SECTION 2. LAND AND WATER RESOURCES NARRATIVE

Introduction to Red Lake River Watershed

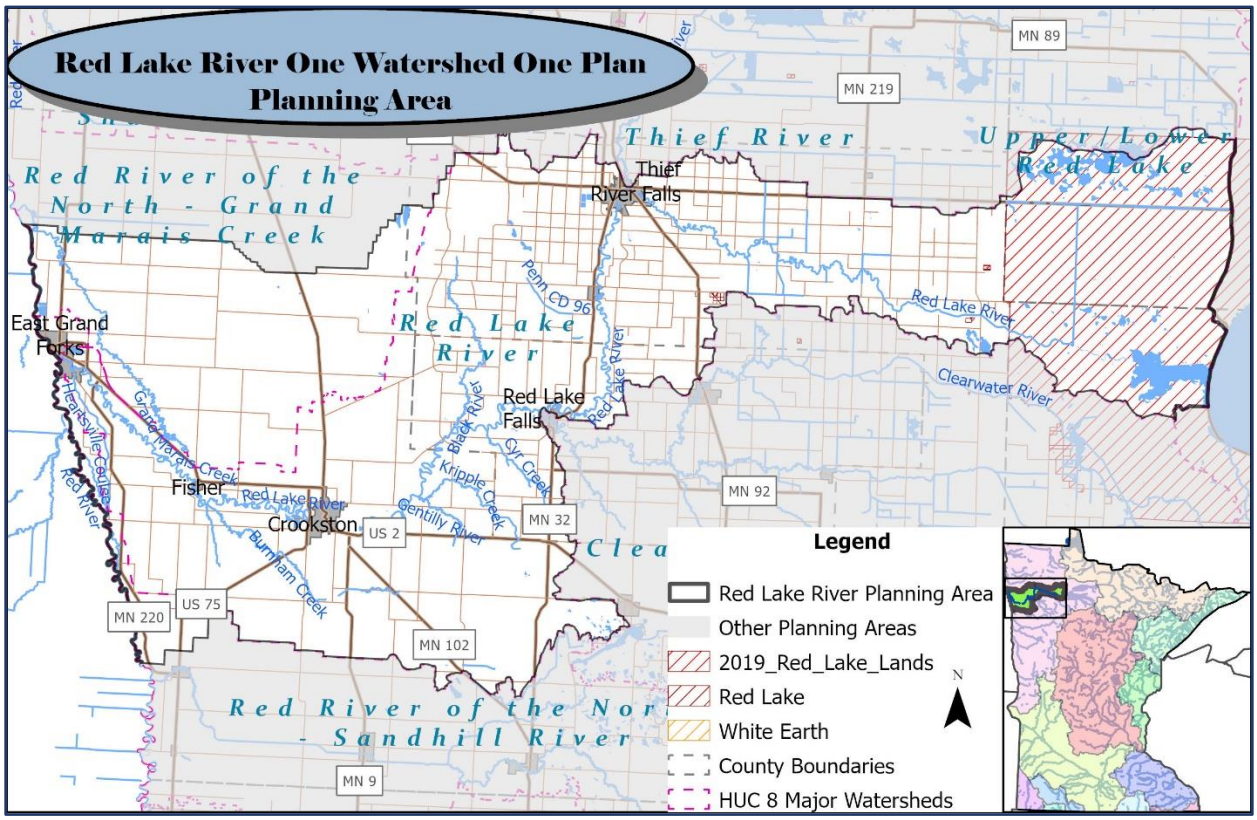

Figure 2.1 Red Lake River Watershed Planning Area

The 1,686 square-mile Red Lake River Watershed Planning Area includes portions of the Red Lake River and Grand Marais Creek major watersheds that are within the Red Lake Watershed District (RLWD) (Figure 2-1). The two rivers drain directly to the Red River of the North, as do other watercourses along the western edge of the planning area. The planning area boundary follows United States Geological Survey (USGS) major watershed boundaries that have been slightly modified to follow watershed district boundaries, where applicable, through an agreement among the Planning Work Group, RLWD, Middle-Snake Tamarac Rivers Watershed District, Sand Hill River Watershed District, and the Board of Water and Soil Resources (BWSR). Watershed district boundaries closely match hydrologic boundaries but are typically drawn along borders of sections and/or property parcels. Though the precision of the watershed district boundaries is limited to section lines, they more accurately follow hydrologic divides than standard HUC8 boundaries by incorporating LiDAR-based knowledge of hydrology and hydrologic alterations.

Nearly all the Red Lake River major watershed is included in this planning area. The Red Lake River Watershed is a 1,340 square-mile HUC8 watershed in northwestern Minnesota. The watershed covers significant portions of Pennington, Red Lake, and Polk counties and flows through (or near) the cities of Thief River Falls, St. Hilaire, Red Lake Falls, Crookston, Fisher, and East Grand Forks. The watershed falls within the jurisdiction of multiple local government units (LGUs), including the RLWD, Pennington Soil and Water Conservation District (SWCD), Red Lake County SWCD, and the West Polk SWCD.

The characteristics of the watershed change from its eastern origins to its western extent. The Red Lake River begins in the peatlands of the Northern Minnesota Wetlands ecoregion and flows through the Lake Agassiz plain beach ridges, and sand deltas to the Glacial Lake Agassiz plain portions of the Lake Agassiz Plain ecoregion. The Thief River and Clearwater River major watersheds join the Red Lake River along its course. There is a relatively significant change in topography along the glacial ridges that were once shorelines of the massive Glacial Lake Agassiz.

The Grand Marais Creek portion of the Red Lake River 1W1P planning area covers approximately 346 square miles, focuses on the drainage area of Grand Marais Creek and excludes MSTRWD ditches that flow directly to the Red River of the North. Grand Marais Creek begins near Fisher and conveys runoff from a network of drainage ditches as it flows northwest to the Red River of the North. These ditches flow from east to west and a different ditch enters Grand Marais Creek along every section line. The Grand Marais Creek Outlet Restoration Project restored flow to 6 miles of meandering channel and diverted most flow away from a cut-channel ditch that had brought flow directly to the Red River. Before the restoration project, flow from the Grand Marais Creek drainage area exited the watershed through an unstable “cut-channel” ditch. The cut channel ditch has been stabilized and still conveys local flows and watershed flows that exceed a 2-year flood event. All other flows go through the restored channel. Drainage improvement projects have been recently completed for RLWD Ditch 15 and Ditch 16. According to a University of North Dakota geologist, the Red Lake River once flowed through the channel currently occupied by Grand Marais Creek. This explains why the headwaters of the Grand Marais Creek channel is oversized for the flow that it conveys, and the upper portion resembles oxbow wetlands rather than a stream channel.

Watershed History

Humans have occupied the region since the glaciers retreated approximately 12,000 years ago. The Ojibwe migrated from the northern Great Lakes area to this region during the 17th century, their warriors battling and forcing the Dakota out of the area. Fur traders are believed to be the first Europeans to interact with the Ojibwe in the area. The Red Lake Band aligned with the Pembina Band of Chippewa Indians in 1863, and

successfully negotiated the "Treaty of Old Crossing," in which lands in the Red River and Pembina areas were ceded to the federal government. Old Crossing Park, near Huot, is a Red Lake County Park near the old river ford and layover site where the treaty was signed. Ceded Red Lake Tribal Lands include the headwaters of the Red Lake River as well as portions of Pennington, and Red Lake Counties.

In subsequent decades, additional agreements of land cessions were made as the result of increased pressure from European-American settlers in the area. The 1867 Treaty with the Chippewa of the Mississippi resulted in the ceding of two million acres of land to the United States. This ceded territory extends northwest from the White Earth reservation boundary and into the middle portion of the Red Lake River Watershed. The reservation was left with little more than 300,000 acres of land that included all Lower Red Lake, and most of Upper Red Lake. Subsequent actions led to the 1904 Land Act that established present day reservation boundaries, also known as the “Diminished Reservation.” Tribes retain the right to hunt, fish, and gather on public lands within ceded territories. The Red Lake Nation, a sovereign nation, stewards much of the headwaters of the Red Lake River, encompassing large portions of the Red Lake River and Upper/Lower Red Lakes major watersheds. The Red Lake Department of Natural Resources has a long history of partnering with local, state, and federal agencies to monitor and protect water resources throughout the 1863 Treaty area.

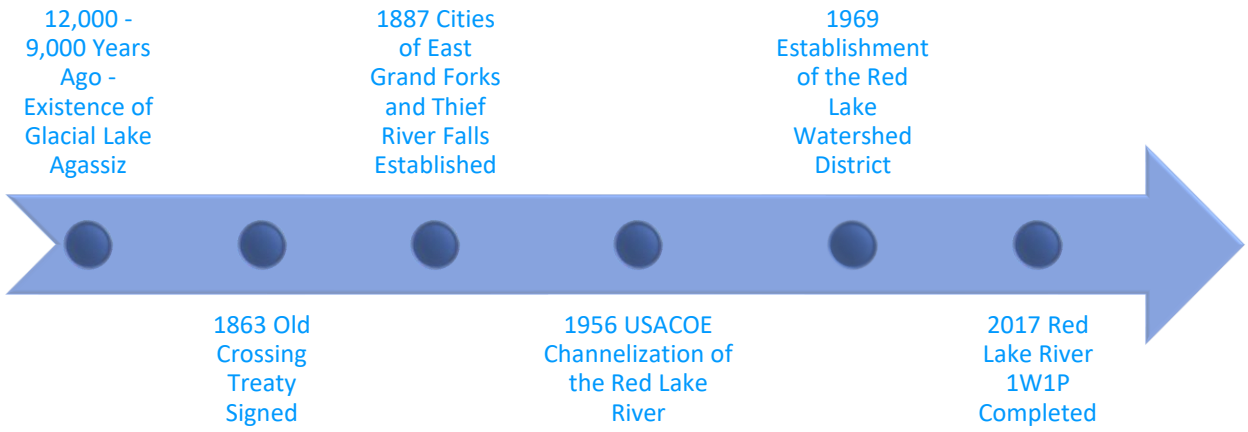

Figure 2.2 Watershed History

Communities sprang up along the Red Lake River in the late 1800s, supported by fertile soils for agriculture, grain milling, lumber milling, and railroads. The Pembina Trail, a 19th century ox cart trading route, crossed through this planning area near Red Lake Falls and Crookston, connecting settlements that are now St. Paul and Winnipeg.

The 1935 Soil Conservation Act established the Soil Conservation Service and established procedures for organizing local SWCDs which included the Pennington SWCD (1948), Red Lake SWCD (1949), East Polk SWCD (1944), and West Polk SWCD

(1957). The RLWD was established in 1970 under the Minnesota Watershed District Act, Minnesota State Statutes Chapter 103D. Glacial Ridge National Wildlife Refuge was established in 2004 in the headwaters of Burnham Creek, near Mentor.

Portions of the Red Lake River were channelized in the 1950s to facilitate drainage. Networks of drainage ditches throughout the watershed facilitate drainage for agriculture and development.

Dams were constructed along the Red Lake River, including the Thief River Falls Dam and Otter Tail Power Dam in Crookston. In recent decades, the United States Fish and Wildlife Service (USFWS) and Minnesota Department of Natural Resources (DNR) have been working to remove these fish passage barriers, particularly when existing dams no longer serve their purpose, require costly maintenance, and pose safety/liability issues. Channel catfish, walleye, sturgeon, and smallmouth bass have benefited from the 2005 removal of the dam in Crookston.

Topography, Soils, and General Geology

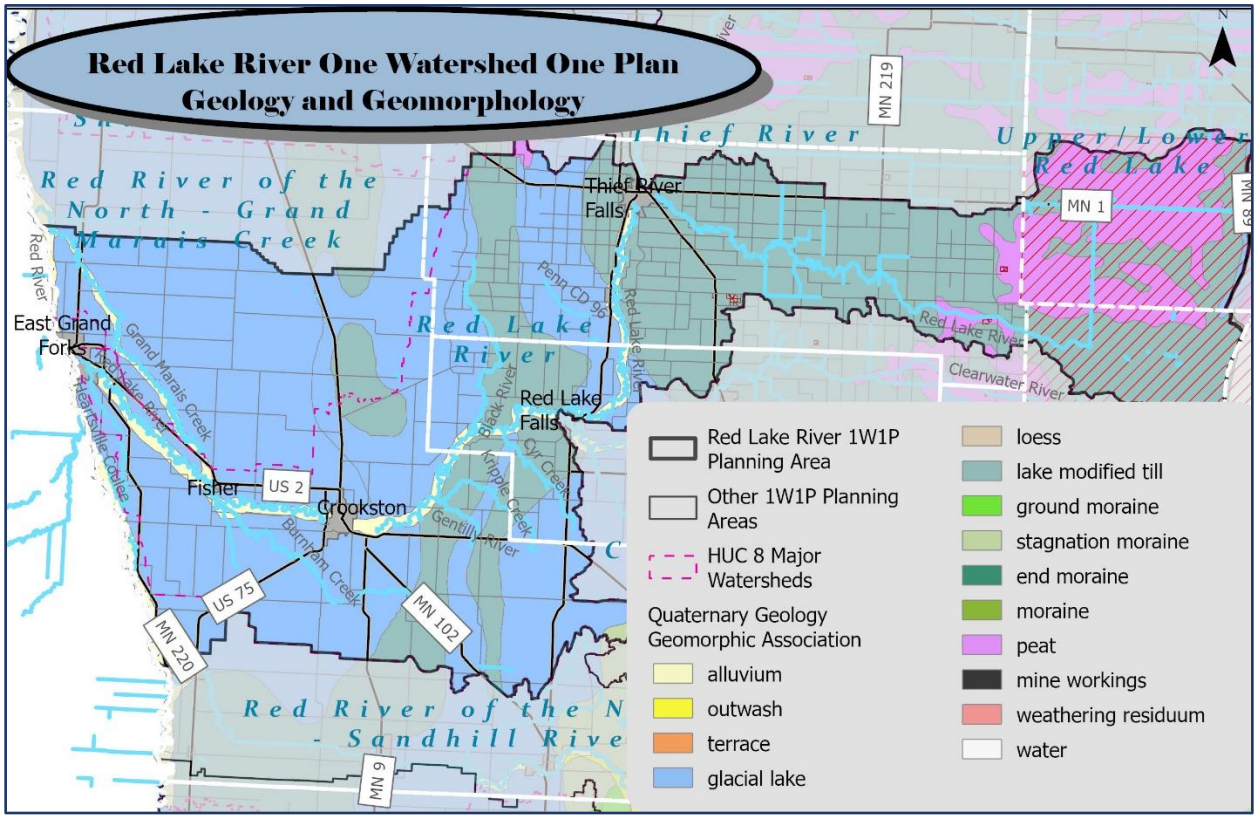

Figure 2.3 Geology and Geomorphology

The Red Lake River flows through lake modified glacial till in the eastern, upstream portion of the watershed. Near St. Hilaire, the glacial till deposits change to shoreline and near-shore glacial sediment (Figure 2.3). The near-shore sediments are moderately-

to-well-sorted silt, clay, and sand that deposited in shallow water of Glacial Lake Agassiz. The shoreline sediments consist of sand and silt with gravel ridges. As the river flows south to Red Lake Falls and west to the Black River confluence, fine sand soil types are more prevalent. From the Black River confluence to where the Red Lake River turns directions and flows west (near Gentilly), the glacial deposits are from wave-eroded, low-relief glacial sediment. These areas are made up of clay to slightly pebbly soils.

Near Crookston, there is a shift to finer soil particles (clay, loam, very fine sandy loam, and silty clay loam). A series of sandy ridges along the transition to the Red River Valley ecoregion are remnants of ancient beaches along the eastern edges of Glacial Lake Agassiz. Calcareous fens can be found along those sandy beach ridges, as shown in the topographical map (Figure 2.4). Another influential glacial remnant is a layer of gray clay called the Huot formation that is very prone to slumping, has low shear strength, underlies the (newer) Brenna formation. It plays a factor in large riverbank slumps along the Red Lake River between Crookston and Red Lake Falls.

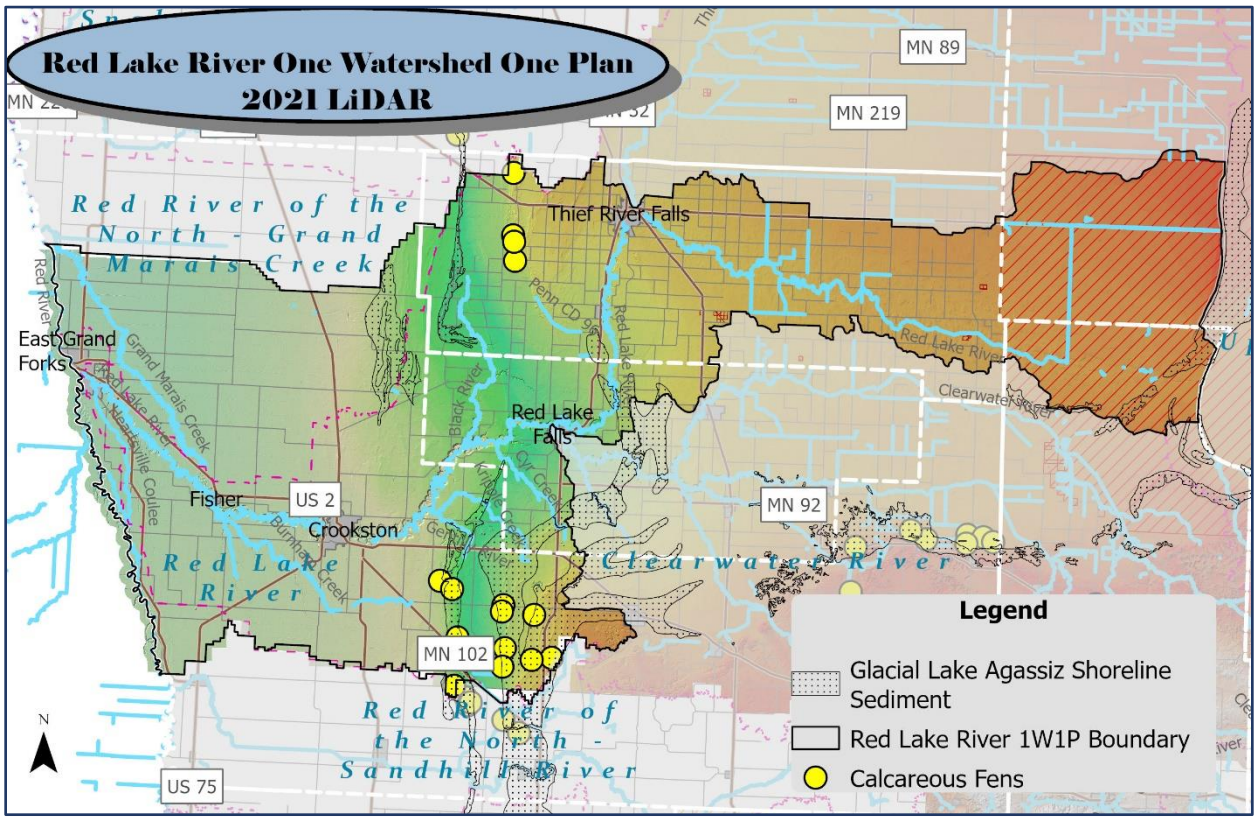

Figure 2.4 Topography of the Red Lake River Planning Area

Precipitation

The growing season in the Red Lake River Watershed is typically May through September, which dictates what crops are grown in the area. Climate trends in the Red Lake River include warmer average, minimum, and maximum temperatures. Though the historical upward trend in annual precipitation in the Red Lake River Watershed is only 0.5”/decade, heavier and more damaging rainfall events are becoming more common (Figure 2.5). Drought conditions, particularly in the late summer, are a concern. The watershed can sometimes experience flooding conditions and drought conditions within the same year.

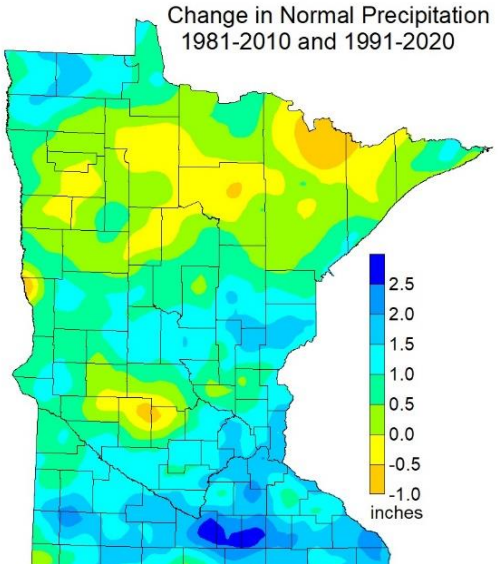

Figure 2.5. MN's change in normal precipitation

Water Resources

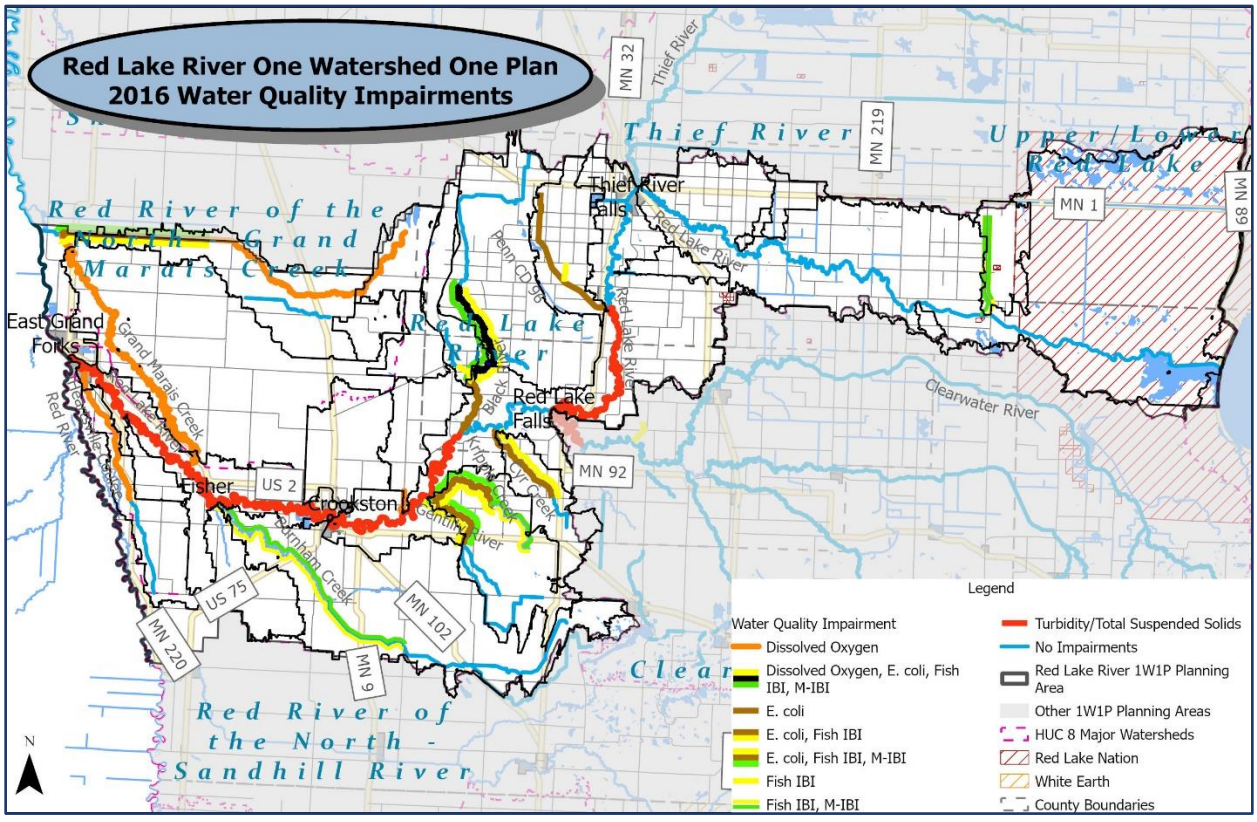

Figure 2.6 Water Quality Impairments

The Red Lake River begins at the outlet of Lower Red Lake, flows east to Thief River Falls where it is joined by the Thief River, flows south to Red Lake Falls where it is joined

by the Clearwater River, and then flows west through Crookston to East Grand Forks where it flows into the Red River of the North. Other tributaries include the Black River, Cyr Creek, Gentilly River, Burnham Creek, and Heartsville Coulee.

Though much of the watershed was shaped by Glacial Lake Agassiz, there are no significant lakes within the Red Lake River major watershed or planning area. The only waterbodies featured in DNR lakes GIS data are the Thief River Falls Reservoir and large wetlands like the “Goose Lake” wetland.

The primary pollutants of concern in the watershed are total suspended solids (TSS, excess sediment), low dissolved oxygen (DO, typically due to stagnant water), and E. coli bacteria. Figure 2.6 shows water quality impairments in the Red Lake River Planning Area. An assessment of 2012-2021 water quality data found that exceedances of the TSS standard were less frequent along much of the Red Lake River compared to the most recent statewide water quality assessment. This was good news considering TSS levels had been trending upwards through 2014. Implementation of projects through Watershed Based Implementation Funding (WBIF) and the 2018 Buffer Law may be helping to improve water quality. The influence of 2022 flooding on water quality statistics has not yet been assessed, however. The State will officially assess water quality in the Red Lake River and Grand Marais Creek watersheds in 2025.

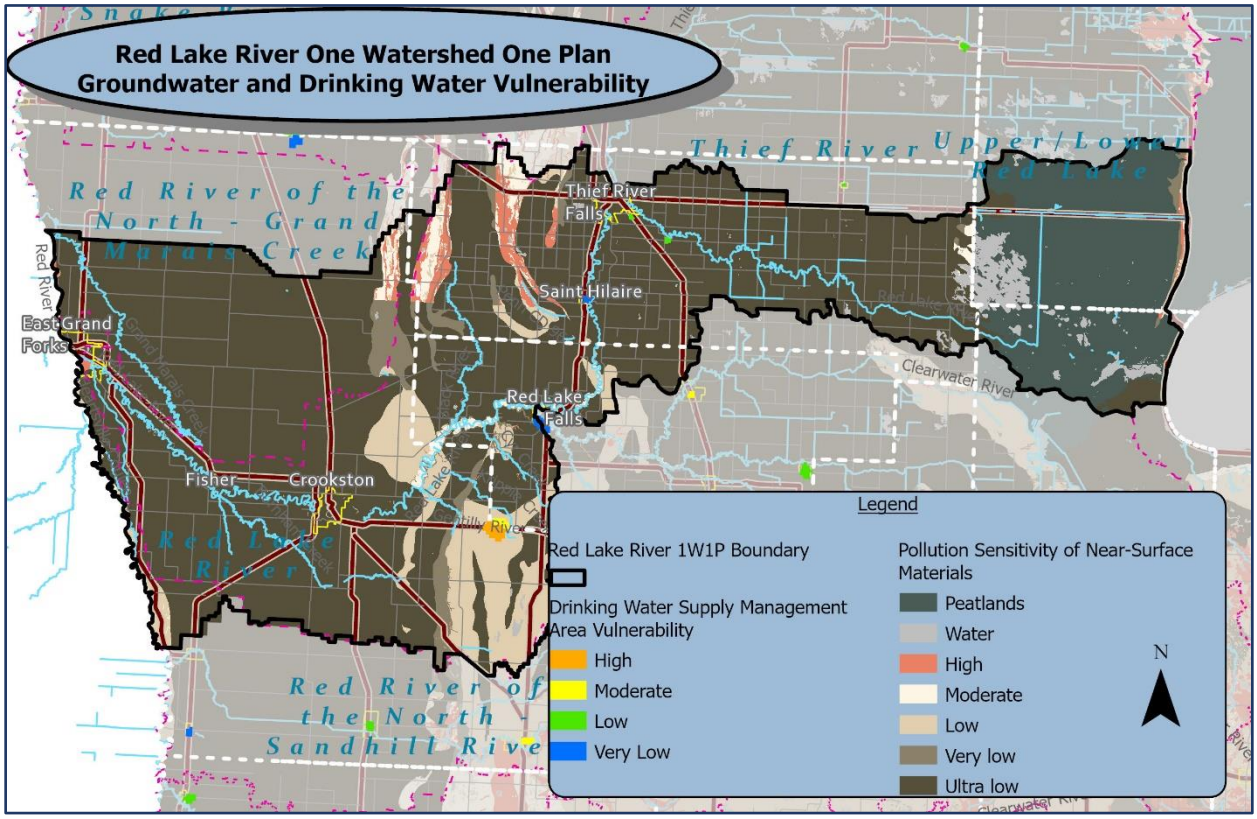

Figure 2.7 Groundwater and Drinking Water Vulnerability

Figure 2.7 shows groundwater and drinking water vulnerability in the Red Lake River Planning Area. Groundwater pollution risk in the planning area is highest in the beach ridge area that runs north to south through the middle of the Red Lake River Watershed. The relatively low risk rate shown in areas like the Red River Valley may be due to the low infiltration rate of clay soils.

Stormwater Systems, Drainage Systems, and Control Structures

Public ditch systems throughout the planning area provide drainage for agricultural production and flood damage reduction. Legal ditch systems are governed by Minnesota State Chapter 103E Drainage Law. These ditches are managed by local drainage authorities. Figure 2.8 shows higher concentrations of public ditches in portions of the planning area with flatter topography. Ditches flow into Grand Marais Creek from the east along every section line. Recent improvement projects have been completed to establish RLWD Ditch 15 and RLWD Ditch 16. An improvement project has been petitioned for CD 39, which would create RLWD Ditch 17, but the construction of the project is presently being delayed for various legal appeals. The State Altered Watercourse Project classified 66.4% of streams in the Red Lake River Watershed and 72% of the streams in the Grand Marais Creek Watershed as altered watercourses.

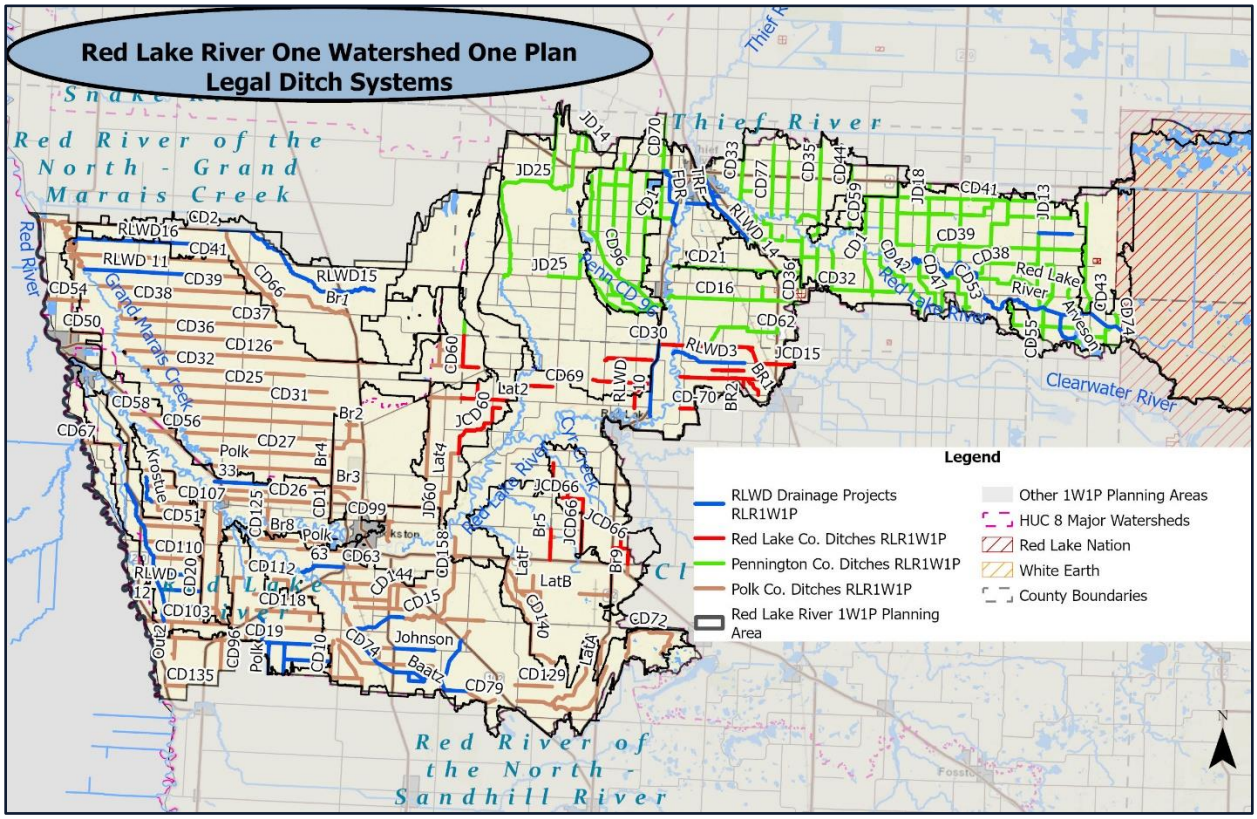

Figure 2.8 Legal Ditch Systems

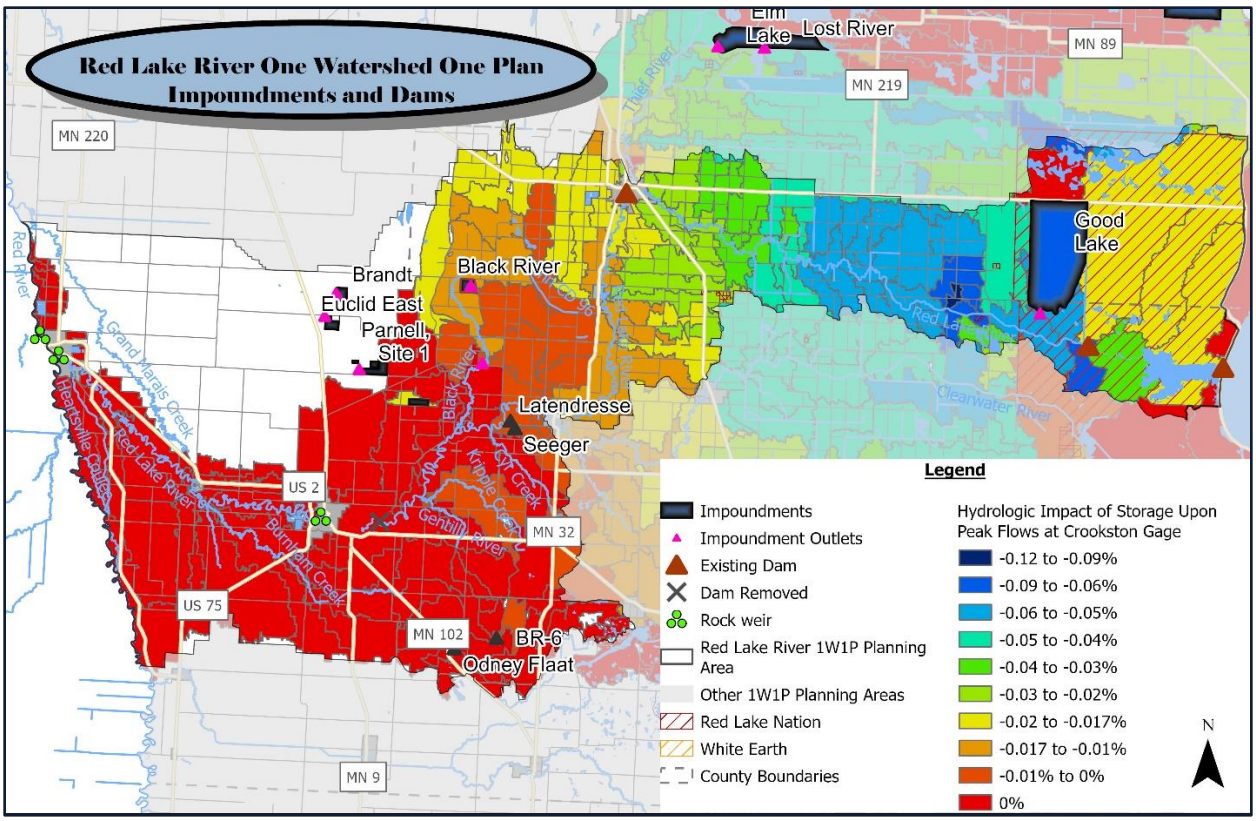

Figure 2.9 Impoundments and Dams

Impoundments have been constructed to capture runoff, reduce peak flows during flood events, provide habitat, provide drinking water, or even provide hydroelectric power (Figure 2.9). These include Good Lake, the Thief River Falls Reservoir, Shirrick Dam, Parnell Impoundment, Lousiville/Parnell Impoundment, Brandt Impoundment, Euclid East Impoundment, and the Black River Impoundment. Soil Conservation Service dams were also constructed to reduce runoff and erosion, including Seeger Dam, Latundresse Dam, Barid-Beyer Dam, and others. Some of the historically constructed dams along the Red Lake River have been either removed or modified to allow fish passage. Figure 2.9 above shows locations of impoundments and dams along with the hydrologic impact of storage at the Crookston stream gage. Data from the Natural Resources Research Institute reveals that wetland restorations could be viable and beneficial to water quality in a portion of the county east of Highway 75, north of Highway 2, and west of the county's border with Red Lake and Pennington Counties.

Stormwater runoff transports pollutants to the Red Lake River throughout the cities of Thief River Falls, Red Lake Falls, Crookston, Fisher (indirectly), and East Grand Forks. Water quality effects of stormwater runoff have been studied through water quality sampling in Thief River Falls and Crookston. In Thief River Falls, a formal report identified specific projects to reduce the effects from stormwater runoff with the help of a P8 Urban Catchment Model. Several projects from the study have been completed

and another is being constructed in 2025. A distributed retention study has set a goal of a 20% peak flow reduction at the Crookston USGS Gauge through increased storage in strategic subwatersheds like Burnham Creek and Black River.

Water-Based Recreation Areas

Water-based recreation in the Red Lake River Watershed is centered on the river itself. Motorized boating opportunities are limited to the Thief River Falls Reservoir, portions of the Red Lake River upstream of Thief River Falls, and lower portions of the Red Lake River in East Grand Forks. Kayaking, canoeing, tubing, and ice fishing are popular recreational activities on the river. The Red Lake River Corridor Enhancement Project Joint Powers Group was instrumental achieving recognition for the Red Lake River as a Trail of Regional Significance, in 2016, and implementing projects to improve access locations along the river. The river provides great fishing opportunities from its origin at the Lower Red Lake Dam (a destination for guided fishing tours within the Red Lake Nation) to the confluence with the Red River of the North in East Grand Forks where anglers can often be seen waiting for channel catfish to grab their bait. Wetlands in the watershed provide opportunities for waterfowl hunting. Camping opportunities along the Red Lake River can be found at L.B. Hartz Park in Thief River Falls, Voyageur's View in Red Lake Falls, Sportsman's Park in Red Lake Falls, and Central Park in Crookston.

Land Use, Land Protection, and Habitat

Prior to settlement, the eastern portion of the watershed was dominated by wetlands and the western portion of the watershed was mostly prairie (Figure 2.10). The predominant land use is now agriculture, especially in the once prairie-covered landscape of the Red River Valley ecoregion. Soybeans and grains (barley and wheat) are grown throughout the watershed. Sugarbeets are grown on many fields throughout the western portion of the watershed for the American Crystal Sugar agricultural cooperative to supply the sugar factories in Crookston and East Grand Forks.

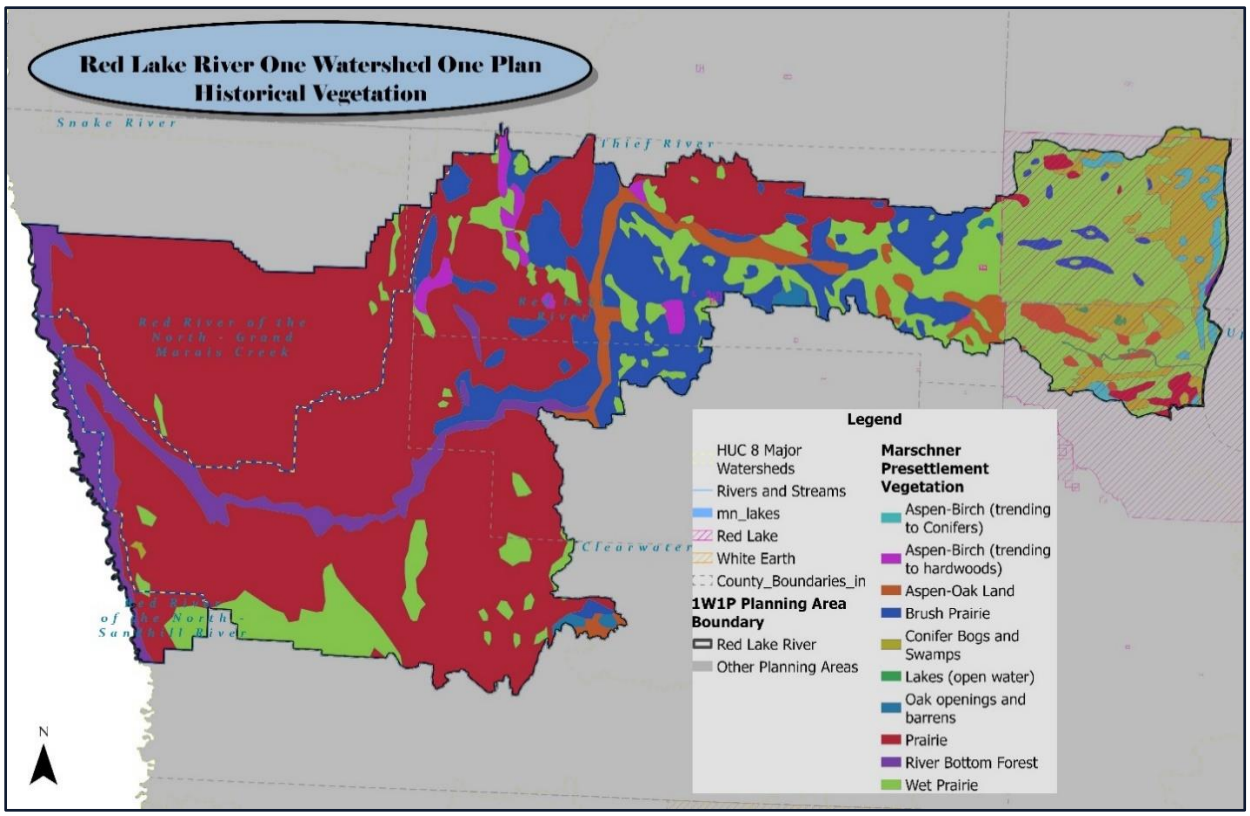

Figure 2.10 Historical Vegetation

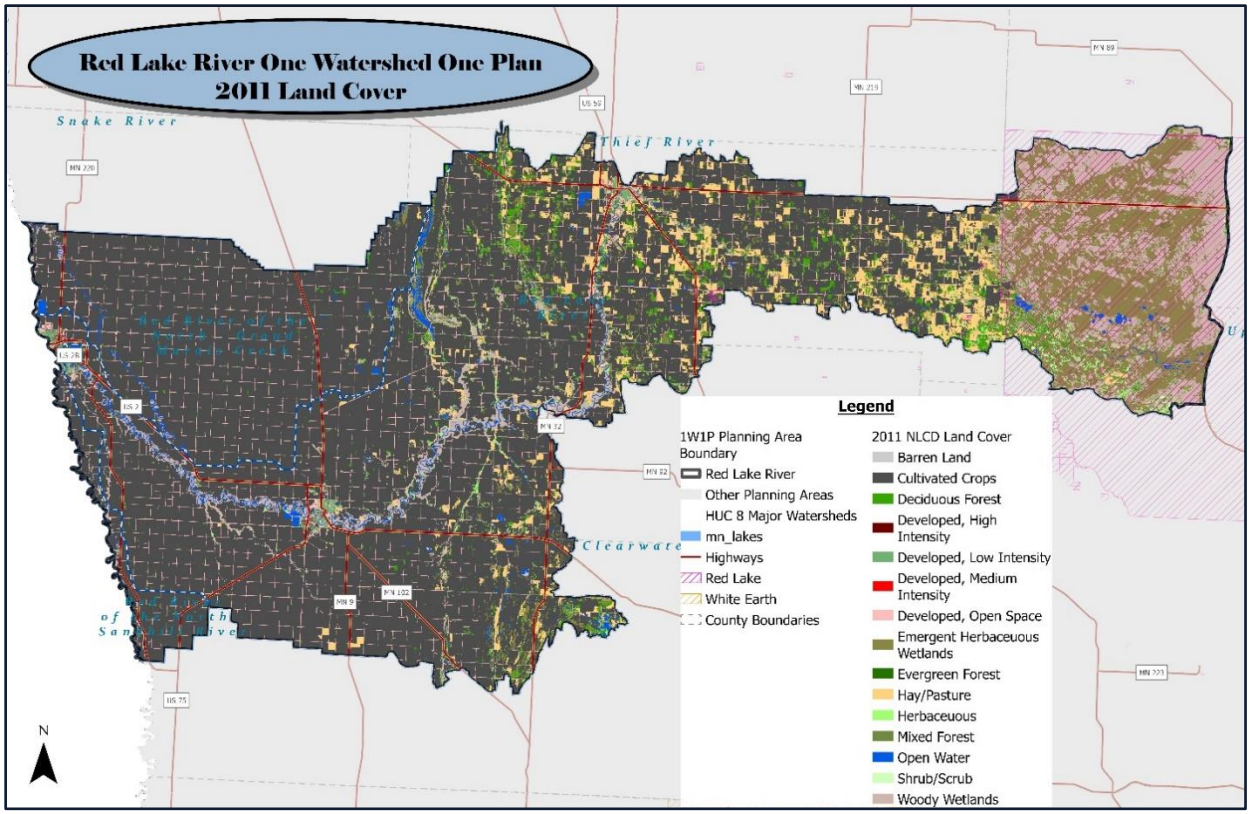

Figure 2.11 Land Cover from 2011 National Land Cover Dataset (NLCD)

Forests of biological significance line portions of the Red Lake River near Mallory, Fisher, Crookston, Gentilly, Huot, and Red Lake Falls. The beach ridges left behind by Glacial Lake Agassiz feature a concentration of lands with high quality, biological habitat, including Glacial Ridge National Wildlife Refuge and many Wildlife Management Areas. The headwaters portion of the Red Lake River, within the Red Lake Nation, mostly consists of wetlands and bogs. The DNR has identified the presence of two threatened species of freshwater mussels (fluted-shell and spike) and two species of special concern (black sandshell and creek heelsplitter). The Red Lake River Planning Area contains a number of Wildlife Management Areas and areas of biodiversity significance, (Figure 2.12) particularly along the beach ridges and river corridors.

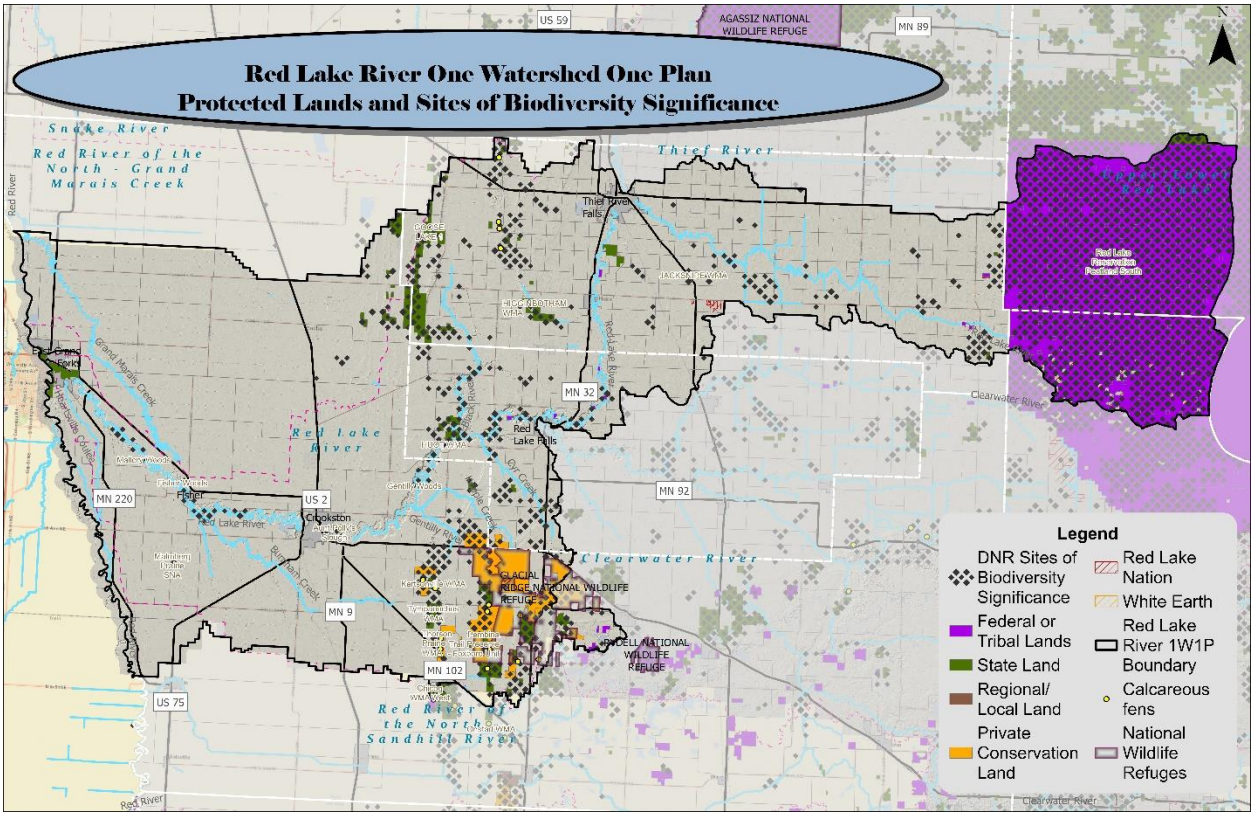

Figure 2.12 Protected lands and sites of biodiversity significance

Relevant Socio-Economic Information

Multiple, overlapping levels of local jurisdiction manage resources within the Red Lake River Planning Area. The RLWD encompasses the entire planning area. The Red Lake Nation has sovereign authority over the lands within its borders where the Red Lake River begins. The authorities of the RLWD and the Pennington SWCD do not begin until the river reaches the western boundary of the reservation (also the eastern boundary of Pennington County). The river then flows through Pennington County, Red Lake County, and Polk County. The West Polk SWCD, Red Lake County SWCD, Pennington SWCD, and RLWD have partnered to implement the priorities of the CWMP. The river flows

through the cities of Thief River Falls, Red Lake Falls, Crookston, Fisher, and East Grand Forks.

The City of Thief River Falls and East Grand Forks drinking water source is the Red Lake River. These Source Water Assessment Areas (SWAA) are considered a high potential contaminant risk due to surface water reliance as the source for drinking water. The City of Crookston relies on groundwater as a drinking water source. The Drinking Water Supply Management Area (DWSMA) for Crookston is both a potential high, and moderate, risk for contamination. The Aesby Trailer Court, Basswood Court, Country Estates Mobile Home Park, City of Red Lake Falls, and City of St. Hilaire have low potential contaminant risk.

Sugarbeet production in the Red River Valley began near Crookston and Fisher in the early 1900s. American Crystal Sugar Company processing plants are located within the planning area, at Crookston and East Grand Forks. Polk County is one of only three counties in the state in which sugarbeets comprise more than 10% of harvested cropland acres.

Populations have generally remained steady throughout the watershed, except for the late 1990s when the populations of East Grand Forks and Polk County dipped after the 1997 Red River Flood (Figure 2.13). Weighting 2020 census data with the percentage of the planning area within each county and the Red Lake Nation estimates a total watershed population of 24,004 people (14.25 per square mile). The population dropped by 388 between the 2010 and 2020 Censuses. The median age is 39.9 years old, and the median household income is $70,950.

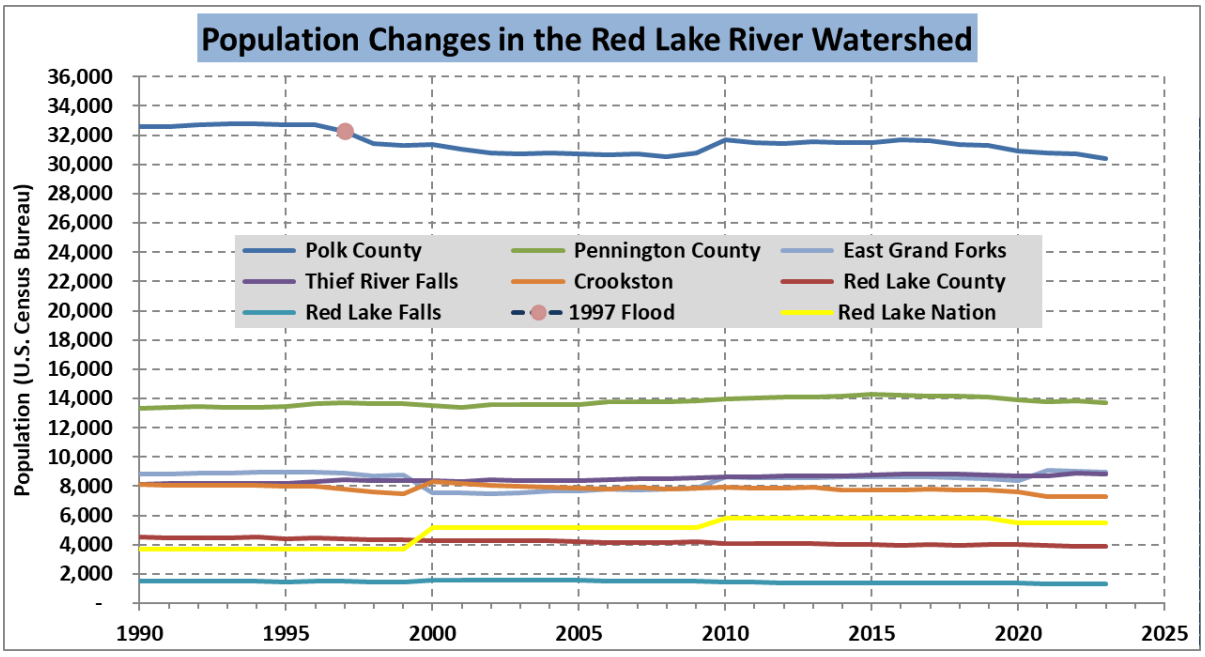

Figure 2.13 Population Changes