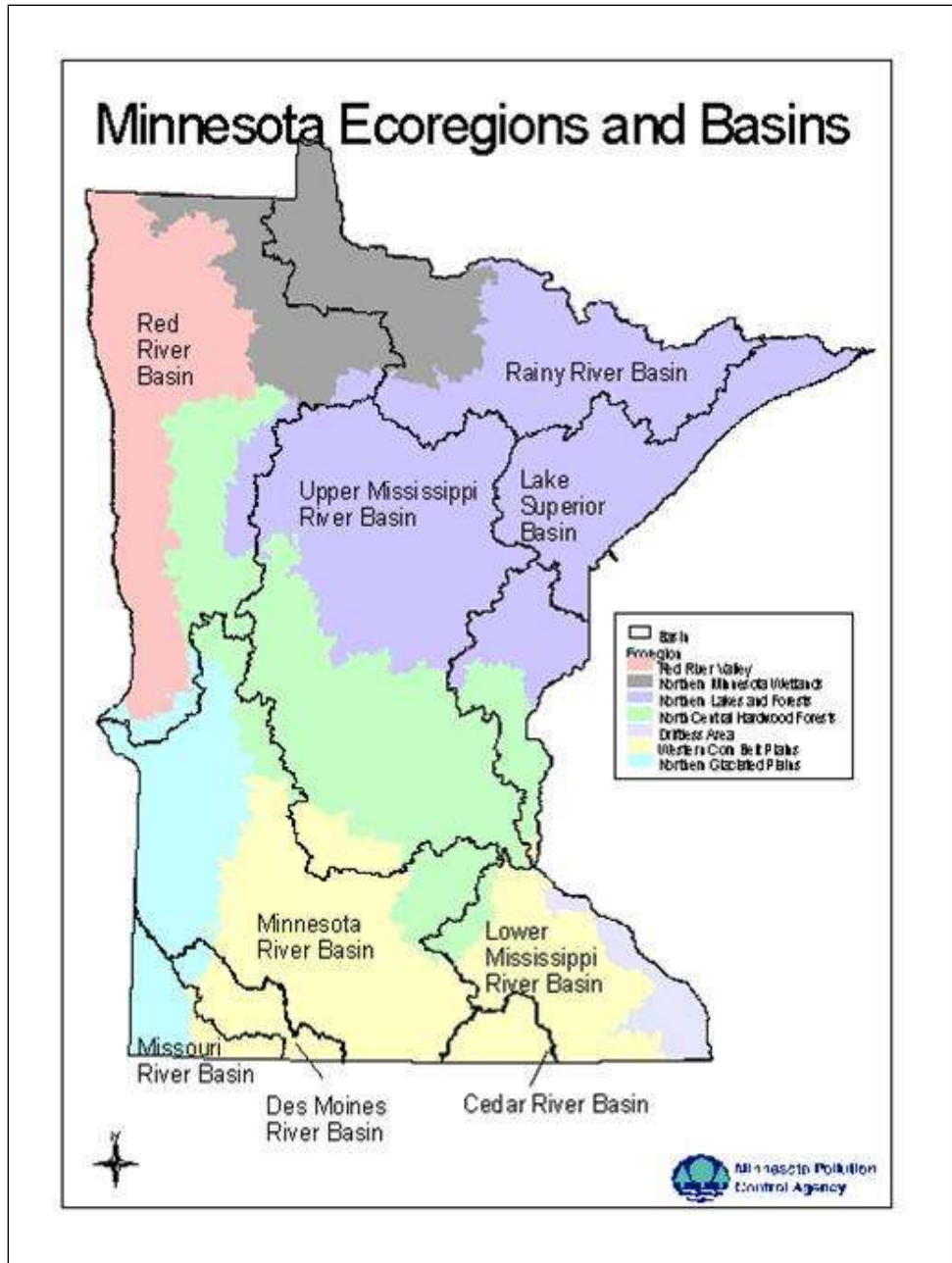
Sand Hill RAL Water Quality Sites

StationAlias	Station_ID	Station_Name	Lat	Lon	Planning Region
WEM10	S003-143	SAND HILL R AT 185TH ST SE, 5.5 MI SE OF MCINTOSH	47.57003	-95.86446	4
Lewis	S003-140	SAND HILL R AT CSAH-1, 5.2 MI E OF FERTILE	47.52830	-96.16957	4
FB15	S000-706	SAND HILL R AT RD BTN S20/29 0.5 MI W OF FERTILE	47.52888	-96.29340	3
FB20	S003-136	SAND HILL R AT 350TH AVE SW, 4 MI SW OF FERTILE	47.51416	-96.34191	2
Kittle	S004-187	KITTLESON CK AT 330TH AVE SW CROSSING, 5.6 MI W OF FERTILE	47.54298	-96.40133	2
CL1A	S004-186	SAND HILL R AT 240TH ST SW CROSSING, 7.5 MI SE OF CLIMAX	47.55675	-96.77206	1
SH1	S002-099	SAND HILL R AT US-75 ON NORTH END OF CLIMAX	47.61467	-96.81278	1

Turbidity: Indicates the degree to which light is scattered in water by suspended particulate material and soluble colored compounds. It provides an estimate of the muddiness or cloudiness of the water due to clay, silt, finely divided organic and inorganic matter, soluble colored organic compounds, plankton, and microscopic organisms. A greater turbidity reading reflects lower water clarity and higher suspended solids content.

The 25th and 75th percentile values also known as the interquartile (IQ) range were calculated for turbidity and compared to the 1970 to 1992 turbidity summer data for the Red River Valley (RRV) and North Central Hardwood Forest (NCHF) ecoregion IQ ranges from McCollor and Heiskary in an attempt to characterize the baseline water quality of the watershed. These ecoregion IQ ranges are used as a range of “typical values” that would be expected for streams in the given ecoregion. Omernik’s ecoregion framework from Fandrei, et al. (1988) was used for spatial division of the watershed. A map of Omernik’s ecoregions is provided below, all of the sites used in this analysis fall within either the RRV or NCHF ecoregions.

Omernik's Ecoregions



Ecoregion Data Comparisons

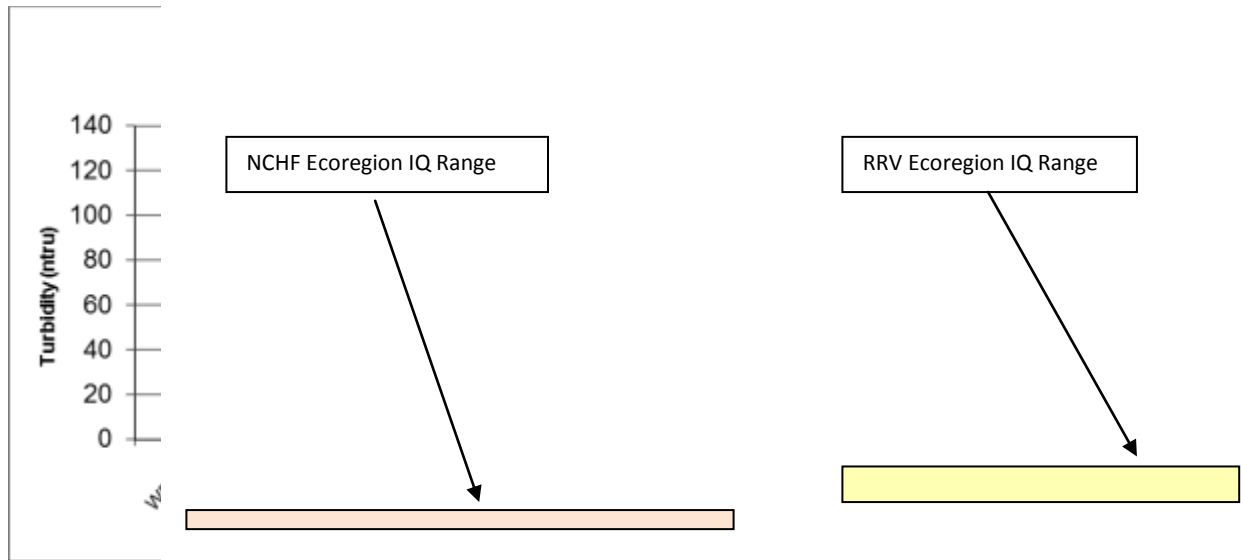
The table below shows a breakdown of the turbidity data by site. The table shows the number of samples the analysis is based on, the IQ ranges, and the MPCA ecoregion expected IQ ranges.

Site	Number of Samples	Sand Hill Parameter Turbidity IQ Range 1995 - 2010 Data	MPCA Ecoregion IQ Range 1970-1992 Summer
WEM10	74	4-11	5 - 10
Lewis	47	4-8	5 - 10
FB15	80	4-9	5 - 10
FB20	51	4-10	5 - 10
Kittle	51	7-17	13 - 28
CL1A	41	29-69	13 - 28
SH1	217	46-124	13 - 28
KEY	NCHF Ecoregion		
	RRV Ecoregion		

To further illustrate the selected RALs IQ range compared to the ecoregion IQ range the following is provided. Sites are arranged from upstream to downstream with the NCHF ecoregion sites being on left half of chart and RRV sites illustrated to the right.

Turbidity data shows that the majority of the RAL sites fall below or within the ecoregion IQ expected turbidity ranges. All of the sites within the NCHF ecoregion; WEM10, Lewis, FB15 and FB20 have turbidity IQ ranges that fall very close to the expected NCHF values. One site in the RRV ecoregion, Kittle, falls within the expected RRV values while sites CL1A and SH1 have turbidity values that exceed the expected RRV values. Each of these final 2 furthest downstream sites has a turbidity IQ range that well exceeds the RRV expected values and can be considered degraded based on the information given here. Also to note is that each Sand Hill River site from WEM10 downstream to site FB20 are behaving very similar to one another. This consistency in turbidity values is not expected as sediment content should in theory increase as you move downstream within a water course. This may be an indicator that the upstream site WEM10 is also degrading and is causing the stream to exhibit the consistent turbidity pattern shown by the data.

Turbidity IQ Range Comparisons



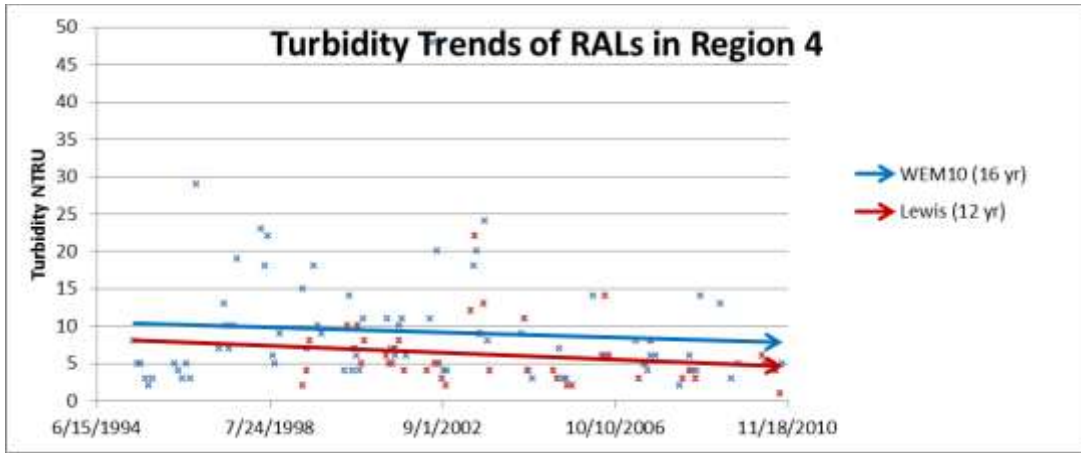
Turbidity Trend Analysis

The following Turbidity trend analysis includes all of the RAL water quality locations listed in this report. The sites have turbidity trend lengths that vary from 8 to 16 years and have been grouped by watershed planning region for display and comparison purposes. The sites are discussed from upstream (Planning Region 4) to downstream (Planning Region 1) and where applicable trend lengths are shown.

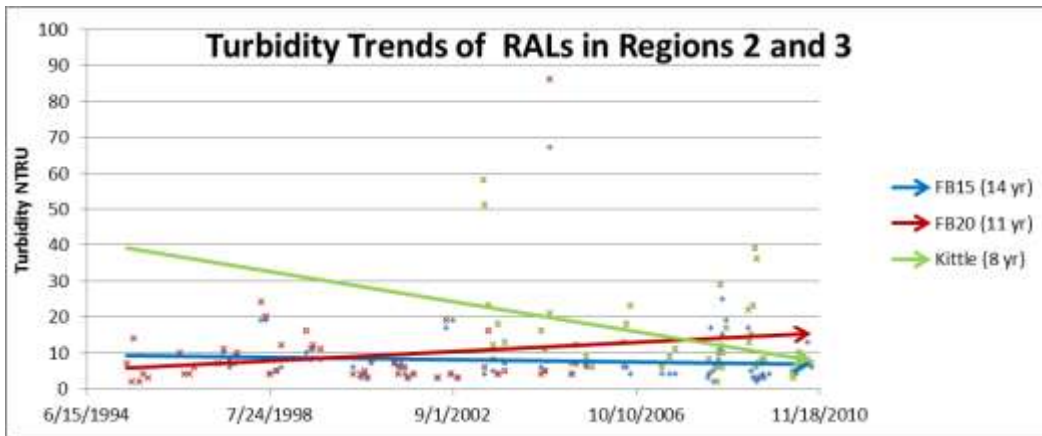
Though the turbidity trend length periods of record and the watershed spatial locations of each site vary significantly the majority of the water quality sites within the Sand Hill Watershed are exhibiting increasing water quality trends as based on turbidity. All of the sites within planning region 4 and planning region 1 are showing very similar patterns with decreases in turbidity. Site FB15 in planning region 3 and Kittle in planning region 2 are also showing this trend with decreasing turbidity over the period of record. The lone exception in the watershed to the RALs decreasing trends in turbidity is site FB20 which is located in planning region 2. This may be attributed to the fact that the last turbidity data collected at FB20 was in 2005. It cannot be stated for certain but the turbidity trend for FB20 would most likely follow the others in the watershed if data was available for the years 2006 thru 2010. This statement is based on the fact that the water quality sites both upstream and downstream of FB20 are showing improved water quality over the same time frame.

With the given turbidity trend discussion above it should be noted that this analysis focuses on turbidity trends only and does not indicate that the sites analyzed for this report meet the state's water quality standard for turbidity. At least three of the sites analyzed for trends here Kittle, CL1A, and SH1 would be considered impaired for turbidity if a state assessment was conducted by the MPCA following its current assessment guidance (2010).

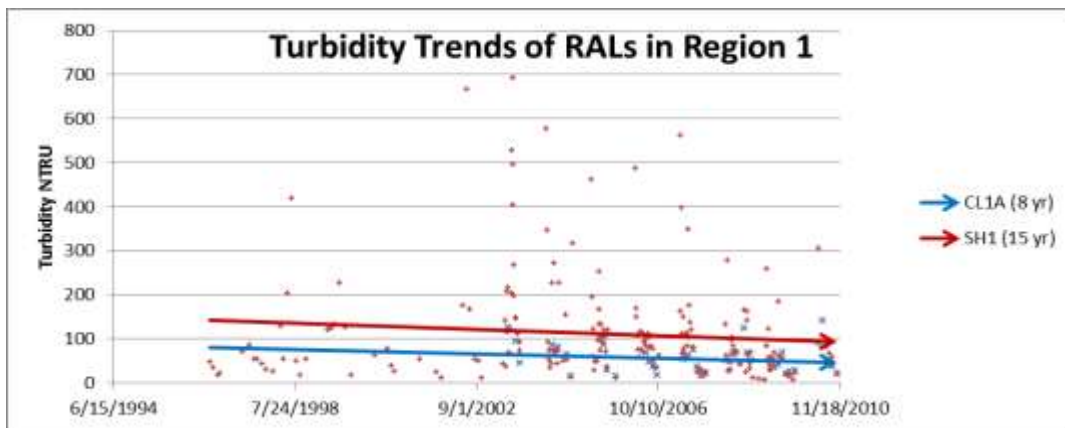
Watershed Planning Region 4 Turbidity Trends



Watershed Planning Regions 2 and 3 Turbidity Trends



Watershed Planning Region 1 Turbidity Trends



D) Although surface water quality is of primary concern for Polk County we will be responsive to the need to monitor and protect our ground water resources. We will participate to our fullest capacity but state and federal agencies such as Minnesota Department of Health (MDH), and USGS will continue to be the primary source for groundwater protection and management. Groundwater sensitivity to pollution of the shallow systems in the area was produced by the MN DNR, based upon the water table depths and soil textures. The beach ridge area has the highest sensitivity to pollution, followed by the glacial moraine area, and then the lake plain area.

The following groundwater assessments are taken from the RLWD 10 Year Comprehensive Plan.

Grand Marais Creek Watershed

Glacial sediment aquifers in the region only provide moderate amounts of groundwater. Suitable yields of 5 gpm or more, for domestic use, are mainly found in sand lenses in the till or in beach ridge deposits. The extent of beach ridge deposits is limited, and sand lenses are often localized.

Beach ridges are typically saturated in the lower few feet. Yields of more than 20 gpm can be obtained from the larger ridges, but supplies from the smaller ridges are unreliable and can dry up in late summer to fall. Groundwater supply for industrial use and irrigation is generally poor. Quantities and quality for such uses are inadequate. Hardness of the groundwater is commonly greater than 180 mg/l.

Paleozoic sediments consisting of shale and limestone are discontinuous and underlie the glacial sediments along the western side of the subwatershed. Precambrian crystalline rocks underlie glacial sediments in most of the watershed. The fractured surface of crystalline rocks may provide an adequate supply of groundwater for localized domestic use but are not a good commercial or municipal source of groundwater.

Information regarding the individual city wells, water quality analysis results and the aquifers that serve as the water supply can be obtained from the individual cities and the Minnesota Geological Survey.

Lower Red Lake Watershed

The subwatershed is located in the Lake Plain physiographic area of the RLWD. The surficial geology of the area consists of mainly clay with small regions of silt, sand, sand and gravel ridges and lake-washed till. Clay deposits dominate the Lower Red Lake River subwatershed and are characterized as being very dense, uniform and of low permeability. Thicknesses can range from a few feet in the eastern part of the watershed to more than 120 feet in the western portions. Nearly level topography in this region also relates to poor drainage. Sand and gravel ridges, known as beach ridges from Glacial Lake Agassiz, occur in mainly north-south trending ridges that range in thickness from a few feet to 30 feet in some areas. Drainage is good within the ridges, but can be poor in the inter-ridge areas where deposits of peat are evident. The fine sand or silt deposits in the area are fairly uniform and are underlain by till and clay. Thicknesses for both deposits are generally less than 20 feet. Lake-washed till deposits are described as sandy, clay-silt loam that contains fine to medium gravel with a scattering of boulders. The

deposits are generally not well drained.

Glacial aquifers in the region only provide moderate amounts of groundwater. Suitable yields of 5 gpm, or more for domestic use, are mainly found in sand and gravel deposits in the till. Beach ridge deposits are limited in aerial extent and saturation is limited to a few bottom feet.

Groundwater supplies from the smaller beach deposits are unreliable due to periods of limited precipitation. Groundwater supply for industrial use and irrigation is generally poor. Quantities and quality for such uses are inadequate. Hardness of the groundwater is commonly greater than 180 mg/l. Paleozoic sediments consisting of shales and limestones are discontinuous and underlie the glacial lake deposits along the western side of the subwatershed.

The western tip of the subwatershed near East Grand Forks contains Paleozoic limestone and sandstone that is thin and discontinuous. Paleozoic deposits contain highly saline groundwater. Precambrian crystalline rocks underlie most of the subwatershed, forming the base of the groundwater reservoir for most of the watershed. The fractured surface of crystalline rocks may provide an adequate supply of groundwater for limited domestic use.

Clearwater Watershed

The subwatershed is located in parts of the Lake-Washed Till Plain and Moraine physiographic area of the RLWD. The surficial geology of the area consists of mainly glacial tills to the south, peat to the northeast, lake-washed till to the northwest and sand to the southwest. The glacial till deposits consist of sandy, clay-silt loam containing fine to medium gravel with a scattering of boulders. The peat deposits are generally only a few feet thick, accompanied by the poor drainage and the water table at or near the land surface. Sand deposits are described as being very-fine to fine and commonly less than 20 feet thick. The lake-washed till deposits have a composition similar to the glacial till and are overlain in many local low areas by thin deposits of clay, silt, sand and peat. In the southern section of the subwatershed, just north of Bagley (and other small regions to the north), deposits of sand and gravel from outwash and ice contact features are present. The deposits consist of fine sand to medium gravel, with thicknesses ranging from a few feet to almost 100 feet. Local topography is generally hilly, with improved drainage over other areas in the watershed.

Glacial sediment aquifers in the region provide moderate amounts of groundwater. Suitable yields of 5 gpm or more for domestic use can be found in sand lenses within the till. These lenses are often localized and yields can vary and may accommodate municipal or industrial uses. Outwash and ice-contact sand and gravel aquifers are the best source in the watershed for large groundwater supply. Yields can reach several hundred gpm. The areal extent of the aquifer is fairly large, and water quality is adequate for municipal, industrial, domestic and irrigation use. Hardness is generally greater than 180 mg/l, and iron content may be high. Paleozoic sediments consisting of shale and limestone are discontinuous and underlie the glacial sediments along the western side of the subwatershed. Precambrian crystalline rocks underlie glacial sediments in most of the watershed. The fractured surface of crystalline rocks may provide an adequate supply of groundwater for localized domestic use but are not a good commercial or municipal source of groundwater.

Sand Hill River Watershed

The following information has been taken from the Sand Hill River Watershed District Watershed Management Plan. The Sand Hill River basin consists of glacial lake deposits, lake shore deposits, till and a small amount of ice-contact deposits overlying the bedrock. Bedrock in the east part of the basin consists of Precambrian, undifferentiated igneous, and metamorphic rock. Bedrock in the west part of the basin consists of a small band of Cretaceous, fine-grained sandstone and shell. Clay and silt lake deposits dominate the Lake Agassiz plain bordering the Red River. A transition zone between the lake plain and the glacial moraine areas is formed by lake shore deposits, delta sand, and gravel.

There are two aquifer systems of note within the SHRWD, a deep aquifer and a shallow aquifer. The deep aquifer is the Cretaceous aquifer. Depths to the aquifer are approximately between 200-600 feet below mean sea level. The shallow aquifer is a glacial drift aquifer, and it is distributed through the SHRWD. As little as 20 feet or less of till overlie some of these areas. The amount and type of material overlying an aquifer is important because it largely determines recharge characteristic, the potential for contamination, and the degree of interaction with surface waters. Glacial drift aquifers within the SHRWD may be surficial and unconfined, meaning an impervious layer above the aquifer is absent and the water table is in equilibrium with the atmosphere. Alternatively, glacial drift aquifers may be buried. Buried aquifers are typically confined by an impermeable layer of material above them, less susceptible to potential contamination and at a pressure greater than atmospheric. Buried aquifers are rare within the District.

The shape of glacial drift aquifers within the District is typically long and narrow, oriented north and south along a beach ridge. Aquifer thickness varies from 10 to 50 feet and potential yields range from 10 to 500 gallons per minute. The flow direction of both deep and shallow aquifers is generally towards the west-northwest to the Red River.

Irrigation Use

Irrigation for crop production is a minor concern in Polk County. There are few agricultural users within the SHRW that draw water for irrigation purposes. A natural tributary to the Red River west of Nielsville has been impounded with a dam to create a reservoir for irrigation. In the northeastern part of the county irrigation is used for the cultivation of wild rice paddies. In the central portion of the county irrigation is used for the production of row crops.

Irrigation Water Use in Polk County in Millions of Gallons per Day, *USGS Data, 2005*

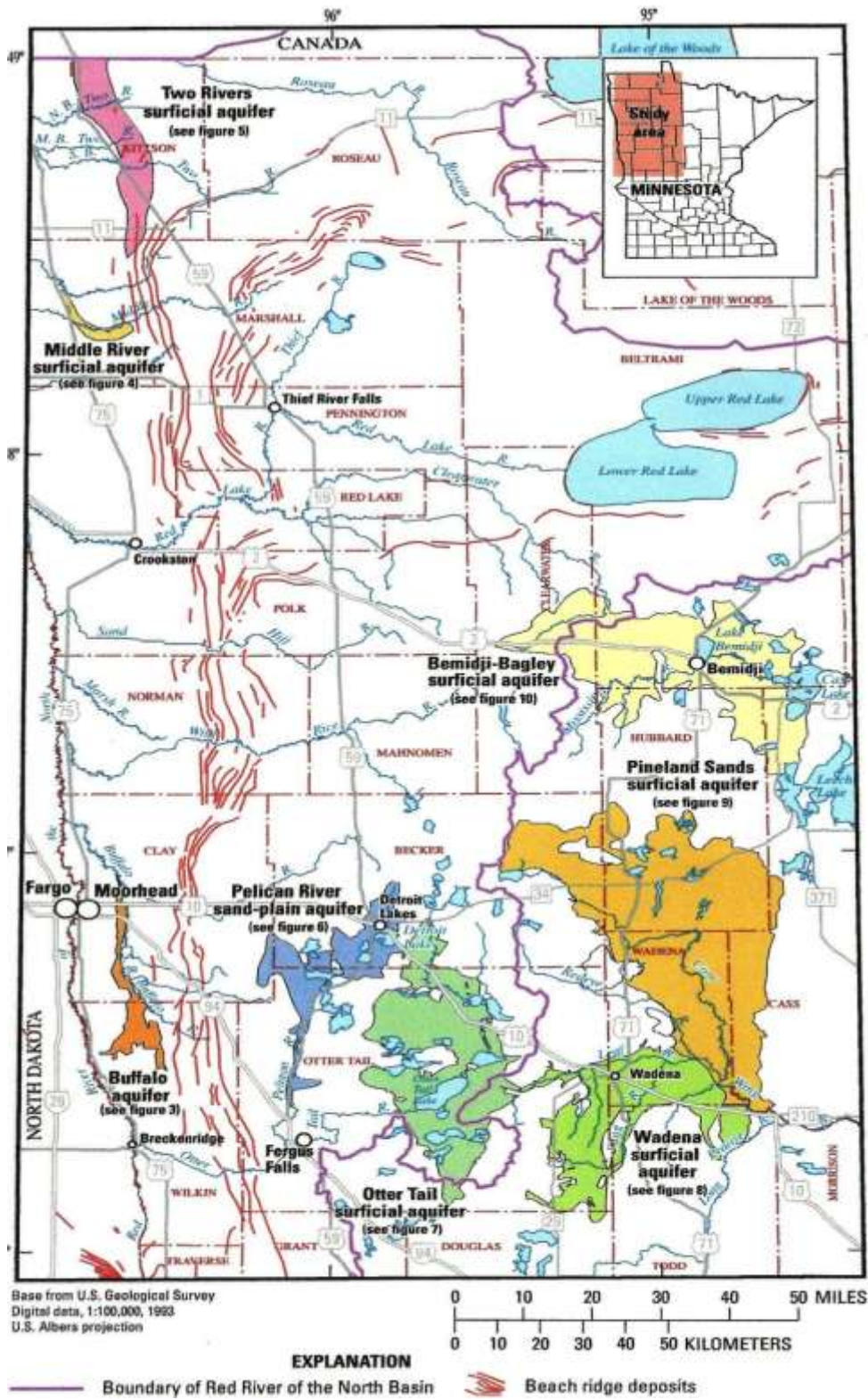
Groundwater	Surface Water
0.17 Mgal/d	4.37 Mgal/d

Beach Ridge Deposits

Discontinuous beach ridge deposits of very fine- to medium-grained sand, with lenses of fine- to medium-grained gravel, are located throughout the Red River Basin. However, the horizontal and vertical extents of the beach ridges are highly variable. The beach ridge deposits range in length from one to tens of miles, and they range in width from a few hundred feet to several miles. The ridges can range in thickness from a few feet to 50 feet and may exceed 150 feet. Groundwater recharge and discharge rates of the beach ridge deposits throughout the Red River Basin are unknown because of the variability of particle size, sediment sorting, geographic distribution, and hydraulic connectivity of the ridges.

Quantity and quality of groundwater from the deposits vary greatly within the Red River Basin and within individual deposits because the beach ridge deposits are discontinuous and variable. The quantity of usable groundwater from the ridges generally increases to the south in the basin. Groundwater from the beach ridge deposits most commonly is used for domestic water supply and secondarily for small-scale sand and gravel mining operations. Theoretical well yields from the beach ridge deposits are unknown, USGS report, *Ground-Water Availability from Surficial Aquifers in the Red River of the North Basin, Minnesota* (Reppe 2005)

Aquifer locations in the Red River Valley



Source Water Protection

The Minnesota Department of Health has completed source water assessments for all the public water systems in the state, as required by the 1996 amendments to the Federal Safe Drinking Water Act. The following cities have had a MDH source water assessment and MN DNR appropriation water permit:

City of Nielsville – one active groundwater well
 City of Climax – two active groundwater wells
 City of Beltrami – two active groundwater wells
 City of Fertile - two active groundwater wells
 City of Fosston – three active groundwater wells
 City of Crookston – six active groundwater wells
 City of Winger – one active groundwater well
 City of Erskine – two active groundwater wells
 City of McIntosh – two active groundwater wells

The water supply systems that are implementing a wellhead protection plan that has been approved by the Minnesota Department of Health under Minnesota Rules 4720 include the cities of Fertile, Nielsville, and Crookston. The water supply systems not formally preparing a wellhead protection plan as defined under Minnesota Rules Chapter 4720 are the communities of McIntosh, Climax, Beltrami, Winger, Erskine, and Fosston.

MN DNR Water Use Permit Appropriations

Permittee	Username	Permit Volume (MG)	Permit GPM	Use 2010
WINGER, CITY OF	Municipal Waterworks	15.5	0	7.23
ERSKINE, CITY OF	Municipal Waterworks	36	530	8.66
ERSKINE, CITY OF	Municipal Waterworks	36	530	15.23
MCINTOSH, CITY OF	Municipal Waterworks	24	225	10.48
MCINTOSH, CITY OF	Municipal Waterworks	24	225	10.57
CLIMAX, CITY OF	Municipal Waterworks	15	320	4.5
CLIMAX, CITY OF	Municipal Waterworks	15	320	6.28
FERTILE, CITY OF	Municipal Waterworks	39	400	13.14
FERTILE, CITY OF	Municipal Waterworks	39	400	13.68
NIELSVILLE, CITY OF	Municipal Waterworks	10	336	3.8
CROOKSTON, CITY OF	Municipal Waterworks	500	1200	36.26
CROOKSTON, CITY OF	Municipal Waterworks	500	1200	36.15
BELTRAMI, CITY OF	Municipal Waterworks	5	80	2.795
BELTRAMI, CITY OF	Municipal Waterworks	5	80	0

Polk County Priority Concern 2: Water Quantity

The Polk County Local Water Management Plan will focus on the quantity of water passing through the County and its associated watersheds by inventorying, assessing and evaluating the drainage infrastructure.

Due to the fluvial geomorphic characteristics of the Red River of the North Basin, Polk County is subject to frequent flooding. Some factors such as topography and increased precipitation are unmanageable, but other factors such as flood plain encroachment, channelization of waterways, land use practices and effective private drainage into public systems, are factors that can be assessed for *Best Management Practices*.

All of Polk County falls within the jurisdictional boundaries of three watershed Districts. With Watershed Districts being “special purpose” Districts and that special purpose:

103D.201 WATERSHED DISTRICT PURPOSE

“To conserve the natural resources of the state by land use planning, flood control, and other conservation projects by using sound scientific principles for the protection of the public health and welfare and the provident use of the natural resources, the establishment of watershed districts is authorized under this chapter.”

The most effective way to manage water is on a watershed perspective making it unattainable for an individual County to successfully implement a comprehensive water management agenda. It will likely be the Watershed Districts who will lead the major efforts to manage the water quantity issues impacting Polk County. They will however need the support and cooperation of Polk County and the West and East Polk SWCDs to accomplish its work in Polk County. Many Watershed District water quantity control projects have been constructed in and outside of Polk County that have assisted in the reduction of flood related damages within the county. Please refer to the Long Rang Plans of the Red Lake, Sand Hill River, and the Middle-Snake-Tamarac Rivers Watershed District for more information on these and future efforts that will control the quantity of water flowing through Polk County.

The Following drainage assessments are taken from the Red Lake and Sand Hill River Watershed District plans.

Grand Marais Creek Watershed

The Grand Marais watershed is dominated by private lands in agricultural production and a series of ditches that drain into the Grand Marais Creek. The hydrology of this subwatershed has been modified due to drainage and land use changes (flashy flows extended periods of low flow). Due to terrain, draining of wetlands for cropland and/or under-designed structures, the Grand Marais subwatershed experiences frequent flooding throughout the subwatershed. Spring flooding is almost an annual occurrence in this watershed. Damages associated with this type of flood are to public infrastructure, personal property, cropland and public resources (fisheries, wildlife, soils and water quality). Agricultural flooding and damages in the City of Euclid were identified as the highest priority flooding issues.

A system of ditches running east to west was constructed every mile around the early 1900s to settle and farm the area. Most of these ditches are undersized for their respective drainage areas and the farmland that was opened up over the last century. A typical ditch draining into the Grand Marias Creek has the capacity to handle runoff from a 1-2 year frequency event (2 inches in 24 hours). Because of the low capacity, flooding and crop losses occur on an almost annual basis. Drainage systems in this subwatershed are a complex network of legal ditch systems located at 1-2-mile intervals that drain east to west into natural streams. Generally, the ditch systems are under the administration of Polk County or the RLWD. One notable storage project within this watershed is the Parnell impoundment, which is capable of storing 3,600 ac-ft of water. Other impoundments include the Louisville –Parnell Impoundment and Flood Storage Easement Sites 1 and 2.

There are no lakes in this subwatershed. Wetland areas are scattered throughout the area. These wetland areas are somewhat denser in the extreme eastern portion of the subwatershed, generally east of U.S. Highway 75. Many of the wetlands in this watershed have been altered by farm drainage, and many wetlands have been drained for the purposes of agricultural production, especially those in the western two-thirds of the subwatershed.

Lower Red Lake Watershed

The Thief River and Upper Red Lake River subwatersheds are tributaries to the Lower Red Lake River subwatershed in Thief River Falls. The Clearwater River subwatershed is a tributary to the Lower Red Lake River in Red Lake Falls.

Due to terrain, draining of wetlands for cropland and/or under-designed structures, the Lower Red Lake River subwatershed experiences frequent flooding throughout the subwatershed. Spring flooding is almost an annual occurrence in this watershed. Damages associated with this type of flood are to public infrastructure, personal property, cropland and public resources (fisheries, wildlife, soils and water quality). Agricultural flooding and damages in the City of Crookston were identified as the highest priority flooding issues.

There are no lakes in this subwatershed. Wetland areas are scattered throughout the area. These wetland areas are somewhat denser in the extreme southeastern portion of the subwatershed, generally south of U.S. Highway 2 and east of State Highway 102. Many of the wetlands in this watershed have been altered by farm drainage for the purpose of agricultural production. Drainage systems in this subwatershed are a complex network of natural streams and legal ditch systems. Generally the ditch systems are under the administration of the county or watershed district in which they reside.

Clearwater River Watershed

Due to terrain, draining of wetlands for cropland and/or under-designed structures, the Clearwater River subwatershed experiences frequent flooding throughout the subwatershed. Spring flooding is almost an annual occurrence in this watershed. Damages associated with this type of flood are to public infrastructure, personal property, cropland and public resources

(fisheries, wildlife, soils and water quality). Agricultural flooding and damages in the cities of Bagley, Clearbrook and Mentor were identified as the highest priority flooding issues.

Lakes are prominent and important resources in this watershed. In particular, a number of small lakes are found throughout the southern half of the watershed. These include a mix of fishing and natural environment lakes that provide seasonal and migratory habitat for a variety of species.

Wetland areas are scattered throughout the area. These wetland areas are considerably denser in the extreme northeastern portion of the subwatershed, especially within the Red Lake Reservation, where the original wetlands are intact. Many of the wetlands have been altered by farm drainage, and many wetlands have been drained for the purposes of agricultural production.

Sand Hill River Watershed

There are numerous public and private drainage systems in the SHRWD, specifically constructed since the early 1900's, to provide agricultural drainage. The SHRWD has legal jurisdiction over many of these ditch systems, with the authority to approve proposed improvements to be made to the ditches. Several other legal ditch systems remain under the jurisdiction of Polk County. However, the SHRWD has been working with Polk County to turn these remaining ditch systems over to the SHRWD as major improvement work is proposed. Most of these remaining drainage systems are located in the lake plain geomorphic region, since this area is flat, has poorly drained soils, and lacks a natural drainage network. Without the drainage network, water would stagnate in the fields and drown crops. The ditch networks have improved the connection between areas that would otherwise not be hydrologically connected.

The need for and intensity of drainage differs to some degree between the eastern glacial moraine and the western glacial lake plain. The development of land for agriculture in the early 1900s modern agriculture would not be possible within the western portion of the District without improved drainage. This portion of the District lacked "natural" drainage because of its origin as the lake bed of Glacial Lake Agassiz. State and federal initiatives through the 1970s encouraged maximizing acreage for agricultural production. Landowners and others undertook drainage within the District's eastern, glaciated moraine area in selected areas to address specific isolated drainage problems.

Minnesota Drainage Law (MSA 103E) provides a set of rules to administer and regulate drainage activity within the state. One of the District's main responsibilities is to administer their state-obligated responsibility under MSA 103E. These responsibilities are associated with both legal and private drainage systems. The legal system is administered jointly with the county or counties overlapping the watershed district. County ditches were originally under the jurisdictions of counties. MSA 103E specifies that ditch systems undergoing an improvement or redetermination of benefits process, or new systems must revert to the jurisdiction of the appropriate watershed district, if one exists. The county may also transfer jurisdiction of a ditch system without a project by resolution of the county board of commissioners. The SHRWD presently administers a number of miles of legal drainage systems, acquired either through petitions of new systems, improvements to existing systems, or the repair of existing systems

under SHRWD jurisdiction. Landowner's efforts to engage in private drainage projects (outside of the authority of MSA 103E), are subject to the SHRWD permit system (MSA 103D).

Flood Damage is another critical issue in the Red River Valley area and the SHRWD. Flooding causes a significant burden, particularly for the agricultural sector. Damage from flooding is most severe in the western portion of the SHRWD. Flooding results in financial damages as well as social and emotional damages that are more difficult to quantify. The majority of flood damages are agricultural in nature. However, Beltrami, Nielsville and Climax are also frequently threatened with flood damages. The SHRWD initiated a project to protect Beltrami several years ago, which has been beneficial. Nielsville and Climax are currently in the process of being studied for flood damage reduction measures under existing MN DNR financing assistance. In general, the lake plain area of the SHRWD is prone to flooding due to the flat landscape and channels that have relatively low capacities. The water from the portions of the watershed contributing to the lake plain area of the SHRWD tends to release its runoff faster than the lake plain channels can carry it away. This is due to the capacity limitations of many of the Polk County legal ditch and natural channel systems in the lake plain. More recently the SHRWD has seen an increase in landlocked basin flooding in the beach ridge and moraine areas of the District.

Surface Drainage through the construction of private and public drainage systems has historically been the primary means of providing suitable soil conditions for crop production. Soils within the Red River Valley were historically considered "too tight" for tile drainage, because the close spacing of tiles necessary for effective drainage. However, there is a growing trend of pattern drainage tiling within the Red River Valley. This change has come about due to several factors, including improved technology and equipment for tile installation, increase prices for agricultural commodities, increase crop yields from drained land, value of farm land, and enhanced farming operations from drained land. The effects of tiling on downstream water quality and quantity are being studied by various agencies, but remains basically unknown. Current thoughts are that quantity changes on peak rates of flow will not be significant from a downstream flooding perspective. However, persistent long term low flows may affect channel maintenance and land access opportunities.

Roles and Responsibilities:

Sand Hill Watershed District: Monitor research efforts to better understand the adverse and beneficial aspects of tile drainage. Watershed Districts will require tiling into existing drainage systems administered by them to comply with MS 103E. In accordance with its Rules, permits are required for tiling. Adequacy of the outlet is considered on all applications. The Watershed District also coordinates and reviews of all tiling applications for compliance with other applicable local, state, and federal laws.

University System: Provide technical data needed to make informed decisions about tile drainage.

Drainage System Management

With the County being the drainage authority on some public drainage systems and the individual Watershed Districts on others it will be vitally important to coordinate maintenance, repairs, and improvements to these systems. Polk County Ag and Drainage department indicates that there are 830 miles of legal drainage systems they maintain. The Red Lake Watershed District is the drainage authority on 295 miles of ditches throughout their entire watershed jurisdiction. No similar data available from the Sand Hill River Watershed District or the Middle Snake Tamarac Rivers Watershed District.

The following assessment has been taken from the Red Lake River Watershed Farm to Stream Tile Drainage Water Quality Study, 2009.

Prior to this project, there were a lot of theories about how the increasing amount of tile drainage in the Red River Basin would affect water quality. However, there was a lack of actual water quality data from tile drainage within the basin. This study was designed to provide actual data from tile drainage in several different areas through-out the Red Lake Watershed District. In each area, tile drainage water quality has been compared with surface drainage water quality. The study also compares flow (sfc. v. tile) and different methods of tile drainage.

Generally, conventional agriculture tile drainage should have a positive impact on the problems of high turbidity, total suspended solids, and total phosphorus in the Red River Basin. Unfortunately, there are “side effects” of high nitrate and conductivity levels. Minnesota scientists are researching possible methods for reducing these “side effects.”

The wild rice paddies were an exception in that the wild rice paddy main-line tile water had all the water quality benefits of conventional agriculture tile, but without the high nitrate levels. Tile drainage for conventional agriculture has little benefit to water quality when the ground is frozen and the tile is not running (during spring runoff). The benefits are also lessened when the ground is saturated enough for surface runoff to occur.

The existence of a grassed waterway appeared to moderate water quality.

Data analysis supports the hypotheses that were expressed at the beginning of the project. Peak flows generated from a surface drained field clearly exceed the peak flows from a tile drained field (tile and surface drainage included). The duration of flow from tile is much longer than the duration of flow from surface drainage. So, the total volume of drainage from a tiled field is clearly greater than the total volume of drainage from a field that lacks tile drainage.

- Tile drainage in the Red River Basin reduces peak flows from an individual field relative to surface drained fields during runoff events.
- Tile drainage in the Red River Basin increases the total volume of runoff in the long-term relative to surface drained fields.
- Antecedent conditions have a significant role on the influence of tile drainage during a runoff event. A rainfall event will have a varying effect upon runoff due to varying levels of initial soil moisture, rainfall amount, rainfall intensity, and rainfall duration.
- These results pertain only to tile drainage systems with similar soils and topography in Red River Basin that do not have surface inlets.

There are plans to continue the monitoring efforts of this study, particularly the flow monitoring and runoff event sampling. Monitoring and research efforts should also be targeted at evaluating what happens to the concentrated discharges of nitrates after they enter a river system. Also, extra monitoring could be done in the lower red river valley, closer to the Red River where soils have higher clay content.

Priority Concern 3: Management, Enhancement and Preservation of Natural Resources

Polk County is concerned with the preservation and enhancement of its natural resources. The geology of Polk County is divided into 3 distinct areas; the glacial-lake plain, glacial lake washed till plain and glacial moraine region. These major areas, because of their size, unique geographical features, and wide diversity of natural resources are of significant benefit to the area and citizens.

- Polk County in cooperation with other local, state, and federal agencies will work to restore, enhance and protect these areas through programs and projects that accomplish this; cautious it is not done at the expense of the local economy.

Proper management and preservation of these unique ecosystems is a Priority Concern for Polk County because of the fragile balance that is needed to sustain the natural resources found in this area.

The Glacial Lake Agassiz Beach Ridge area in Polk County contains some of the largest tracts of native prairie in the state. These prairies are of high quality and include good examples of dry mesic and wet prairies. Saline soils are common in these areas and support unusual prairie types composed of species tolerant to elevated salt levels, including rare species such as; alkali cord grass (*Spartina gracilis*), northern gentian (*Gentiana affinis*), and Hall's sedge (*Carex halliana*). There are several Minnesota listed rare plants found in the Glacial Lake Agassiz Beach Ridge Area, including the federally threatened and state endangered western prairie fringed orchid (*Platanthera praeclara*). The largest known populations of this species in the world are found in Polk County. Other state listed endangered species include; pale moonwort (*Botrychium pallidum*), Indian ricegrass (*Oryzopsis hymenoides*), and gray ragwort (*Senecio canus*).

Located within the Glacial Lake Agassiz Beach Ridge is the Glacial Ridge National Wildlife Refuge composed of 35,000 acres. It is the nation's largest prairie and wetland restoration project. In addition to its biological importance, the restoration of Glacial Ridge should help improve water quality for the City of Crookston and reduce flooding in the Red River Valley. Habitat fragmentation and Invasion by exotic species (non-native plants and animals) are the most significant threats to the project's native diversity. The property connects to other wildlife and recreational areas and, when the project is complete, The Nature Conservancy and its partners will have restored more than 8,000 acres of wetland and about 16,000 acres of Tallgrass Prairie. There will be nearly 20,000 acres enrolled into the federal Wetlands Reserve Program.

Rydell National Wildlife Refuge located within the Glacial Moraine area. The Refuge was established in 1992 and composed of 2,100 acres hosting more than 7,800 visitors per year. The Refuge is a combination of maple/basswood/oak forest, wetlands, tallgrass prairie and bogs. The Refuge offers annual deer hunts for youth and disabled. Refuge objectives are to provide nesting, feeding and resting habitat for waterfowl and other migratory woodland and grassland birds, serve as a regional destination for environmental educational opportunities, provide woodland and prairie habitat for resident wildlife and to provide opportunities for wildlife observation and outdoor recreation.

The Vesedahl Wetland Mitigation Project is also located within the Glacial Moraine area. The Vesedahl project is a wetland restoration project in Polk County which will be used by MnDOT and BWSR to offset wetland impacts that cannot be mitigated on site for state, county, and township road projects in northwestern Minnesota. MnDOT has acquired approximately 1900 acres of farmland. The project will restore approximately 750 acres of land to its pre-agricultural wetland status while the remaining non-wetland acreage will be planted with native grasses. Once the restoration work is completed, control of this land will be transferred from MnDOT to the MnDNR and it will become a wildlife management area. The MN DNR operates 47 additional Wildlife Management Areas in Polk County.

There are large parcels of USFWS and MN DNR land scattered throughout the county that are open to the public to utilize. USFWS reports 13,314 acres of Waterfowl Production Areas in the county. There are 21 known calcareous fens identified on the Minnesota Department of Natural Resources List of Known Calcareous Fen Sites (June 30, 2001) located in Polk County. Calcareous seepage fens are numerous found in the Beach Ridge Area. This fen type is rare, with a precarious biology that makes them vulnerable to change.

Calcareous Fen Sites in Polk County

Site Name	Fen ID NO.	Township	Range	Section(s)
Chicog WMA East	6403	T148N	R45W	NWSWSE28, SWNE33, NENE33,
Chicog WMA West	6405	T148N	R45W	NE29, WSE20
Enerson WMA	16306	T149N	R40W	NENW17
Godfrey Prairie	16268	T148N	R44W	NWSE09, NE09
Gully 27	16326	T150N	R39W	SWNE27
Gully 22	16303	T150N	R39W	NE22, WSE22
Gully 23	16307	T150N	R39W	SE23
Gully 25	16312	T150N	R39W	NWNE25
Gully 30	35382	T150N	R39W	NNE30, NENW30, SSE19
Kertsonville WMA	6402	T149N	R45W	SSESW16
Chester 24	35384	T150N	R40W	SN24, NNSW24, NSE24

Chester 29	18396	T150N	R40W	S29
Kittleson Creek Mire	10149	T147N	R44W	SS06, 0W07
Onstad WMA	16270	T147N	R45W	W01
Pankratz Prairie South	245	T149N	R45W	SWNE17
Pembina Trail: Crookston	1226	T149N	R44W	SSW19
Pembina Trail: TNC	17211	T149N	R44W	ESWNW30
Thorson Prairie WMA South – a	35142	T148N	R45W	SE08
Thorson Prairie WMA South – b	33545	T148N	R45W	NE08
Thorson Prairie WMA South – c	35143	T148N	R45W	NWSE05
Thorson Prairie WMA South – d	35144	T148N	R45W	SWNE05

Conservation Reserve Program

One major concern is the large acreage of Conservation Reserve (CRP) program acres that are being taken out of grass and put into production. Many of these acres are in the prime habitat areas for sharp-tailed grouse and prairie chickens. Wild turkeys have also been introduced and are increasing in numbers. Some of these areas are also identified as MN DNR Deer Wintering areas.

CRP Expiration AC/YEAR

CRP Expiration	Acres
FY 2011	9727.6
FY2012	24580.2
FY 2013	10262
FY 2014	26238.2
FY 2015	19027.9
FY 2016	1483.2
FY 2017	7373.9
TOTAL	98693

Native Plant Communities of Minnesota

The Minnesota Department of Natural Resources and the U.S. Forest Service have developed an Ecological Classification System (ECS) for ecological mapping and landscape classification in Minnesota following the National Hierarchical Framework of Ecological Units. Ecological land classifications are used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features. The system uses associations of biotic and environmental factors, including climate, geology, topography, soils, hydrology, and vegetation. There are eight levels of ECS units in the United States. Map units for six of these levels occur in Minnesota: Provinces, Sections, Subsections, Land Type Associations, Land Types, and Land Type Phases. Ecological subsections in Polk County include the Aspen Parklands, Red River Prairie, and Hardwood Hills subsections.

Species in greatest conservation need (SGCN) are defined as native animals whose populations are rare, declining, or vulnerable to decline and are below levels desirable to ensure their long term health and stability. Minnesota's State Wildlife Action Plan (SWAP) identifies conservation needs for species of concern, including threatened and endangered wildlife and other wildlife species. Minnesota's SWAP titled, "Tomorrow's Habitat for the Wild and Rare" is a strategic plan focused on managing Minnesota's populations of "species in greatest conservation need." In Minnesota, 292 species meet the definition of species in greatest conservation need (SGCN). These species include mammals, birds, reptiles, amphibians, fishes, insects, and mollusks and represents about one-quarter of the nearly 1,200 animal species in Minnesota that were assessed for this project.

Minnesota's SWAP identifies specific key habitats to be conserved and enhanced in each of Minnesota's 25 ecological subsections (see <http://www.dnr.state.mn/ecs/index.html>). It also describes key habitats relative to the ecological subsection, focusing on the important components of the habitats, both in terms of habitat quality and features important to SGCN.

Aspen Parkland Subsection Overview

The Aspen Parklands Subsection, located in northwestern Minnesota, is a mix of lacustrine plain and shoreline (beach) ridges formed by Glacial Lake Agassiz, with extensive forested peatlands to the east and tallgrass prairie to the west. The subsection is the southern end of a much larger province that stretches north and west into Canada and serves as the transition zone between the prairie and forest areas. The large Roseau and Red rivers are in this subsection, and flooding is common due to the level topography. Deep lakes are rare. This subsection contains large complexes of wetlands, aspen and brush prairie with dry prairie on beach ridges.

85 Species in Greatest Conservation Need (SGCN) are known or predicted to occur within the Aspen Parklands. These SGCN include 30 species that are federal or state endangered, threatened, or of special concern. Gray wolves, sharp-tailed grouse, sandhill cranes, eared grebes, northern harriers, marbled godwits, American bitterns, Franklin's gulls, Assiniboia skipper, great gray owls and moose make this subsection unique. It is also a major migratory stopover and breeding area for waterfowl. For more information on the Aspen Parkland Subsection or Species in Greatest Conservation Need and their key habitats refer to the "[Tomorrow's Habitat for the](#)

Wild and Rare” a strategic plan focused on managing Minnesota’s populations of “species in greatest Conservation need.”

Red River Prairie Subsection Overview

The Red River of the North forms the western boundary of the Red River Prairie Subsection and Minnesota. The former range limit of what was once tallgrass prairie forms the eastern boundary. Wet prairies were an important habitat in this subsection. The dominant landform is the large, flat, lake plain of Glacial Lake Agassiz, and associated landforms including beach ridges and sand dunes. Rich soils deposited from Glacial Lake Agassiz make this subsection highly desirable for agriculture. The Agassiz beach ridges include a significant proportion of the state’s remaining prairie acres, half of which are protected in preserves. Most of the remainder of the subsection has been drained using tile and ditching for row crop production. Less than 1 percent of former prairie remains, and remnant patches are often too small to be fully functional, due to the altered surrounding landscape. Some prairie remnants that are not protected in preserves are enrolled in conservation programs, but many have no formal protection and are subject to further agricultural development or mining for construction aggregates. Dams and channelization disrupt aquatic connectivity and degrade habitat along rivers.

83 Species in Greatest Conservation Need (SGCN) are known or predicted to occur within the Red River Prairie. These SGCN include 36 species that are federal or state endangered, threatened, or of special concern. Scattered remnant tracts of native prairie and riparian woodlands in the Red River Prairie are home to a surprising variety of wildlife. Some of the most pristine and extensive prairie tracts remaining in the state are found here. Featured wildlife include greater prairie chickens, marbled godwits, loggerhead shrikes, poweshiek skippers, northern pocket gophers and northern grasshopper mice. Lake sturgeon and black sandshells are found in the Red River. For more information on the Red River Prairie Subsection or Species in Greatest Conservation Need and their key habitats refer to the “Tomorrow’s Habitat for the Wild and Rare” a strategic plan focused on managing Minnesota’s populations of “species in greatest Conservation need.”

Hardwood Hills Subsection Overview

The Hardwood Hills Subsection runs through the heart of the Mississippi River flyway and central Minnesota. The Continental Divide splits this subsection; rivers to the north flow to Hudson Bay, and rivers to the south, to the Mississippi. The subsection contains numerous lakes, more than 400 greater than 160 acres and many smaller lakes. Wetlands, prairie potholes, and kettle lakes exist throughout the area. Before settlement by people of European descent, vegetation included maple-basswood forests interspersed with oak savanna, tallgrass prairie, and oak forest. Currently much of this subsection is farmed. While many wetlands have been drained, many potholes remain and provide habitat for waterfowl and shorebirds. Important areas of forest and prairie exist throughout the subsection, but they are small and fragmented. About 15 percent of the subsection is forested. Other significant land uses are tourism and outdoor recreation, especially around lakes. Increased lakeshore development and wetland loss are conservation concerns in this subsection.

85 Species in Greatest Conservation Need (SGCN) are known or predicted to occur within the Hardwood Hills. These SGCN include 28 species that are federal or state endangered, threatened, or of special concern. This subsection is a fascinating, wetland rich transition zone between prairies and forest, intermingled with hundreds of lakes. There is a mix of wildlife, including trumpeter swans, prairie chickens, sandhill cranes, western grebes, great egrets, great blue herons, Forster’s terns, bald eagles, creek heelsplitters, and least darters. This is also a major migratory corridor for forest birds and waterfowl. For more information on the The Hardwood Hills Subsection or Species in Greatest Conservation Need and their key habitats refer to the “Tomorrow’s Habitat for the Wild and Rare” a strategic plan focused on managing Minnesota’s populations of “species in greatest Conservation need.”

Biodiversity Significance

The DNR’s Natural Heritage and Nongame Research Program, in collaboration with the Minnesota County Biological Survey (MCBS) identifies, describes and maps rare and high quality native plant communities in the Natural Heritage Information System (NHIS). Polk County has a unique diversity of rare species that the state listed endangered, threatened or special concern.

Rare Species found in Polk County

Common name	Scientific name	Group	Federal status	State status
A Jumping Spider	Metaphidippus arizonensis	spider	none	special concern
Annual Skeletonweed	Shinnersoseris rostrata	vascular plant	none	threatened
Assiniboia Skipper	Hesperia comma assiniboia	insect	none	endangered
Baird's Sparrow	Ammodramus bairdii	bird	none	endangered
Bald Eagle	Haliaeetus leucocephalus	bird	none	special concern
Beach-heather	Hudsonia tomentosa	vascular plant	none	special concern
Beaked Spike-rush	Eleocharis rostellata	vascular plant	none	threatened
Black Sandshell	Ligumia recta	mussel	none	special concern
Blanket-flower	Gaillardia aristata	vascular plant	none	special concern
Blunt Sedge	Carex obtusata	vascular plant	none	special concern

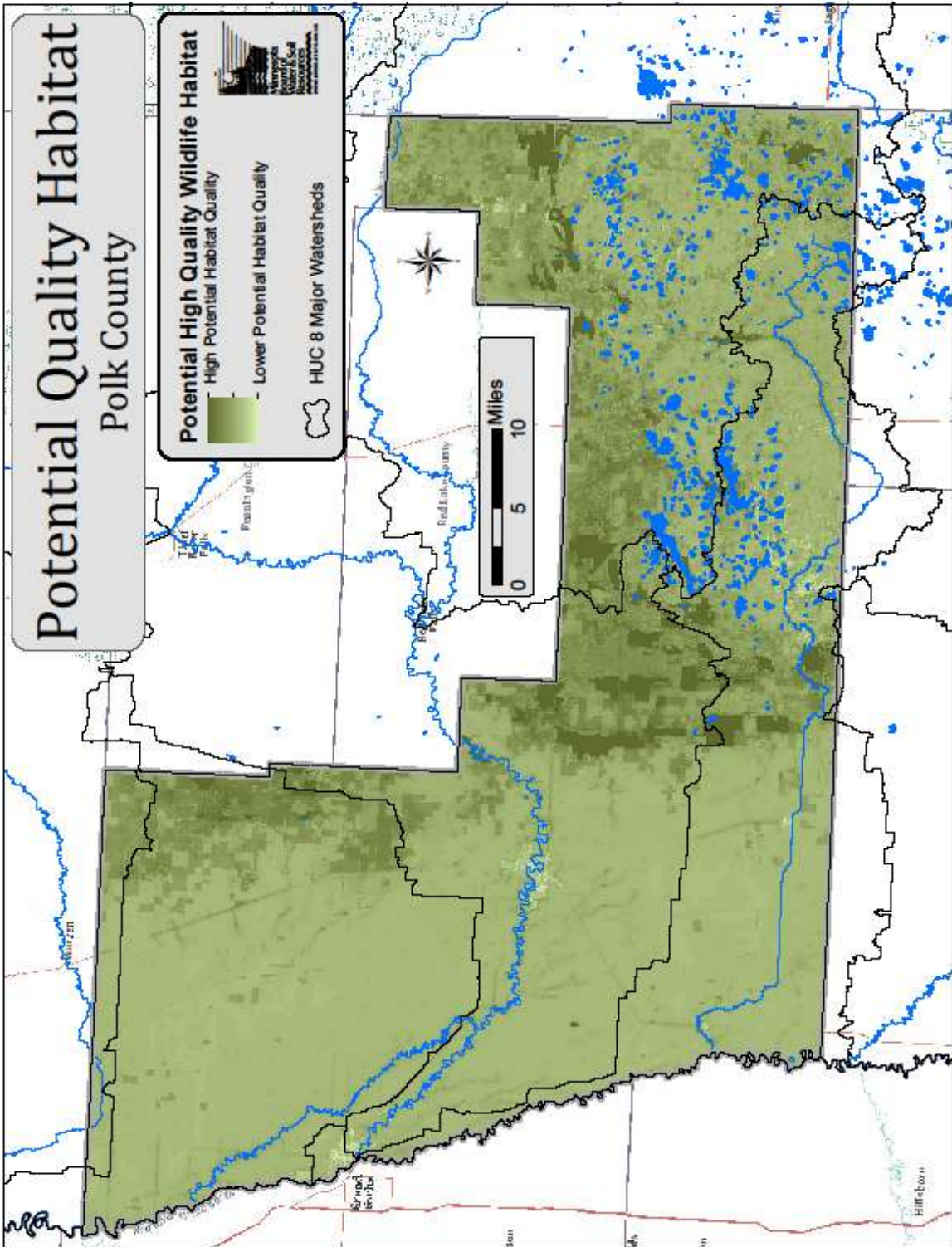
Burrowing Owl	<i>Speotyto cunicularia</i>	bird	none	endangered
Chestnut-collared Longspur	<i>Calcarius ornatus</i>	bird	none	endangered
Clustered Broomrape	<i>Orobanche fasciculata</i>	vascular plant	none	special concern
Creek Heelsplitter	<i>Lasmigona compressa</i>	mussel	none	special concern
Creeping Juniper	<i>Juniperus horizontalis</i>	vascular plant	none	special concern
Dakota Skipper	<i>Hesperia dacotae</i>	insect	candidate	threatened
Drummond's Campion	<i>Silene drummondii</i>	vascular plant	none	special concern
Few-flowered Spike-rush	<i>Eleocharis quinqueflora</i>	vascular plant	none	special concern
Fluted-shell	<i>Lasmigona costata</i>	mussel	none	special concern
Franklin's Gull	<i>Larus pipixcan</i>	bird	none	special concern
Goblin Fern	<i>Botrychium mormo</i>	vascular plant	none	special concern
Gray Ragwort	<i>Senecio canus</i>	vascular plant	none	endangered
Greater Prairie-chicken	<i>Tympanuchus cupido</i>	bird	none	special concern
Hair-like Beak-rush	<i>Rhynchospora capillacea</i>	vascular plant	none	threatened
Hall's Sedge	<i>Carex hallii</i>	vascular plant	none	special concern
Indian Ricegrass	<i>Oryzopsis hymenoides</i>	vascular plant	none	endangered
Lake Sturgeon	<i>Acipenser fulvescens</i>	fish	none	special concern
Least Weasel	<i>Mustela nivalis</i>	mammal	none	special concern
Little White Tiger Beetle	<i>Cicindela lepida</i>	insect	none	threatened
Loggerhead Shrike	<i>Lanius ludovicianus</i>	bird	none	threatened
Louisiana Broomrape	<i>Orobanche ludoviciana</i>	vascular plant	none	special concern
Marbled Godwit	<i>Limosa fedoa</i>	bird	none	special concern

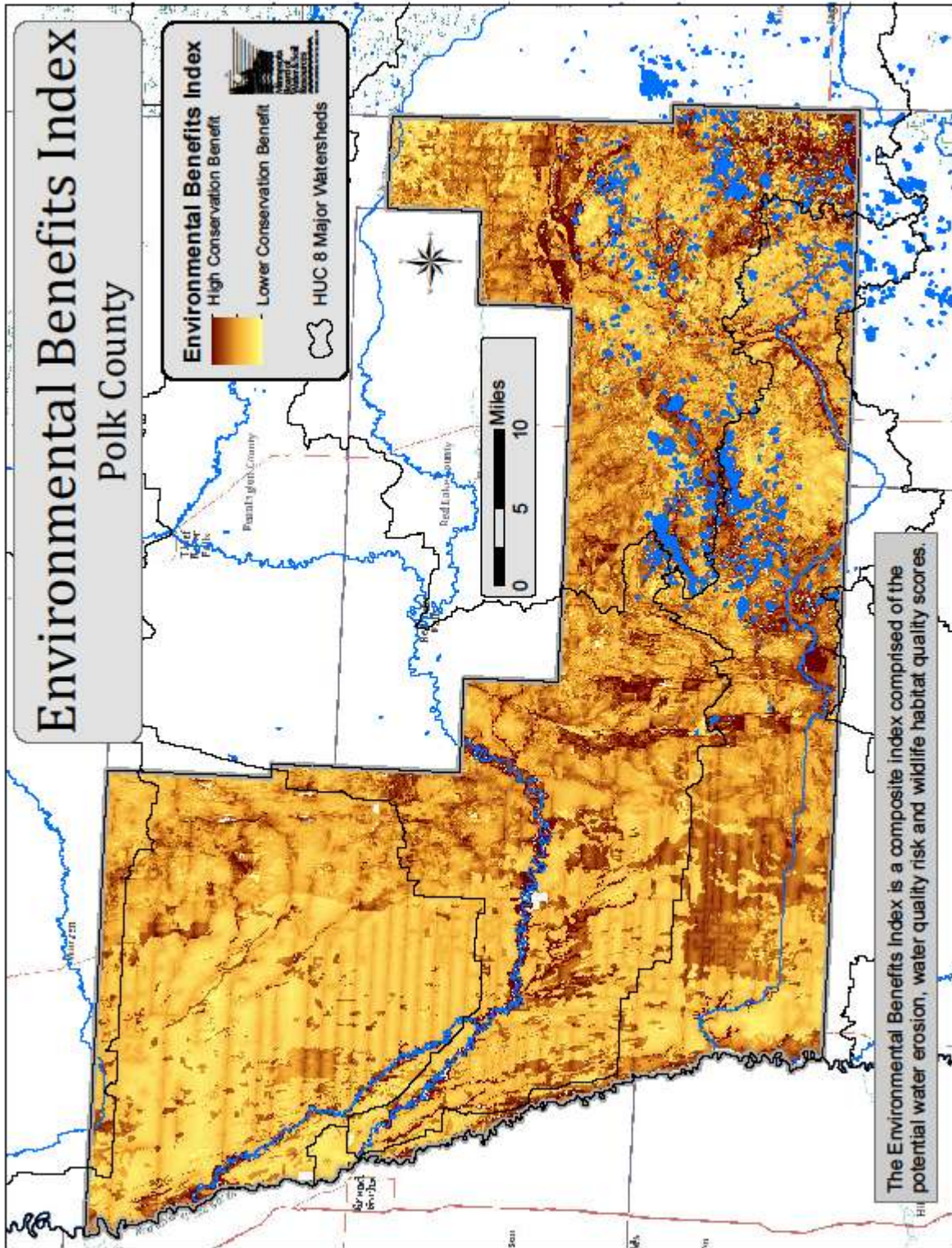
Nelson's Sparrow	<i>Ammodramus nelsoni</i>	bird	none	special concern
Northern Gentian	<i>Gentiana affinis</i>	vascular plant	none	special concern
Northern Single- spike Sedge	<i>Carex scirpoidea</i>	vascular plant	none	special concern
Oat-grass	<i>Helictotrichon hookeri</i>	vascular plant	none	special concern
Pale Moonwort	<i>Botrychium pallidum</i>	vascular plant	none	endangered
Plains Pocket Mouse	<i>Perognathus flavescens</i>	mammal	none	special concern
Powesheik Skipper	<i>Oarisma powesheik</i>	insect	none	special concern
Prairie Moonwort	<i>Botrychium campestre</i>	vascular plant	none	special concern
Prairie Vole	<i>Microtus ochrogaster</i>	mammal	none	special concern
Ram's-head Lady's-slipper	<i>Cypripedium arietinum</i>	vascular plant	none	threatened
Regal Fritillary	<i>Speyeria idalia</i>	insect	none	special concern
Sandy Tiger Beetle	<i>Cicindela limbata nympha</i>	insect	none	endangered
Sea Naiad	<i>Najas marina</i>	vascular plant	none	special concern
Short-eared Owl	<i>Asio flammeus</i>	bird	none	special concern
Shorthead Fleabane	<i>Trimorpha lonchophylla</i>	vascular plant	none	special concern
Small White Lady's-slipper	<i>Cypripedium candidum</i>	vascular plant	none	special concern
Small-leaved Pussytoes	<i>Antennaria parvifolia</i>	vascular plant	none	special concern
Sprague's Pipit	<i>Anthus spragueii</i>	bird	candidate	endangered
Sterile Sedge	<i>Carex sterilis</i>	vascular plant	none	threatened
Trumpeter Swan	<i>Cygnus buccinator</i>	bird	none	threatened
Twig-rush	<i>Cladium mariscoides</i>	vascular plant	none	special concern
Western Prairie Fringed Orchid	<i>Platanthera praeclara</i>	vascular plant	threatened	endangered

Whorled Nut-rush	<i>Scleria verticillata</i>	vascular plant	none	threatened
Widgeon-grass	<i>Ruppia maritima</i>	vascular plant	none	special concern
Wilson's Phalarope	<i>Phalaropus tricolor</i>	bird	none	threatened
Yellow Rail	<i>Coturnicops noveboracensis</i>	bird	none	special concern

Habitat Quality

The following Potential Quality Habitat map and Environmental Benefit Index map of Polk County will be used to identify areas of potential high quality wildlife habitat and greatest conservation benefits.





Priority Concern 4: Exotic and Invasive species Management

Polk County Local Water Management Plan will identify any new or yet to date undiscovered exotic and invasive species for prevention and management practices.

Polk County Cooperative Weed Management Area

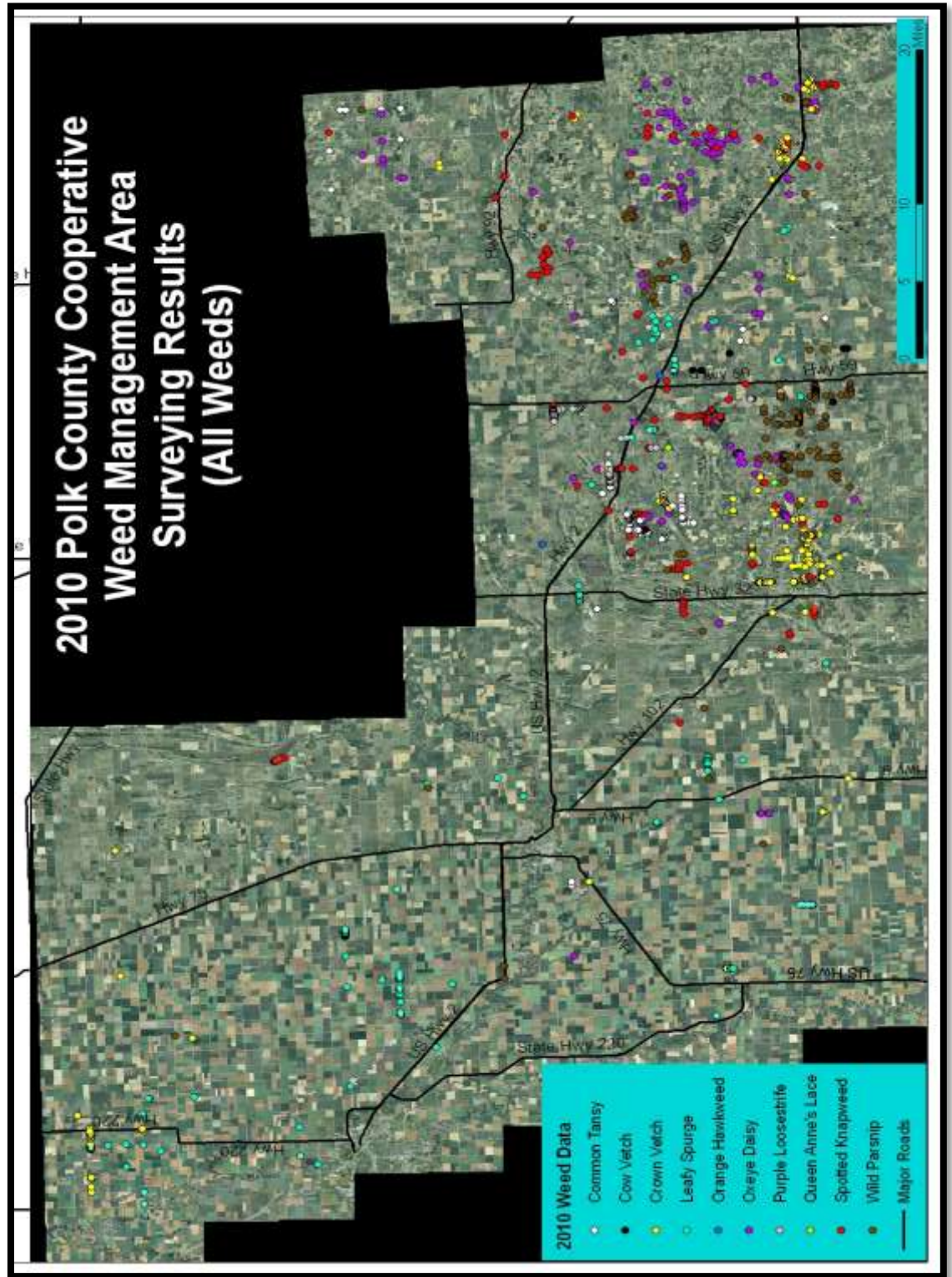
Chaired by Polk County Agricultural and Drainage Inspector, Jody Beauchane, agencies including the Minnesota Department of Natural Resources, Pembina Trail RC&D, East and West Polk County Soil and Water Conservation Districts, U.S. Fish and Wildlife Service, Minnesota Extension, Farm Service Agency, The Nature Conservancy, and Minnesota Department of Transportation have joined to form the Polk County Cooperative Weed Management Area (PCCWMA). The purpose of the PCCWMA is to work cooperatively to reduce the economic and environmental impacts that invasive plant species have on lands in the County.

Representatives from these agencies are focusing on cooperative partnerships with policies, funding opportunities and time committed to reduce invasive weed species in Polk County. The overall objectives are on public education and mapping and control of invasive species with the specific goal to prevent, reduce and eliminate weeds through the use of chemical, mechanical and biological efforts to achieve success.

Formation of the Polk County Cooperative Weed Management Area (PCCWMA), including the development of a Purpose Statement and the drafting of a Memorandum of Understanding was initiated in 2008. Meetings were held to discuss what each agency was doing in regards to invasive weed management, how collaboration would benefit each agency and the benefits in working more cooperatively to promote control of invasive species. The PCCWMA established *Euphorbia esula* (leafy spurge), *Centaurea stoebe* (spotted knapweed), thistle species, and *Typha* spp. (cattails) as priority species. Additionally, secondary plants of concern for the county include *Linaria vulgaris* (common toadflax), *Tanacetum vulgare* (common tansy), *Vicia cracca* (cow vetch), *Coronilla varia* (crown vetch), *Chrysanthemum leucanthemum* (oxeye daisy), *Daucus carota* (Queen Ann's Lace), *Pastinaca sativa* (wild parsnip), *Butomus umbellatus* (flowering rush), *Lythrum salicaria* (purple loosestrife), and *Hieracium aurantiacum* (Orange Hawkweed).

The Polk County Ag and Drainage Inspector reports noxious weed acreages controlled by Polk County along county and state roads have increased for the sixth year in a row. In 2008, the increase is largely due to a \$12,000 grant received from the U.S. Fish and Wildlife that allowed Polk County to go beyond its normal budgeted amount. The grant was used to identify, map, and control non-native invasive plant species with an herbicide that leaves a residual behind to control any new noxious weed seeds that could germinate after an area was initially treated. The final total resulted in treating more than 2,456 acres equaling over 1,193 continuous miles of invasive noxious weeds along county and state roads within Polk County.

Location of Invasive Species in Polk County



Aquatic Invasive Species

The spread of AIS (aquatic invasive species) must be controlled because they threaten our economy, recreational opportunities and fish and wildlife habitats. Once established, invasive species can rarely be eliminated. Currently one lake in Polk County has been identified as being infested with Eurasian Water Milfoil (*Myriophyllum spicatum*), Union Lake. Curly Leaf Pondweed (*Potamogeton crispus*) was found in Whitefish Lake in 1998 as part of a fishery survey. Purple loosestrife (*Lythrum salicaria*) is found scattered throughout the County in wetlands and lakes. The closest known threat of zebra mussels occurs in several lakes in Otter Tail County.

Terrestrial Invasive Species

Noxious weeds have and are becoming prolific in areas of Polk County. Canada, plumeless thistle, spotted knapweed and leafy spurge, for example are very successful at establishing themselves within the county. Wild parsnip is starting to appear in the southern part of the County.

III. Goals and Objectives

Priority Concern #1

The Polk County Local Water Management Plan will focus on protection and enhancement of surface water quality. Specific areas of focus will be:

- Lake Region in the eastern part of the county, with specific focus on the human impacts.
 - Increases in development around smaller, non-recreational lakes and larger wetland complexes should be assessed to determine if adverse impacts have affected the water quality of these smaller bodies of water.
 - For nearly all of the lakes in this ecoregion phosphorus is the limiting factor. Major management efforts related to water quality are directed at limiting the amount of phosphorus loading into the lakes.
 - Sediment loading has also become a major concern to the water quality of the lakes. Proper land use management and implementation of Best Management Practices needs to be analyzed and addressed.
- Surface water and ground waters in the western part of the county.
 - The City of East Grand Forks receives its public water supply from the Red Lake River.
 - The Red Lake River is impaired for turbidity and management efforts should focus on sediment loading into the Red Lake River and its tributaries.
- In addition to the above mentions specific areas of concern for Polk County, The County Board, Watershed Districts and SWCD's will actively pursue efforts to address surface water quality concerns within the county.
- Although surface water is of primary concern for Polk County we will be responsive to the need to monitor and protect our groundwater resources. We will participate to our fullest capacity but state and federal agencies such as Minnesota Department of Health (MDH), and USGS will need to be the primary source for groundwater protection and management.

Goal: Improve the water quality of rivers and streams from the point they enter Polk County. Our goal is to attain/maintain a fishable/swimmable status of all lakes in the county, with the overall goal for all waters in Polk County to meet or exceed state water quality standards.

To meet this goal Polk County will need to coordinate its efforts with those having authority/interest to attend to water quality concerns in the watersheds shared with Polk County.

The County will actively participate in the Sand Hill River Watershed Restoration and Protection Project (WRAP) and the Red Lake River WRAP. Once complete, priority will be given to areas identified as a result of the WRAP process. The county will also participate in upcoming intensive watershed-wide monitoring studies scheduled to be completed in the future. Additional priority areas will be determined upon based on outcomes of future studies.

Major Watershed Restoration and Protection Studies

Watershed	Intensive Monitoring Start Year
Sand Hill River Watershed	2011
Red Lake River Watershed	2012
Grand Marais Creek Watershed	2013
Snake River Watershed	2013
Clearwater River Watershed	2014

Until additional targeting efforts are applied the following have been identified as the county's priority project areas based on a collaborative approach to water quality issues, readiness of projects, and willingness of project stakeholders. These and other future projects will be further defined and identified in the SWCD annual planning process.

Priority Areas: Projects identified in the Sand Hill River Watershed include the upper reaches of the Sand Hill Watershed, Fertile Airport site located west of Fertile, Carlson site located west of Winger, Environmental Learning Center stream bank erosion project, and ditch systems that drain within 1 mile of a river or a county ditch system. Other potential projects include the Maple Lake Diversion Clean Water project, areas within 1 mile of a well head protection area, the sealing of unused and unsealed wells, educate, market and install Ag BMPs based with whole farm planning. Priorities around the lakes region include educating shoreland owners on lake-scaping, working with new developments on natural environmental lakes, and lakeshed assessments on Union, Sarah and Maple Lake and wetland retention to improve water quality entering Lake Sarah. The following watersheds are in the process of initiating a Watershed Restoration and Protection (WRAP) projects; Sand Hill River, Red Lake, Grand Marias Creek. The SWCD will be actively involved in these processes for watersheds currently underway and for those to be assessed in the future.

1) Objective: Identify areas of agricultural land use, especially in those areas with sensitive ground water and surface water resources for the installation of erosion and sediment control practices to reduce sedimentation into rivers, lakes, and wetlands with priority given to land with a Land Management Plan. Pursue funds to do land management plans to accelerate implementation on needed areas with priority to source water protection.

Surface Water

- Action: Install BMP's to address the resource needs such as grassed waterways, sediment control basins, side inlet pipes, minimum tillage or no-till.
- Action: Develop a cost share program, which may supplement existing programs.
- Action: Provide technical assistance.

- Action: Provide financial support by seeking grant, Ag BMP loans, or working with agency/ special group partners (example such as NRCS, Deer Hunters Assoc, Ducks Unlimited, Pheasants Forever, and Turkey Federation).
- Action: Target areas for land retirement programs into RIM, CRP, WRP, walk-in- lands, wetland banking, or other programs available.
- Action: Apply targeting tool to identify priority project areas.
- Action: Conduct sub subsurface sewage treatment system (SSTS) inventory and upgrades as needed on priority lakes: Maple, Union and Sarah with the potential to expand to other recreation and natural environment lakes.

Ground Water

- Action: Provide financial support to seal priority wells. Priority will be given to those meeting the State Cost Share priority guidelines, and/or have the potential to impact aquifers.

2) Objective: Maintain and assess the water quality of rivers, lakes, and groundwater resources.

- Action: Utilize monitoring data to establish an attainable range for water quality.
- Action: Continue to support the Red River Basin River Watch Program.
- Action: Continue participation in the Citizen Stream Monitoring Program.
- Action: Continue taking water elevation readings on designated lakes.
- Action: Continue MNDNR observation well readings.
- Action: Continue citizens' rainfall monitoring program.
- Action: Set up lake monitoring programs.
- Action: Implement the Lake Improvement Districts lake plans.
- Action: Implement the Watershed District plans.

3) Objective: Assist in the development of Watershed Restoration and Protection Project (WRAP) including TMDL's for waters listed as impaired and Protection Plans for surface waters not impaired.

- Action: Use resources to assist with and confirm listed waters on the TMDL impaired list.
- Action: Develop a water quality monitoring program.
- Action: Pursue grants and funding opportunities that will support the county's surface water protection and improvement efforts.
- Action: Once TMDL Implementation Plans are developed, high prioritize their implementation.

4) Objective: Promote and educate the citizens of Polk County about the wise use of our natural resources as it pertains to water quality.

- Action: Participate at the Polk County fair with educational displays.

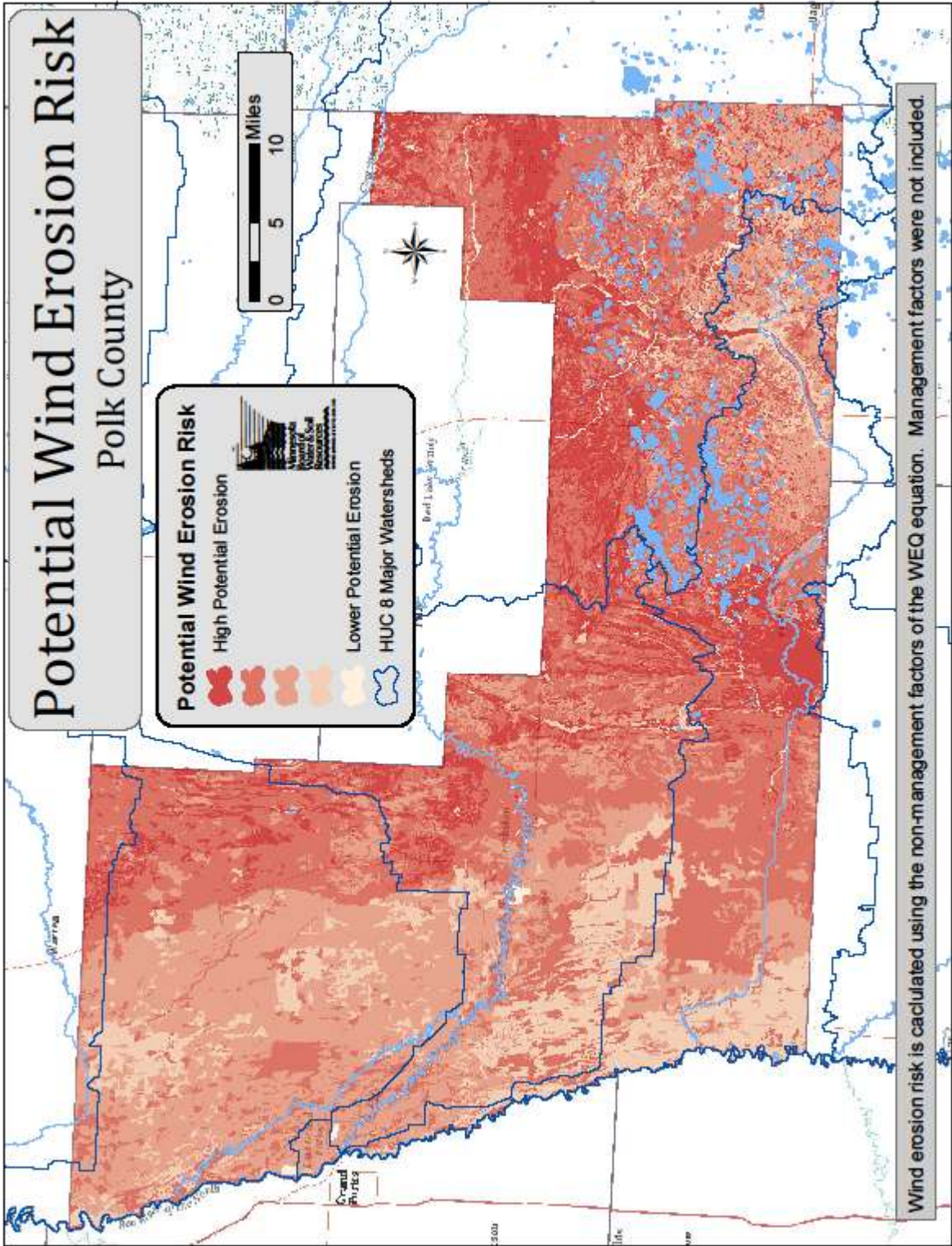
- Action: Participate in presentations to schools, River Watch, agency meetings, and other educational events.
- Action: Put out timely news releases and newsletters.
- Action: Conduct tours and demonstrations.

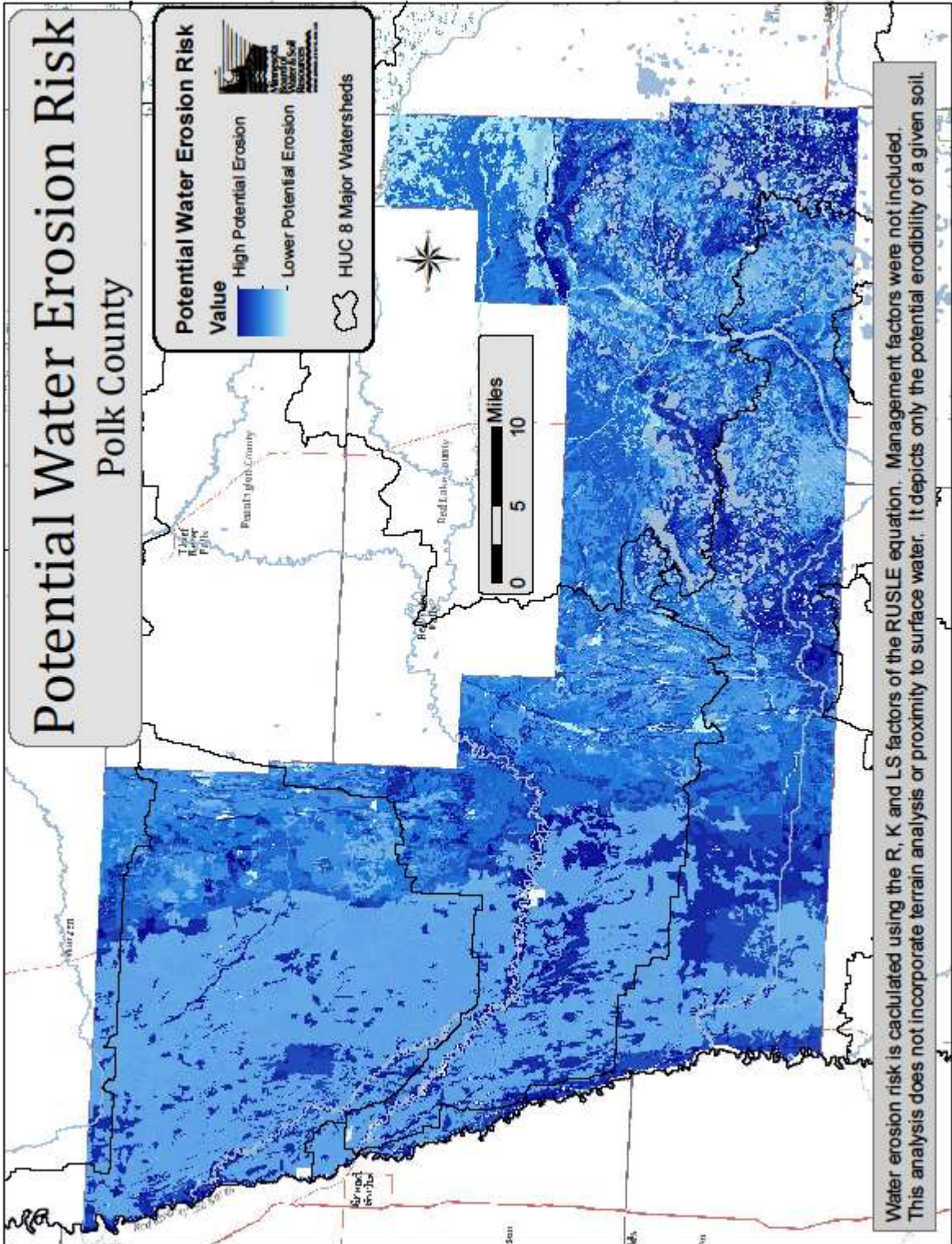
5) Objective: Polk County has 82 feedlots that are registered, with an additional 35 smaller operations that are not required to be registered. Many of these feedlots are located next to rivers, lakes or wetlands that may have the potential to impact water quality. Polk County has an approved MPCA Animal Feedlot and Manure Management Plan it will follow and implement.

- Action: Conduct site visits and inspection as required in the County Feedlot Plan.
- Action: Provide landowners information on feedlot registration, permitting, regulations, and rule requirements.
- Action: Provide educational and technical information.
- Action: Seek grants or cost share for financial assistance to correct issue with priority given to riparian lots, and high priority to those on impaired waters.

Potential Wind and Water Erosion Risk

The following maps will be referred to provide the county with baseline information for prioritization of efforts when addressing water concerns related to sediment and turbidity.





Priority Concern #2

Due to the fluvial geomorphic characteristics of the Red River of the North Basin, Polk County is subject to frequent flooding. Some factors such as topography and increase precipitation are unmanageable, but other factors such as flood plain encroachment, channelization of waterways, land use practices and effective private drainage into public systems, are factors that can be assessed for *Best Management Practices*.

- Polk County Local Water Management Plan will focus on the quantity of water passing through the County and its associated watersheds by inventorying, assessing and evaluating the drainage infrastructure.

Goal: Manage waters in Polk County in a manner that reduces flood damages within the County as well as the Red River Basin. Goals that have been established and will be recognized by Polk County are:

1) The Red River Basin Commission 20% Flow Reduction Strategy which indicate a 35% peak flow reduction on the Sand Hill River at Climax and a 35% peak flow reduction on the Red Lake River at Crookston. To meet these goals Polk County will need to coordinate its efforts with other counties and watershed districts to attain these peak flow reduction in the watersheds shared with Polk County.

2) The Flood Damage Reduction Work Group Mediation Agreement which include but not limited to:

Prevent damage to farm structures, homes, and communities.

- a. Promote the construction of farmstead ring dikes built to a minimum of 2 feet of freeboard over the flood of record, or 1 foot above the administrative 100-year flood, whichever is greater.
- b. Promote the construction of community setback levees and floodwalls built to the flood of record plus uncertainty (3 feet) or the 100-year flood plus uncertainty, whichever is greater.
- c. Promote the acquisition and permanent removal of flood-prone structures and establishment of greenways within the 100-year flood plain.
- d. Accelerate flood insurance studies, flood plain remapping and hydraulic/hydrologic studies in poorly defined or unmapped areas.
- e. Accelerate comprehensive watershed and systems approaches to basin management.
- f. Discourage the development of structures within the 100-year flood plain, with the exception of those approved in a community's flood plain ordinances.

3. Reduce damage to farmland by:

- a. Providing protection against a ten-year summer storm event for intensively farmed agricultural land;
- b. Maintaining existing levels of flood protection when consistent with a comprehensive watershed management plan; and
- c. Providing a higher level of protection, e.g., 25-year event, when feasible at a minimal incremental cost.

Until additional targeting efforts are applied the following have been identified as the county's priority project areas based on a collaborative approach to water quantity issues, readiness of projects, and willingness of project stakeholders. These and other future projects will be further defined and identified in the SWCD annual planning process.

Priority Areas: validate that all ditch systems are functioning properly with adequate culvert size, and proper BMP's associated with that ditch system, be it a private, county or watershed ditch. Make sure that absentee landowners are maintaining the natural water courses so water movement isn't impeded. Address water impoundments or any wetland improvements or dikes that hold water back so it does not alter the drainage system or change the water table so it will have an adverse affect on neighboring property, multi-purpose drainage Assessments, and wetland restoration through the state banking program to hold back water.

1) Objective: Ensure that county, township, watershed and private ditch systems adequately address the drainage needed to support agriculture without negatively impacting water quality and other natural resources, as well as economic impacts to the infrastructure of Polk County.

- Action: Establish design standards for the repair, maintenance, improvement, and establishment of agricultural drainage systems.
- Action: Determine if ditch systems are of adequate size.
- Action: Identify needed BMP's such as buffer strips and side inlet pipes.
- Action: Assess and modify, if needed, Polk County ditch rules and ordinances.
- Action: Assess and modify, if needed Polk County ditch and culvert permitting.
- Action: Assess adequacy of the drainage infrastructure.
- Action: Conduct a culvert inventory.
- Action: Identify and map private ditch systems to better understand water movement within the ditch system and county.
- Action: Assess need to record tiling activity that is presently unregulated.
- Action: Work with Watershed Districts on proper permitting for tiling on private land.
- Action: Address the need for beaver control in public and private ditch systems.
- Action: Implementation of new technologies in ditch and drainage systems and maintenance as they come available.

2) Objective: Identify key areas within the County that are prone to flooding and implement proper actions to address flood prevention.

- Action: Use targeting tools to prioritize.
- Action: Establishment of BMP's that will reduce and/or slow down water movement through the County.
- Action: Identify site for water retention through land retirement programs such as the RIM/WRP or Agricultural Wetland Banking programs.
- Action: Carry out goals and objectives in Watershed District 10 year plans.
- Action: Seek funding to assist landowners in flooded areas of the County; this could include MN Recover funds, emergency funding and FEMA funding.

Priority Concern #3

Polk County is concerned with the preservation and enhancement of its natural resources. The geology of Polk County is divided into 3 distinct areas; the glacial-lake plain, glacial lake washed till plain and glacial moraine region. These major areas, because of their size, unique geographical features, and wide diversity of natural resources are of significant benefit to the area and citizens.

- Polk County in cooperation with other local, state, and federal agencies will work to restore, enhance and protect these areas through programs and projects that accomplish this; cautious it is not done at the expense of the local economy.

Goal: Participate in the restoration, conservation, and protection of key areas providing unique ecological values and recreational opportunities.

Until additional targeting efforts are applied the following have been identified as the county's priority project areas based on a collaborative approach to restore, protect and enhance natural areas, readiness of projects, and willingness of project stakeholders. These and other future projects will be further defined and identified in the annual planning process.

Priority Areas: Conservation Reserve Program (CRP) acres that will be expiring in upcoming years which are located in the "high conservation potential" areas identified on the EBI map located on page 61. Areas that protect or restore rare natural features as identified in the Minnesota County Biological Survey (MCBS). Priority will also be given to those areas on which a land management plan has been developed to ensure proper conservation and habitat goals are met.

1) Objective: Identify, restore, and protect grassland, wetland, and woodland habitats and key natural areas with multiple benefits to Polk County and its Citizens.

- Action: Seek funding opportunities with existing or future land retirement or easement programs, with cooperating partners.
- Action: Minimize land use impacts of potential land use changes by the installation of BMP's.

2) Objective: Recognize areas that are unique to the County such as native prairie sites in the glacial beach ridge areas, and wetland areas of the lake region. Utilize Minnesota County Biological Survey (MCBS) Areas of Biodiversity Significance, native plant communities, and key habitats as a resource to identifying appropriate sites.

- Action: Seek funding opportunities with existing or future land retirement or easement programs, with cooperating partners.
- Action: Minimize land use impacts of potential land use changes by the installation of BMP's.

3) Objective: Protect and identify areas of threatened or endangered species

- Action: Promote education on the species that are threatened or endangered.
- Action: Minimize land use impacts of potential land use changes by the installation of BMP's.

4) Objective: Preserve high quality wetlands within Polk County for their best functional values.

- Action: Identify wetlands that are of high value for banking credits, easements, flood storage, and wildlife.
- Action: Offer cost share and other incentives to landowners to participate in restoration of wetlands.
- Action: Assist with development of Agricultural Wetland Banking program.

Priority Concern #4

Polk County Local Water Management Plan will identify any new or yet to date undiscovered exotic and invasive plant and invasive species for prevention and management practices.

Goal: Reduce invasive species impacts within Polk County.

Until additional targeting efforts are applied the following have been identified as the county's priority project areas based on a collaborative approach to invasive species impacts, readiness of projects, and willingness of project stakeholders. These and other future projects will be further defined and identified in the SWCD annual planning process.

Priority Areas: Address invasive species along road right-of-ways, absentee landowner's property, and local state and federal lands, aiming to prevent the spread of terrestrial invasive species. Address aquatic invasive species threats to area lakes. Monitor infestation of Eurasian Water Milfoil in Union Lake.

Terrestrial Invasive Species

1) Objective: Control terrestrial invasive species by prevention, reduction and elimination.

- Action: Map know sites and species occurrence.
- Action: Conduct public education on the invasive species by public meeting, mailings, news releases and newsletters
- Action: Seek funding through cooperating partners and grants.

2) Objective: Continue support of the Polk County Cooperative Weed Management Area.

- Action: Have a central clearinghouse to compile all data collected.
- Action: Continue to have meetings to keep the PCCWM group active.
- Action: Keep the public informed of the PCCWM group activities.

Aquatic Invasive Species

3) Objective: Control aquatic invasive species by prevention, reduction and elimination.

- Educate staff and lake associations on aquatic invasive species threats.
- Educate public on reducing aquatic invasive species threats.
- Identify and map aquatic invasive species within county and regional threats.
- Implement a prevention and restoration program to reduce aquatic invasive species.

Reference Documents and Website Locations

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<http://www.dnr.state.mn.us/rsg/index.html>

Minnesota Department of Natural Resources List of Known Calcareous Fen Sites (June 30, 2001)

Minnesota Department of Natural Resources, Invasive Species in Minnesota,
<http://www.dnr.state.mn.us/invasives/index.html>

MPCA Red River Basin Water Quality Plan, 1999
<http://www.pca.state.mn.us/water/basins/redriver/wqplan/index.html>

Minnesota Pollution Control Agency, Impaired Waters and TMDLs,
www.pca.state.mn.us/water/tmdl/index.html

NRCS Website, Watershed Overview
<http://www.mn.nrcs.usda.gov/technical/rwa/Assessments>

Red Lake River Watershed Farm to Stream Tile Drainage Water Quality Study
Final Report, Revision 3 - March 20, 2009
<http://www.redlakewatershed.org/projects>

Red Lake Watershed District 10-Year Comprehensive Plan, April 2006
<http://www.redlakewatershed.org/planupdate>

Sand Hill River Watershed Management Plan, May 13, 2011

Summary of Regional Assessment Locations
By Danni Halvorson, IWI

- Heiskary, Steven, and S. McCollor. 1993. Selected Water Quality Characteristics of Minimally Impacted Streams from Minnesota's Seven Ecoregions, Addendum to: Descriptive Characteristics of the Seven Ecoregions in Minnesota. Minnesota Pollution Control Agency.
- Fandrei, G., S.A. Heiskary, and S. McCollor. 1988. Descriptive Characteristics of the Seven Ecoregions in Minnesota. Minnesota Pollution Control Agency.

- Minnesota Pollution Control Agency. 2010. Guidance Manual for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment: 305(b) Report and 303(d) List.

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U.S. Geological Survey, Ground-Water Availability from Surficial Aquifers in the Red River of the North Basin, Minnesota (Reppe 2005).

U.S. Geological Survey, Water-Resources Investigation Report 95-4201, 1996.

Cover Photograph courtesy of Ben Sullivan, July 7, 2011.

IV. Implementation Schedule

Fundamental goals and objectives can be generalized, project's budgets will be further refined as the projects develop.

Priority Concern # 1

Goal: Improve the water quality of rivers and streams from the point they enter Polk County. Our goal is to attain/maintain a fishable/swimmable status of all lakes in the county, with the overall goal for all waters in Polk County to meet or exceed state water quality standards.

- 1) **Objective:** Identify areas of agricultural land use, especially in those areas with sensitive ground water and surface water resources for the installation of erosion and sediment control practices to reduce sedimentation into rivers, lakes, and wetlands with priority given to land with a Land Management Plan. Pursue funds to do land management plans to accelerate implementation on needed areas with priority to source water protection.

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Install BMP's to address the resource needs	Ongoing	SWCD/NRCS	Watershed Districts	Unknown	All
Develop a cost share program	Ongoing	SWCD/NRCS	BWSR	Unknown	All
Provide technical assistance	Ongoing	SWCD/NRCS	Landowners, Watershed Districts	\$30,000/year	All
Provide financial support by seeking grants	Ongoing	SWCD	Watershed Districts, BWSR, Other	Unknown	All
Target areas for land retirement programs	Ongoing	SWCD/NRCS	Watershed Districts, BWSR	Unknown	All
Apply targeting tool to identify priority project areas	Ongoing	SWCD	Watershed Districts, BWSR, NRCS	Unknown	All
Conduct SSTS inventory & upgrades	Ongoing	Environmental Services	SWCD	Unknown	All
Provide financial support to seal priority wells	Ongoing	SWCD/NRCS	BWSR	\$5,000/year	All

2) **Objective:** Maintain and assess the water quality of rivers, lakes, and groundwater resources.

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Utilize monitoring data to establish an attainable range for water quality	3 years	MPCA	Watershed Districts, SWCD, River Watch	Unknown	All
Continue to support the Red River Basin River Watch Program	Ongoing	River Watch	Watershed Districts	\$1,000/year	All
Continue participation in the Citizen Stream Monitoring Program	Ongoing	SWCD	MPCA, Watershed Districts	\$2,000/year	RLWD SHRWD
Continue taking water elevation readings on designated lakes	Ongoing	SWCD	Watersheds	\$2,000/year	RLWD SHRWD
Continue MNDNR observation well readings	Ongoing	SWCD	MNDNR	\$200/year	RLWD
Continue citizens' rainfall monitoring program	Ongoing	SWCD	MNDNR	\$500/year	All
Set up lake monitoring programs	Ongoing	SWCD	County, SWCD, MPCA	\$10,000/year	All
Implement the Lake Improvement Districts lake plans	Ongoing	Lake Improvement District	MPCA, County, SWCD, Watershed Districts, MNDNR	\$100/year	RLWD SHRWD
Implement the Watershed District plans	Ongoing	Watershed Districts	County, Watershed Districts, MPCA, Lake Imp. Assoc., SWCD	\$100,000/year	All

3) **Objective:** Assist in the development of Watershed Restoration and Protection Project (WRAP) including TMDL's for waters listed as impaired and Protection Plans for surface waters not impaired.

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Use resources to assist with and confirm listed waters on the TMDL impaired list	Ongoing	MPCA, Watershed Districts	SWCD	\$2,000/year	All
Develop a water quality monitoring program	Ongoing	Watershed Districts, MPCA	SWCD	\$1,000/year	All
Pursue grants and funding opportunities that will support the county's surface water protection and improvement efforts	Ongoing	SWCD	Watershed Districts, County	\$6,000/year	All

4) **Objective:** Promote and educate the citizens of Polk County about the wise use of our natural resources as it pertains to water quality.

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Participate at the Polk County fair with educational displays	Ongoing	SWCD	County, Watershed Districts, MNDNR	\$100/ year	All
Participate in presentations to schools, River Watch, agency meetings, educational events	Ongoing	SWCD	River Watch, County, Watershed Districts, MNDNR, USFWS	\$1,500/year	All
Put out timely news releases and newsletters	Ongoing	SWCD	River Watch, County, Watershed Districts, MNDNR, USFWS	\$1,000/year	All
Conduct tours & demonstrations	Ongoing	SWCD	River Watch, County, Watershed Districts, MNDNR, USFWS	\$1,000/year	All

5) **Objective:** Polk County has 82 feedlots that are registered, with an additional 35 smaller operations that are not required to be registered. Many of these feedlots are located next to rivers, lakes or wetlands that may have the potential to impact water quality. Polk County has an approved MPCA Animal Feedlot and Manure Management Plan.

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Conduct site visits and inspection as required in the County Feedlot Plan.	Ongoing	SWCD	MPCA	\$7,000/year	All
Provide landowners information on feedlot registration, permitting, regulations, and rule requirements	Ongoing	SWCD	MPCA U of M Extension	\$7,000/year	All
Provide educational and technical information	Ongoing	SWCD	MPCA U of M Extension	\$1,000/year	All
Seek grants or cost share for financial assistance	Ongoing	SWCD	MPCA	Unknown	All

6) **Objective:** Preserve high quality wetlands within Polk County for their best functional values.

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Identify wetlands that are of high value for banking credits, easements, flood storage, and wildlife	Ongoing	SWCD	BWSR, Watershed Districts	\$75/hour	All
Offer cost share and other incentives to landowners to participate in restoration of wetlands	Ongoing	SWCD	BWSR, NRCS	Unknown	All
Assist with development of Agricultural Wetland Banking program	Ongoing	SWCD	BWSR, NRCS	\$75/hour	All

Priority Concern #2

Goal: Manage waters in Polk County in a manner that reduces flood damages within the County as well as the Red River Basin. Goals that have been established and will be recognized by Polk County are:

1) The Red River Basin Commission 20% Flow Reduction Strategy which indicate a 35% peak flow reduction on the Sand Hill River at Climax and a 35% peak flow reduction on the Red Lake River at Crookston. To meet these goals Polk County will need to coordinate its efforts with other counties and watershed districts to attain these peak flow reduction in the watersheds shared with Polk County.

2) The Flood Damage Reduction Work Group Mediation Agreement which include but not limited to:

Prevent damage to farm structures, homes, and communities.

- a. Promote the construction of farmstead ring dikes built to a minimum of 2 feet of freeboard over the flood of record, or 1 foot above the administrative 100-year flood, whichever is greater.
- b. Promote the construction of community setback levees and floodwalls built to the flood of record plus uncertainty (3 feet) or the 100-year flood plus uncertainty, whichever is greater.
- c. Promote the acquisition and permanent removal of flood-prone structures and establishment of greenways within the 100-year flood plain.
- d. Accelerate flood insurance studies, flood plain remapping and hydraulic/hydrologic studies in poorly defined or unmapped areas.
- e. Accelerate comprehensive watershed and systems approaches to basin management.
- f. Discourage the development of structures within the 100-year flood plain, with the exception of those approved in a community's flood plain ordinances.

3. Reduce damage to farmland by:

- a. Providing protection against a ten-year summer storm event for intensively farmed agricultural land;
- b. Maintaining existing levels of flood protection when consistent with a comprehensive watershed management plan; and
- c. Providing a higher level of protection, e.g., 25-year event, when feasible at a minimal incremental cost.

- 1) **Objective:** Ensure that county, township, watershed and private ditch systems adequately address the drainage needed to support agriculture without negatively impacting water quality and other natural resources, as well as economic impacts to the infrastructure of Polk County.

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Establish design standards for the repair, maintenance, improvement, and establishment of agricultural drainage systems	3 years	Watershed Districts	Polk County Drainage Authority	\$1000/ year	All
Determine if ditch systems are of adequate size	5 years	Watershed Districts	Polk County Drainage Authority	\$500/year	All
Identify needed BMP's	5 years	SWCD	Watershed Districts	\$500/year	All
Assess and modify, if needed, Polk County ditch rules and ordinances	5 years	County	Watershed Districts	\$500/year	All
Assess and modify, if needed Polk County ditch and culvert permitting	3 years	County, Watershed Distr.	Townships	\$500/year	All
Assess adequacy of the drainage infrastructure	3 years	County, Watershed Distr.	Townships	\$500/year	All
Conduct a culvert inventory	5 years	Watershed Dist.	SWCD	\$50,000/year	All
Identify and map private ditch systems to better understand water movement within the ditch system and county	5 years	SWCD	Townships, Landowners	\$50,000/year	All
Assess need to record tiling activity that is presently unregulated	3 years	Watershed Districts	SWCD, County	\$10,000/year	All
Work with Watershed Districts on proper permitting for tiling on private land	3 years	Watershed Districts	SWCD	\$500/year	All
Address the need for beaver control in public and private ditch systems	Ongoing	Townships	SWCD, Watershed Districts, County	\$500/year	All
Implementation of new technologies in ditch and drainage systems and maintenance as they come available.	Ongoing	Watershed Districts, SWCD	County	Unknown	All

2) **Objective:** Identify key areas within the County that are prone to flooding and implement proper actions to address flood prevention.

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Establishment of BMP's that will reduce and/or slow down water movement through the County	Ongoing	SWCD	NRCS, Watershed Districts	\$5,000/year	All
Identify site for water retention through land retirement programs such as the RIM/WRP or Agricultural Wetland Banking programs	Ongoing	SWCD	BWSR, NRCS, Watershed Districts	\$25,000/year	All
Carry out goals and objectives in Watershed District 10 year plans	Ongoing	Watershed Districts	SWCD	Unknown	All
Seek funding to assist landowners in flooded areas of the County; this could include MN Recover funds, emergency funding and FEMA funding	Ongoing	SWCD	BWSR, NRCS, Watershed Districts	\$5,000/year	All

Priority Concern #3

Goal: Participate in the restoration, conservation, and protection of key areas providing unique ecological values and recreational opportunities.

- 1) **Objective:** Identify, restore, and protect grassland, wetland, and woodland habitats and key natural areas with multiple benefits to Polk County and its Citizens.

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Seek funding opportunities with existing or future land retirement or easement programs, with cooperating partners	Ongoing	SWCD	NRCS	\$25,000/year	All
Minimize land use impacts of potential land use changes by the installation of BMP's	Ongoing	SWCD0	NRCS, Watershed Districts	\$20,000/year	All

Objective: Recognize areas that are unique to the County such as native prairie sites in the glacial beach ridge areas, and wetland areas of the lake region. Utilize Minnesota County Biological Survey (MCBS) Areas of Biodiversity Significance, native plant communities, and key habitats as a resource to identifying appropriate sites.

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Seek funding opportunities with existing or future land retirement or easement programs, with cooperating partners	Ongoing	SWCD	NRCS	\$20,000/year	All
Minimize land use impacts of potential land use changes by the installation of BMP's	Ongoing	SWCD	NRCS, Watershed Districts	\$15,000/year	All

2) **Objective:** Protect and identify areas of threatened or endangered species.

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Promote education on the species that are threatened or endangered	Ongoing	SWCD	MNDNR, USFWS, County	\$4,000/year	All
Minimize land use impacts of potential land use changes by the installation of BMP's	Ongoing	SWCD	MNDNR, USFWS, Lake Improvement Associations, County	\$15,000/year	All

Priority Concern #4

Goal: Reduce invasive species impacts within Polk County.

Terrestrial Invasive Species

1) **Objective:** Control invasive species by prevention, reduction and elimination.

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Map know sites and species occurrence	Ongoing	County	Polk Co. Cooperative Weed Management Group, DNR	\$15,000/year	All
Conduct public education on the invasive species by public meeting, mailings, news releases and newsletters	Ongoing	SWCD	Polk Co. Cooperative Weed Management Group, DNR	\$1,000/year	All
Seek funding through cooperating partners and grants	Ongoing	SWCD	Polk Co. Cooperative Weed Management Group, DNR	\$500/year	All

2) **Objective:** Continue support of the Polk County Cooperative Weed Management Area

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Have a central clearinghouse to compile all data collected	Ongoing	County	Polk Co. Cooperative Weed Management Group, DNR	\$30,000/year	All
Continue to have meetings to keep the PCCWM group active	Ongoing	County	Polk Co. Cooperative Weed Management Group, DNR	\$600/year	All
Keep the public informed of the PCCWM group activities	Ongoing	County	Polk Co. Cooperative Weed Management Group, DNR	\$300/year	All

Aquatic Invasive Species

3) Objective: Control aquatic invasive species by prevention, reduction and elimination

Action	Schedule	Lead Agency	Partnerships	Budget	Watershed
Educate Staff and lake associations on AIS threats	Ongoing	County, DNR	Polk Co. Cooperative Weed Management Group, DNR	\$5,000/year	All
Educate public on reducing AIS threats	Ongoing	County	Polk Co. Cooperative Weed Management Group, DNR	\$10,000/year	All
Identify and map aquatic invasive species within the county and regional threats	Ongoing	County	Polk Co. Cooperative Weed Management Group, DNR	\$15,000/year	All
Implement a prevention and restoration program to reduce AIS	Ongoing	County	Polk Co. Cooperative Weed Management Group, DNR	\$30,000/year	All

V. Ongoing Activities

Polk County Local Water Plan

Polk County Local Water Management Program - Monitoring					
Activity/Initiative	Schedule	Lead Agency	Partner Agency	Budget	Watershed District
DNR Lake Levels	7 per year	East Polk SWCD	MNDNR	\$2,000	All
DNR Observation Well Measurements	8 per year	East Polk SWCD	MN DNR	\$160	RLWD
Stream Readings	7 per year	East Polk SWCD	MPCA	\$3,000	All
Rainfall Monitoring	8 per year	East Polk SWCD West Polk SWCD	MNDNR	\$400	All
Nitrate Testing Clinic	Yearly	East Polk SWCD	MN Dept. of Ag	\$360	All
Polk County Local Water Management Program - Education					
4 th Grade Water Festival	2 per year	East Polk SWCD West Polk SWCD	Area 1 SWCD's	\$900	All
Area 1 Envirathon	2 per year	East Polk SWCD West Polk SWCD	Area 1 SWCD's	\$900	All
Polk County Fair Booth Participation	Yearly	East Polk SWCD West Polk SWCD	Watershed Districts, County, MNDNR, USFWS, River Watch	\$400	All
Tree Newsletter	Yearly	East Polk SWCD West Polk SWCD	None	\$1,200	All
UMC Class Presentations	4 per year	East Polk SWCD West Polk SWCD	Not Applicable	\$800	Not Applicable
River Watch Presentations	2 per year 3 per year	East Polk SWCD West Polk SWCD	Not Applicable	\$1,000	All
Newsletter (Lake Leader, Landowner)	2 per year (both)	East Polk SWCD West Polk SWCD	None	\$4,000	All
Rydell 7 th Grade Youth Tour	Yearly	East Polk SWCD	None	\$300	Not Applicable
Arbor Day Presentations	Yearly	West Polk SWCD	Not Applicable	\$500	Not Applicable
Cooperative Weed Management Education	Yearly	East Polk SWCD	Township Boards	\$6,000	All

Polk County Feedlot Program					
Activity/Initiative	Schedule	Lead Agency	Partner Agency	Budget	Watershed District
Feedlot Inspection	Ongoing	East Polk SWCD West Polk SWCD	MPCA	\$2,500	All
Feedlot Permitting	Ongoing	East Polk SWCD West Polk SWCD	MPCA, Polk County Environmental Services	\$250	All
Feedlot Registration	Ongoing	East Polk SWCD West Polk SWCD	MPCA, Polk County Environmental Services	\$1,000	All
Feedlot Staff Training	Ongoing	East Polk SWCD West Polk SWCD	MPCA, Polk County Environmental Services	\$2,000	All
Feedlot Owner Assistance	Ongoing	East Polk SWCD West Polk SWCD	MPCA, Polk County Environmental Services	\$5,000	All
Feedlot Administration	Ongoing	East Polk SWCD West Polk SWCD	MPCA, Polk County Environmental Services	\$2,000	All
Wetland Conservation Act Program					
Activity/Initiative	Schedule	Lead Agency	Partner Agency	Budget	Watershed District
WCA Program Administration	Ongoing	East Polk SWCD West Polk SWCD	BWSR	\$42,554/year	All
District Tree Program					
Activity/Initiative	Schedule	Lead Agency	Partner Agency	Budget	Watershed District
Hand Plant Tree Sales	Ongoing	East Polk SWCD West Polk SWCD	NRCS, Landowners	\$22,500/year	All
District Tree Planting Services	Yearly (Spring)	East Polk SWCD West Polk SWCD	NRCS	\$10,000/year	All
District Tree Maintenance Services	Ongoing	East Polk SWCD West Polk SWCD	NRCS	\$5,000/year	All
Shoreland Ordinance					
Activity/Initiative	Schedule	Lead Agency	Partner Agency	Budget	Watershed District
DNR Shoreland Management	Ongoing	Environmental Services	SWCD, DNR	\$6,798	All

SSTS					
Activity/Initiative	Schedule	Lead Agency	Partner Agency	Budget	Watershed District
SSTS Sewage Treatment Ordinance	Ongoing	Environmental Services	MPCA, SWCD, BWSR	\$9,931	All

Appendix A

Common Abbreviations

ACOE – Army Corps of Engineers

AIS – Aquatic Invasive Species

BMP – Best Management Practice

BWSR – Board of Soil and Water Resources

CLWP – Comprehensive Local Water Plan

CRP – Conservation Reserve Program

DNR – Department of Natural Resources

FDR – Flood Damage Reduction

LGU – Local Government Unit

MDA – Minnesota Department of Agriculture

MPCA – Minnesota Pollution Control Agency

NRGG – Natural Resources Block Grant

NRCS – Natural Resources Conservation Service

RIM – Reinvest in Minnesota

RLWD – Red Lake Watershed District

SHRWD – Sand Hill River Watershed District

SWCD – Soil and Water Conservation District

TMDL – Total Maximum Daily Load

TSS – Total Suspended Solids

WCA – Wetland Conservation Act

WRP – Wetland Reserve Program

WD – Watershed District

WRAC – Water Resources Advisory Committee

Appendix B

**POLK COUNTY LOCAL WATER MANAGEMENT PLAN UPDATE
PRIORITY CONCERNS SCOPING DOCUMENT**

April 14, 2011



For Review

Introduction

Polk County is located in northwest Minnesota. According to the U.S. Census Bureau, the county has a total area of 1,998 square miles of which 1,970 square miles is land and 27 square miles is water. According to the April 1, 2010 census, the population was 31,600. Projected population change as reported by the Minnesota Demographic Center, (June, 2007) show the population increases slightly (32,610) by the year 2015. The County seat is located in Crookston and the largest community is East Grand Forks. There are 58 townships and 15 cities within the county.

Polk County includes three general physiographic areas; glacial moraine, glacial lake-washed till plain, and glacial-lake plain. The glacial moraine is an area of hills and depressions that has local relief up to 150 feet and is present in the eastern part of Polk County. The glacial lake-washed till plain is flat to a very gently rolling area that has local relief up to 15 feet and is located mid-county. The western part of the glacial lake-washed plain is traversed by north-south and northeast-southwest trending long, narrow beach ridges, some are as much as 20 feet high. Approximately the western third of Polk County is glacial-lake plain. This area is extremely flat, sloping only a few feet per mile. (U.S. Geological Survey, Water-Resources Investigation Report 95-4201, 1996).

Polk County lies within the Red River of the North Basin Watershed. Due to the unique lake/river basin soils left by Glacial Lake Agassiz, the primary land use of Polk County is agriculturally based, approximately 78%. The 2007 Census of Agriculture County Data from the USDA National Agriculture Statistic Service shows the number of farms in Polk County is 1,609 with the average farm size at 684 acres. The total cropland acres are 976,367 and with 10,439 acres of irrigated land. Land use practices in the beach ridge areas have previously been gravel mining and agriculture. These areas are now trending toward the restoration of pre-settlement conditions.

Four major watersheds are predominant within the jurisdictional boundaries of Polk County. They include the Grand Marais Creek, Red Lake River, Sand Hill River, and the Clearwater River Watersheds. Three other major watersheds have small acreage within the County. They are the Wild Rice, Snake, and Marsh Watersheds.

Under legislative mandate, revisions to County Water Plans must be written within a watershed context. The purpose of this requirement is to ensure that counties look beyond the jurisdictional boundaries when making assessments and goals for water quality issues. By doing this, the county will be able to identify trends, problems, and opportunities that are specific to a watershed rather than assuming the problem or issue is confined to political boundaries.

MAJOR WATERSHEDS IN POLK COUNTY

Red Lake Watershed

The Red Lake Watershed is 909,024 acres in size with the predominate land uses/land covers being row crops (61%), wetlands (17%), forest (10%), grass/pasture/hay (6%), and residential/commercial development (5%). Agricultural land use in the basin accounts for approximately 67 percent of the overall watershed.

The main resource concerns in the watershed are wind and water erosion, nutrient management, wetland management, surface water



quality, flood damage reduction, and wildlife habitat. Many of the resource concerns relate directly to flooding and increased sediment and pollutant loading to surface water (USDA Natural Resources Conservation Services *Rapid Watershed Assessment, Red Lake, on-line*).

Grand Marais Watershed

The Grand Marais Watershed is 298,264 acres in size with the predominate land uses/land covers being row crops (90.6%), residential/commercial development (5.1%), open water (1.8%), wetlands (1.6%), and forest (0.8%). Land use within the watershed is largely agricultural, accounting for nearly 92% of the overall watershed acres.

The main resource concerns in the watershed are wind and water erosion, nutrient management, wetland management, surface water quality, flood damage reduction, and wildlife habitat. Many of the resource concerns relate directly to flooding and increased sediment and pollutant loadings to surface waters (USDA Natural Resources Conservation Services *Rapid Watershed Assessment, Grand Marais, on-line*).



Sandhill-Wilson Watershed

The Sandhill-Wilson Watershed is 708,469 acres in size with the predominate land uses/land covers being row crops (81.5%), residential/commercial development (6.9%), wetlands (4.0%), grass/pasture/hay (3.1%), and forest (3.0%). Land use within the watershed is largely agricultural, accounting for nearly 85% of the overall watershed acres.

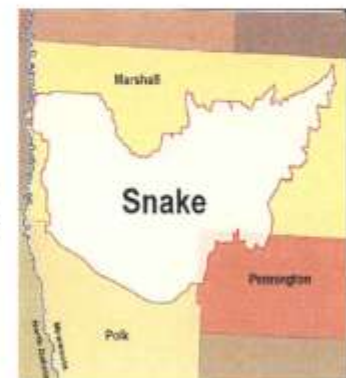
The main resource concerns in the watershed are wind and water erosion, nutrient management, wetland management, surface water quality, flood damage reduction, and wildlife habitat. Many of the resource concerns relate directly to flooding and increased sediment and pollutant loadings to surface waters (USDA Natural Resources Conservation Services *Rapid Watershed Assessment, Sandhill-Wilson, on-line*).



Snake Watershed

The Snake Watershed is 624,422 acres in size with the predominate land uses/land covers being row crops (81%), wetlands (6%), forest (5%), residential/commercial development (5%), and grass/pasture/hay (3%). Agricultural land use in the basin accounts for approximately 84% of the overall watershed acres

The main resource concerns in the watershed are wind erosion, surface water quality, nutrient, wetland, and pasture management, water quantity management and wildlife habitat. Many of the resource concerns relate to flooding and increasing sediment and pollutant loadings to surface waters (USDA Natural Resources Conservation Services *Rapid Watershed Assessment, Snake, on-line*).



Clearwater

The Clearwater Watershed is 886,632 acres in size with the predominate land uses/land covers being row crops (33%), forest (24%), grass/pasture/hay (21%), wetlands (14%), and residential/commercial development (4%). Agricultural land use in the basin accounts for approximately 54% of the overall watershed acres.

The main resources concerns in the watershed are wind and water erosion, nutrient management, wetland management, surface water quality, flood damage reduction, and wildlife habitat. Many of the resources concerns relate directly to flooding and increased sediment and pollutant loading to surface waters (USDA Natural Resources Conservation Services *Rapid Watershed Assessment, Red Lake*, on-line).



Polk County Local Water Management Plan's Update Process

The Polk County Water Plan focuses on water and related land resource issues. The county has gathered and studied available information relating to the physical environment, including, but not limited to, the surface and ground water resources, and their related land use.

Concerns were analyzed within the context of the watershed units and ground water systems where appropriate. The plan applies to the entire area within the county.

The plan is also based on key economic and environmental principles, and is consistent with other plans that exist for Polk County, including Watershed Districts, Soil and Water Conservation Districts, Environmental Service agencies, Red River Valley Basin organizations, and appropriate state and federal agencies.

The Polk County Water Plan is coordinated and administered by the East Polk Soil and Water Conservation District and the West Polk Soil and Water Conservation District. Other *Natural Resources Block Grant* Programs that Polk County participates in are; **Minnesota Wetland Conservation Act (WCA)** administered by the East and West Polk Soil and Water Conservation Districts, **Minnesota Pollution Control Agency's Feedlot Program** administered by the East and West Polk Soil and Water Conservation Districts, **Minnesota Department of Natural Resources Shoreland Program** administered by Polk County Planning and Zoning, **Minnesota Pollution Control Agency's Subsurface Sewage Treatment System (SSTS) Program** administered by Polk County Planning and Zoning.

The Polk County Water Plan (previously known as the Polk County Comprehensive Local Water Plan) was first developed and approved by the Minnesota Board of Water and Soil Resources in 1990. It was developed as a five year plan and was updated in 1997 (the 1990-1995 Plan was granted a two year extension). The 1997-2002 Plan was granted a two year extension. The 2005 to 2009 plan was also granted a two year extension which expires December 31, 2011.

The 2012 Polk County Water Plan will apply for a period of ten years from the date of State approval.

List of Priority Concerns – Polk County Local Water Management Plan Update

Through the Advisory Work Group process with excellent representation and input by the Work Group, as well as a comprehensive call for input to the Polk County Local Water Management update process, it was determined that the three Priority Concerns identified in the expiring plan were still relevant with the addition of a fourth Priority Concern. The three previous Priority Concerns (PC 1, 2, and 3) will be updated as needed to reflect current data and information with appropriate action items.

Priority Concern 1: Surface Water Quality

The Polk County Local Water Management Plan will focus on protection and enhancement of surface water quality. Specific areas of focus will be:

- Lakes region in the eastern part of the county, with specific focus on the human impacts
 - Increases in development around smaller, non-recreational lakes and larger wetland complexes should be assessed to determine if adverse impacts have affected the water quality of these smaller bodies of water
 - For nearly all of the lakes in this ecoregion, phosphorus is the limiting factor. Major management efforts related to water quality are directed at limiting the amount of phosphorus loading into the lakes
 - Sediment loading has also become a major concern to the water quality of the lakes. Proper land use management and implementation of *Best Management Practices* needs to be analyzed and addressed
- Source water supplies in the western part of the county
 - The City of East Grand Forks (and to some extent the City of Grand Forks) receives its public water supply from the Red Lake River
 - The Red Lake River is impaired for turbidity and management efforts should focus on sediment loading into the Red Lake River and its tributaries

Polk County will be an active participant of the *Total Maximum Daily Load (TMDL)* process as they are initiated in the associated watersheds.

Priority Concern 2: Water Quantity

The Polk County Local Water Management Plan will focus on the *quantity* of water passing through the County and its associated watersheds by inventorying, assessing and evaluating the drainage infrastructure.

Due to the fluvial geomorphic characteristics of the Red River of the North Basin, Polk County is subject to frequent flooding. Some factors such as topography and increased precipitation are unmanageable, but other factors such as floodplain encroachment, channelization of waterways, land use practices and ineffective private drainage into public systems, are factors that can be assessed for *Best Management Practices*.

Water quantity, whether in excess or lack of, has an impact on the natural resources and economy of Polk County and its associated watersheds.

Priority Concern 3: Management, Enhancement and Preservation of Natural Resources within the Glacial Lake Agassiz Beach Ridge area

The Polk County Local Water Management Plan will focus on *Best Management Practices*, enhancement activities and preservation of the unique geographical features and the wide diversity of flora and fauna found in these areas.

The Glacial Lake Agassiz Beach Ridge area in Polk County contains some of the largest tracts of native prairie in the state. These prairies are typically of high quality and including good examples of dry mesic and wet prairies.

With the unique natural resource benefits found in the Glacial Lake Agassiz Beach and the native prairie and pre-settlement restoration that has occurred through the Nature Conservancy's Glacial Ridge Project, there is an economic benefit to Polk County and its citizens.

Priority Concern 4: Exotic and Invasive Species Management

The Polk County Local Water Management Plan will identify any new or yet to date undiscovered exotic and invasive plant and aquatic species for prevention and management practices

- Currently one lake in eastern Polk County has been identified to have an infestation of Eurasian Water Milfoil
- Spotted knapweed, Leafy spurge and Wild parsnip are examples of some of the noxious weeds that have readily established themselves in Polk County

Identification, education and management are beneficial tools that would be used to control and in some cases, hopefully, eradicate this resource management problem.

Priority Concerns Identification

Public and Internal Forums

- September 29, 2010 – Initial Polk County Water Plan Work Group meeting
 - Agenda:
 - Introduction of what the County Water Plan is
 - Role of the Polk County Water Plan Work Group
 - Review of the previous Polk County Water Plan
 - Development Process for the Polk County Water Plan update
 - Timeline of process
 - Work Group Members
 - County Commissioners; Craig Bunes and Warren Affeldt
 - East Polk SWCD Staff – Gary Lee
 - East Polk SWCD Supervisor – Larry Vettleson
 - West Polk SWCD Staff – Paige Guetter
 - West Polk SWCD Supervisor – Russ Severson
 - Union Lake Sarah Lake Association - Brian Paradis
 - MN Dept. of Natural Resources – Terry Wolfe (Wildlife) and Garry Bennett (Hydrology)

- US Fish and Wildlife Service – Ryan Frohling
 - The Nature Conservancy, Glacial Ridge Project – Keith Mykleseth
 - Polk County Planning and Zoning – Josh Johnston
 - MN Board of Water and Soil Resources – Brian Dwight
 - MN Pollution Control Agency – Jim Courneya
 - Sand Hill River Watershed District – Dan Wilkins
 - Red Lake Watershed District – Corey Hanson
 - Middle-Snake-Tamarac Watershed District – Nick Drees
 - MN Dept. of Agriculture – Rob Sip
 - MN Dept of Health – Bemidji District Office
 - Natural Resources Conservation Service – Randy Huelskamp
 - City of East Grand Forks – Dan Boyce
 - City of Crookston – Pat Kelly
 - City of Fosston – Charles Lucken
- September 30, 2010 – *Priority Concerns Input Document* sent to Work Group members for input, due date October 31, 2010
 - October 8, 2010 – Request for *Plans and Official Controls* and *Priority Concerns Input Document* sent to required Local Governmental Units and State Agencies, due date December 1, 2010
 - January 5, 2011 – Polk County Water Plan work Group meeting to:
 - Review and discuss submitted *Priority Concerns Input Documents and Plans*
 - Prioritize Priority Concerns
 - Identify Priority Concerns for the Polk County Local Water Management Plan
 - February 2, 2011 – Notice of Public Input meetings sent for publication in the:
 - East Grand Forks Exponent, East Grand Forks, MN
 - Crookston Times, Crookston, MN
 - The Thirteen Towns, Fosston, MN
 - Public Informational and Input meetings held on:
 - February 10, 2011, 11:00 a.m. at the East Polk SWCD office
 - 1 person in attendance, no input comments
 - February 16, 2011, 8:00 a.m. at the West Polk SWCD office
 - no one in attendance, no comments received

Issues Identified by Stakeholders

Bulleted items are comments and inputs received by the referenced agency/representative.

Priority Concern 1

Polk County will focus on surface water *quality*; specifically as it pertains to the human-impacts on the lakes region in the eastern portion of the County and as it pertains to the surface water resource as a source water supply in the western portion of the County

- Participation, outreach and implementation in the TMDL process (RLWD, MPCA, Marshall Co., City of Crookston, City of East Grand Forks, BWSR)
- Surface water data base (RLWD)
- Stormwater attributing to water quality (MPCA)

- Feedlot compliance (MPCA)
- Sealing of unused wells (MDH, City of East Grand Forks)
- Development along shorelines of MN Protected Waters Wetlands (BWSR)
- Lake shed assessments on major three lakes in Polk County (BWSR)
- Installation of AgBMPs and runoff reductions practices based on conservation farm planning (BWSR)
- Promote and install when possible conservation drainage practices during new construction, maintenance and repairs of private and public drainage systems (BWSR, MPCA, Townships)

Priority Concern 2

Polk County will focus on the *quantity* of water passing through Polk County by inventorying, assessing and evaluating the drainage infrastructure of the County.

- Water Quantity as it relates to flooding (RLWD, City of Climax, City of Nielsville)
- Drainage issues (Townships, Municipalities)
- Stormwater runoff (MPCA,)
- Sealing of unused wells (MDH, City of East Grand Forks)
- Overland flooding (Townships)
- Drainage record modernization (BWSR)
- Water management authorities promote and install conservation drainage practices when maintaining and/or improving drainage systems (BWSR, MPCA)

Priority Concern 3

Polk County is concerned with the preservation and enhancement of Polk County's natural resources within the Glacial Lake Agassiz Beach Ridge area because of the unique geographical features, wide diversity of natural resources and the citizens that benefit from them.

Priority Concern 4

Exotic and invasive species management (Lake Assoc.)

- Carp
- Milfoil
- Zebra mussels
- Education, promotion and regulation/enforcement

Others

- Ground water quality (City of Crookston, MDH)
- Ground Water data base (City of East Grand Forks)
- Small municipalities and waste water
- Agricultural Heritage – discussion of this incorporated into the Executive Summary of the Plan

Priority Concerns Selection

The Polk County Water Plan addresses in Priority Concern 1 goals and objectives that promote and educate the citizens of Polk County about the BMP's and the wise use of our natural resources as it pertains to water quality.

Also addressed in Priority Concern 2 goals are three objectives:

- Ensure that county, township, watershed, and private ditch systems adequately address the drainage needed to support agricultural activities without negatively impacting water quality and other natural resources, as well as economic impacts to the infrastructure of Polk County
- Determine if ditch systems are of adequate size
- Determine whether there is proper maintenance

Priority Concerns Not Addressed by the Plan

One input received and discussed at the second Polk County Water Plan Work Force meeting was an expressed concern about maintaining the County's strong agricultural heritage and culture.

This was not chosen as a Priority Concern, but the Work Force and Plan Developers felt it was important and will be incorporated as a Needs Statement in the Final Polk County Local Water Management Plan, 2012 – 2022.