
2.0 GENERAL DESCRIPTION OF RED LAKE WATERSHED DISTRICT

2.1 LOCATION AND SIZE

The RLWD is located in northwestern Minnesota and includes all of Red Lake County and parts of the following counties: Beltrami, Clearwater, Itasca, Koochiching, Mahnomen, Marshall, Pennington, Polk and Roseau (Figure 1 and Figure 2).

The RLWD extends 140 miles from east to west at its widest extremity and 80 miles from north to south. The area of the watershed is approximately 5,990 square miles. It lies between Range 28 West and Range 50 West and Township 146 North and Township 158 North (Figure 3).

The Red Lake Nation is a sovereign nation, wherein the RLWD has no jurisdiction (Figure 4).

2.2 GEOLOGY

The watershed is divided into seven distinct geomorphic areas, namely, the Agassiz Lacustrine Plain, Red River Valley; Agassiz Lacustrine Plain, Inter-Beach area; Red Lake area; Agassiz Peatlands, Till Plain; Moraine and Bagley Outwash area (Figure 5). The legend in Figure 5 is referenced to the geomorphic area by parenthesis. The historical extent of Lake Agassiz is shown in Figure 6.

2.2.1 Agassiz Lacustrine Plain – Red River Valley (See Lake Agassiz in Figure 5)

The Red River Valley area consists of low, nearly level plain. Lake-laid sediments are commonly 5-10 feet thick. Most common soil types are clay, silty clay and silt loam. Water table depth is normally 5- 10 feet, with runoff slow to very slow. Permeability is low, and the water holding capacity is high.

2.2.2 Agassiz Lacustrine Plain – Inter-Beach Area (See Lake Agassiz in Figure 5)

The Inter-Beach area consists of beaches formed by stages of Glacial Lake Agassiz and has poorly-drained areas between beaches. Ridges are usually 2-15 feet high. Widths are from 150-500 feet. The water table on well-formed beaches is normally 10 feet, but between ridges is usually less than 6 feet. Soils are generally sandy, gravelly and droughty.

2.2.3 Agassiz Lacustrine Plain – Red Lake Area (See Lake Agassiz, Koochiching Lobe and Organic Deposits in Figure 5)

The Red Lake area is nearly level with depressed plains and organic and sandy soils. The water table is normally over 10 feet on drained soils and between surface and 6 feet on poorly-drained soils and contains shallow lacustrine sediments over calcareous loam and clay loam soils.

2.2.4 Bagley Outwash Plain (See Red River Lobe and Koochiching Lobe in Figure 5)

The Bagley Outwash consists of nearly level to gently rolling topography. The water table is normally more than 10 feet on well-drained soils. In lower elevations, the water table is between the surface and 6 feet deep. Soils range from loamy to sandy and in most places includes sand and gravel substrata. Water holding capacity is very low.

2.2.5 Agassiz Peatlands (See Organic Deposits in Figure 5)

The Agassiz Peatlands are low and very poorly-drained plains. About 75 percent of it consists of organic soil generally 7-8 feet deep. Normal water tables are from 0-3 feet deep on organic soils and 6-10 feet deep in mineral soils. Most sandy soils are 2-4 feet thick over loamy glacial till. Organic soils are mostly non-acid (> 5.5). The water holding capacity is very high on the peat soils and low on the sandy soils.

2.2.6 Moraine (See Red River Lobe and Koochiching Lobe Figure 5)

The Moraine consists mainly of calcerous loam till. Glacial stones are fairly common over most of the region. The soils have a high water holding capacity. The water table is generally greater than 10 feet on the upland and surface, to 6 feet in the depressions. The topography of the Moraine area, which occupies the southern part of the watershed, is made up of hills and depressions with local relief up to 150 feet.

2.2.7 Till Plain (See Koochiching Lobe in Figure 5)

Till plain is characterized by gently rolling topography with a few areas of more rolling landscape. Depressions, potholes and small bogs are common. The water table is normally deeper than 10 feet. From the surface to 6 feet deep, the water is on peat bogs and poorly-drained soils. The soils developed on calcareous loam till. Soils, in some places bordering on the Mahnomen Lacustrine Plain, are silty in the upper 12-24 inches.

2.3 TOPOGRAPHY

The altitude of the watershed ranges from 800 feet in the western end, at the confluence of the Red Lake River and Red River of the North, to 1,600 feet mean sea level (msl) in the south-central part (Figure 7 and Figure 8). In general, the southern part of the area, which is made up of northern Clearwater County and a small tract of land in Mahnomen County, has the highest elevation, ranging approximately 1,260-1,600 feet msl. The northern part of the watershed, which is north of the Upper and Lower Red lakes and the Red Lake River, is rather flat, ranging from 1,200 feet on the eastern edge of the watershed to 1,140 feet msl at the western edge of Mud Lake. The Lake Plain in the western edge is also flat, ranging from 920 feet at Gentilly to 800 feet msl at East Grand Forks.

The slope of the Red Lake River above Crookston is about 2 feet per mile, but the slope of the downstream reach is only 1.1 feet per mile.

Figure 1
Red Lake Watershed District

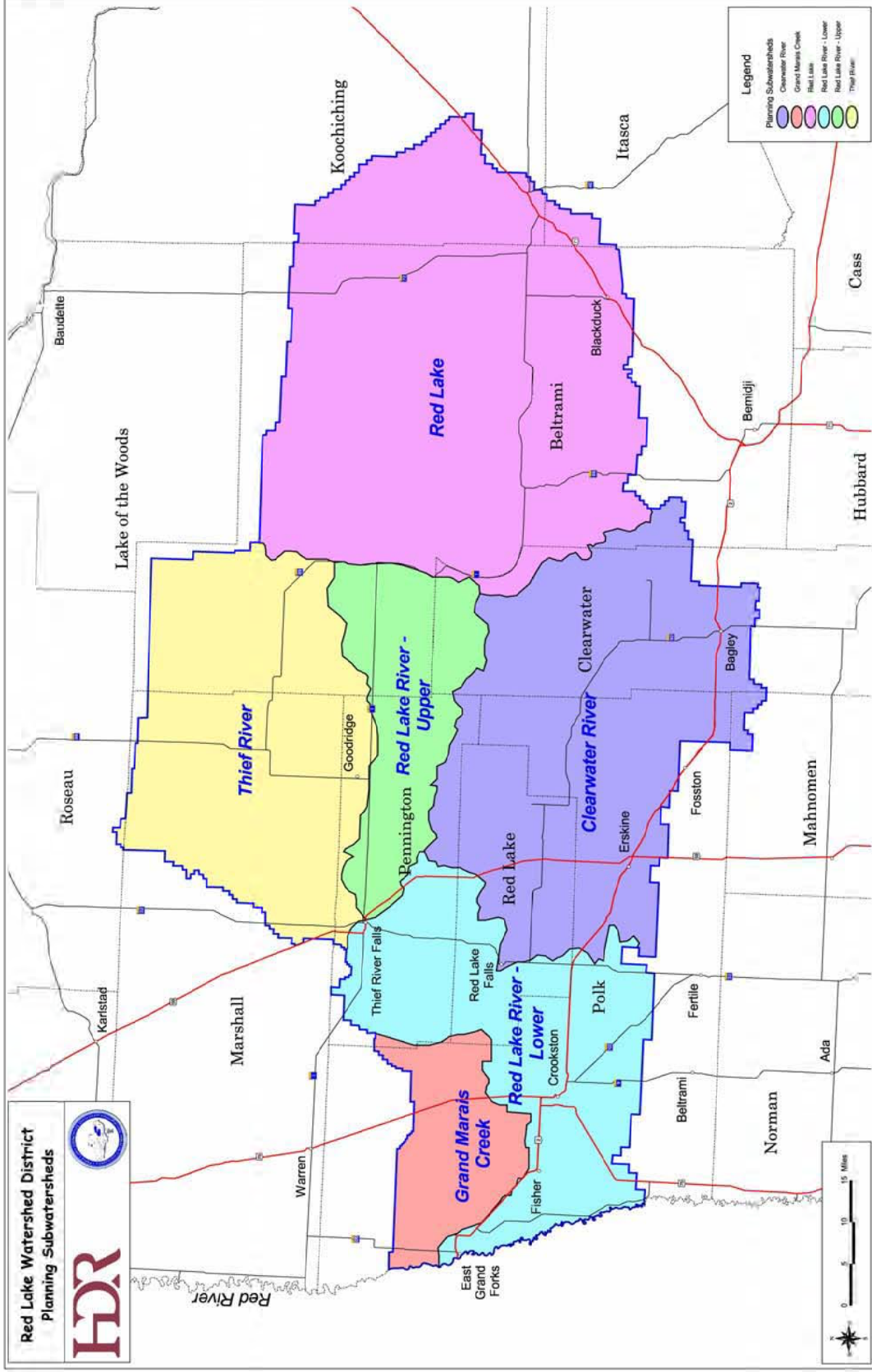


Figure 2
Red Lake Watershed District Counties

Counties in the RLWD

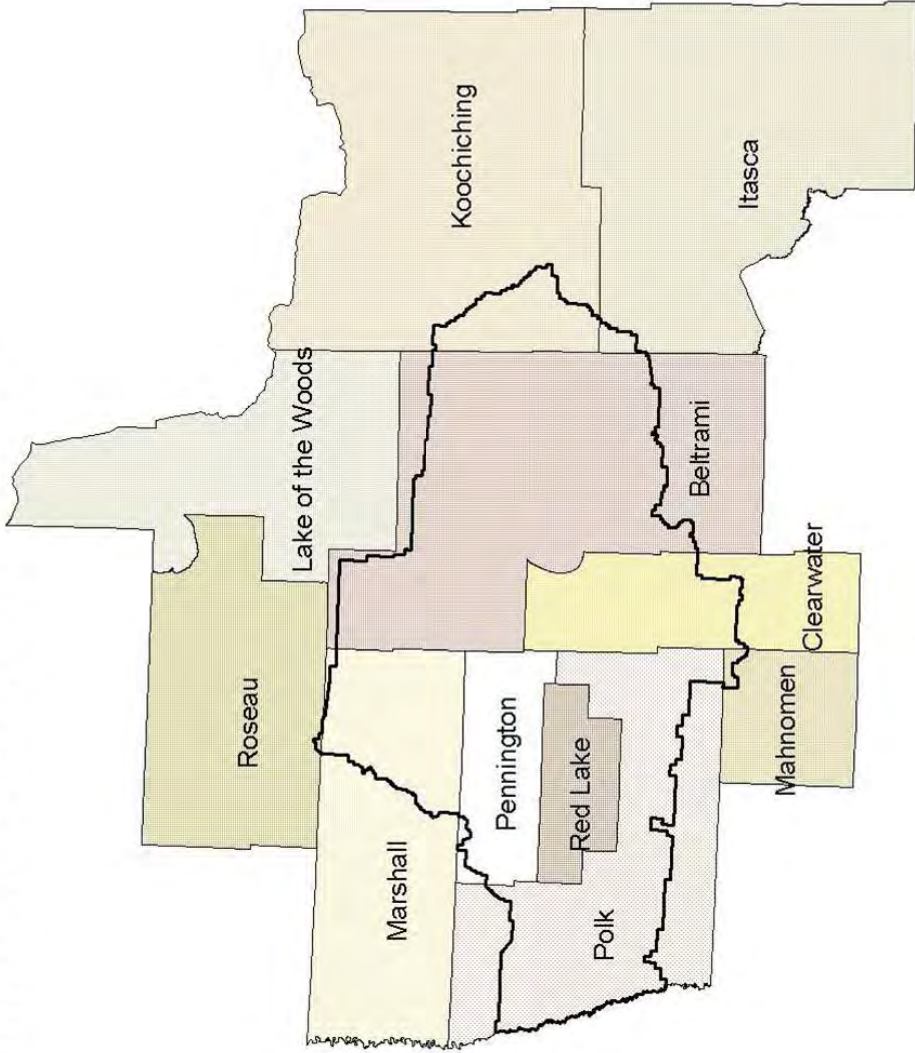
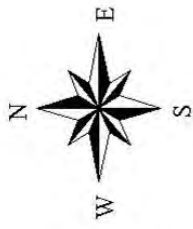


Figure 3
Red Lake Watershed District Features

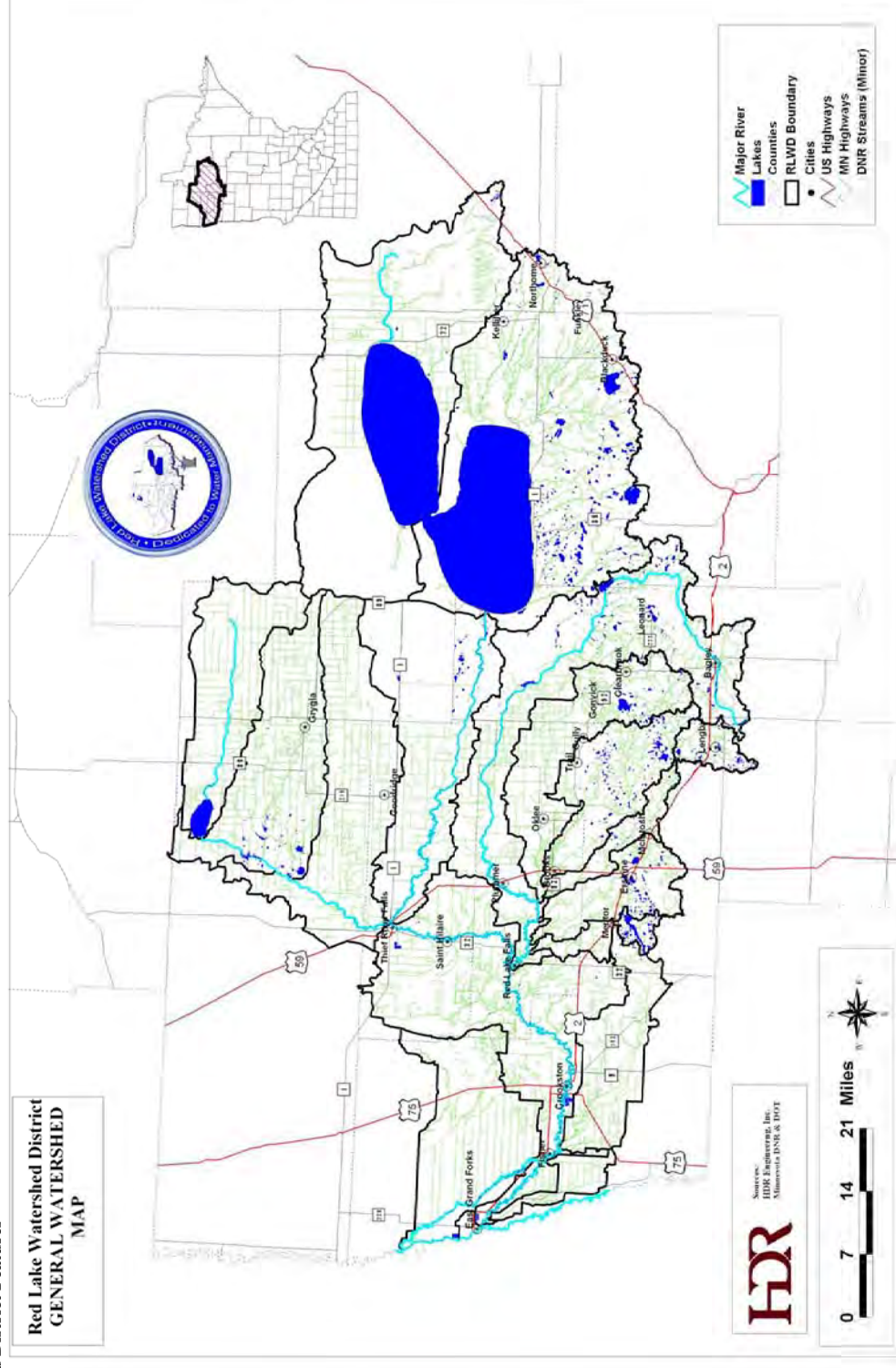


Figure 4
Public and Tribal Lands

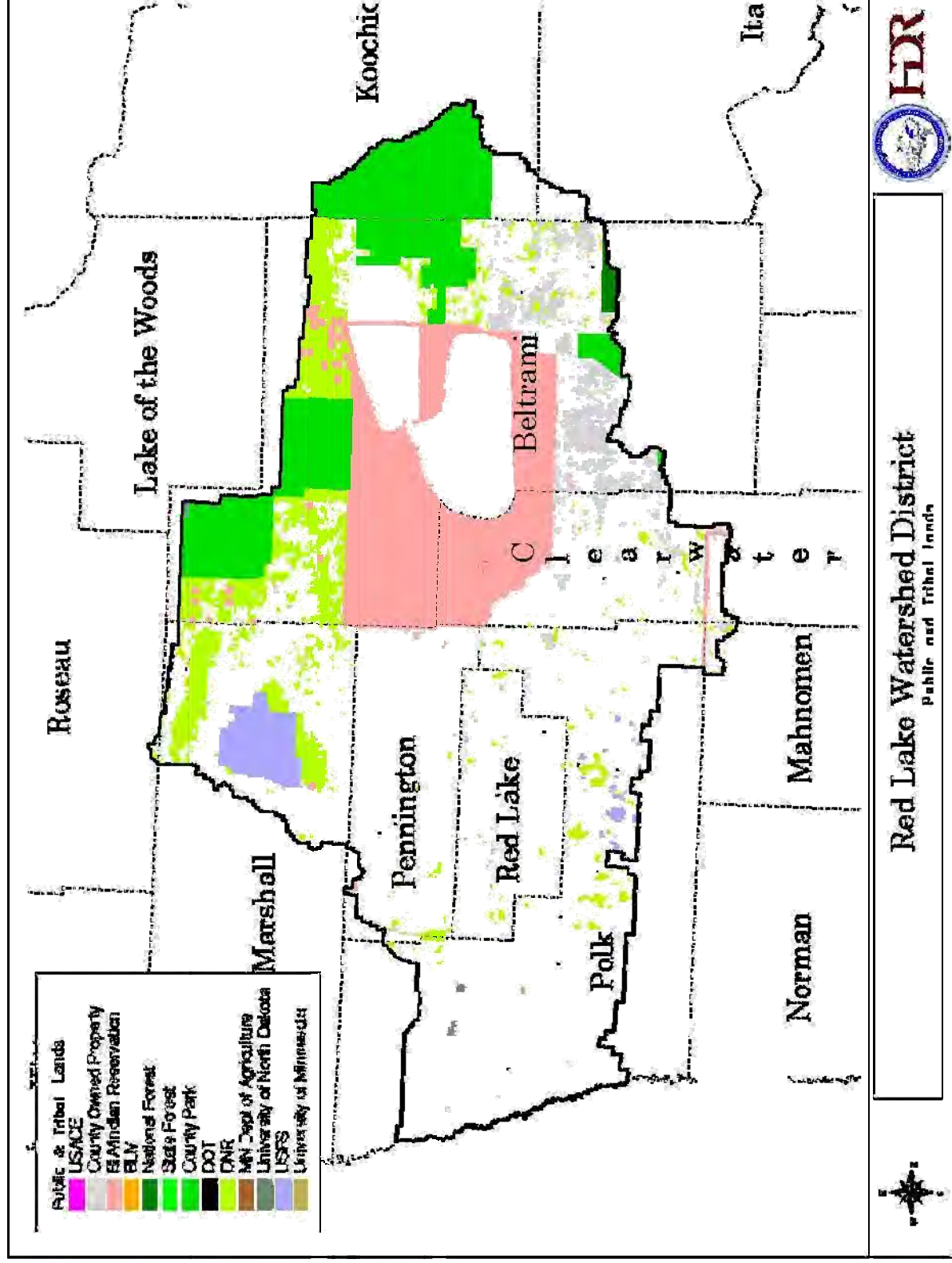


Figure 5
Red Lake River Watershed Geomorphology

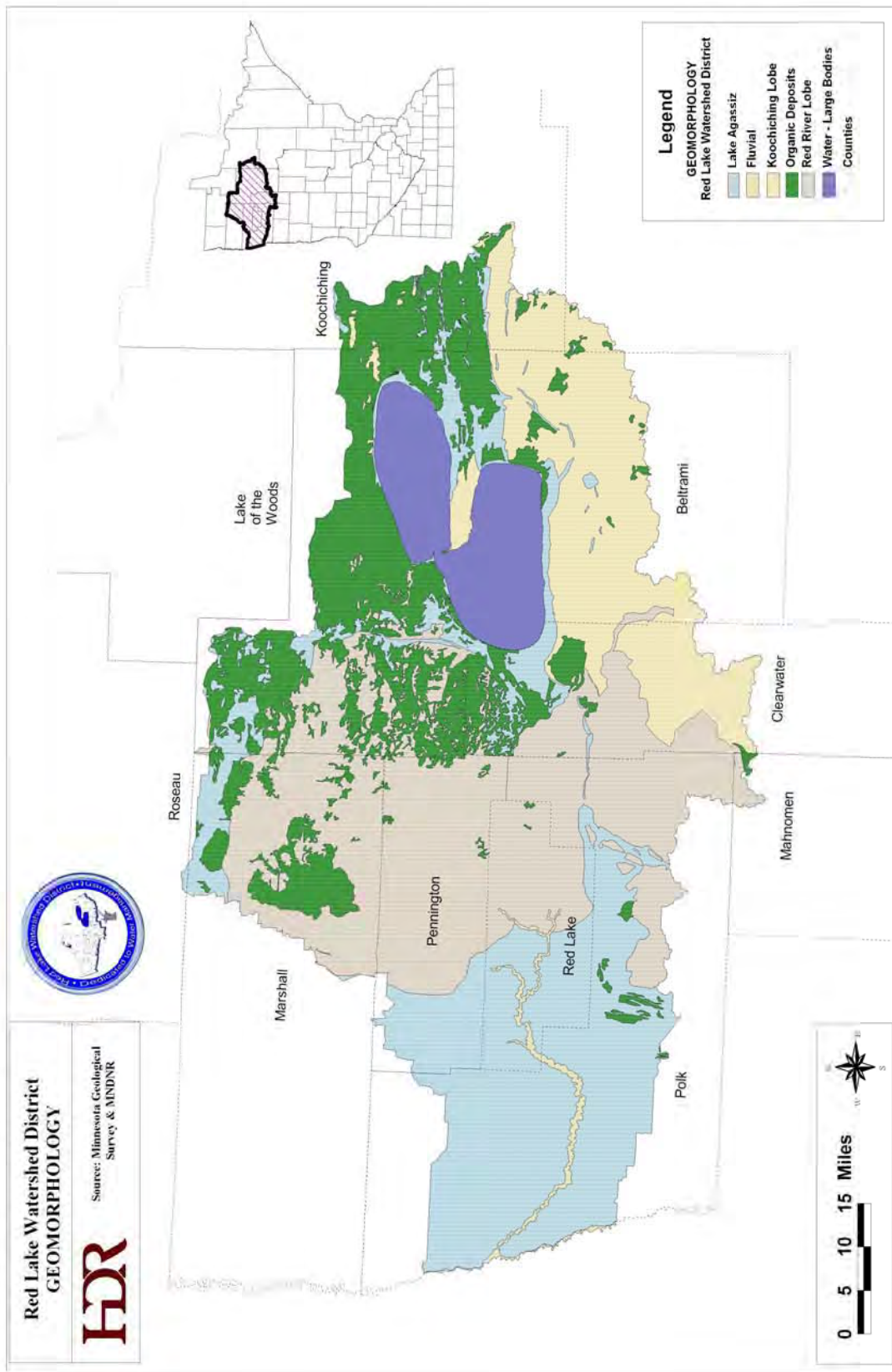


Figure 6
Lake Agassiz

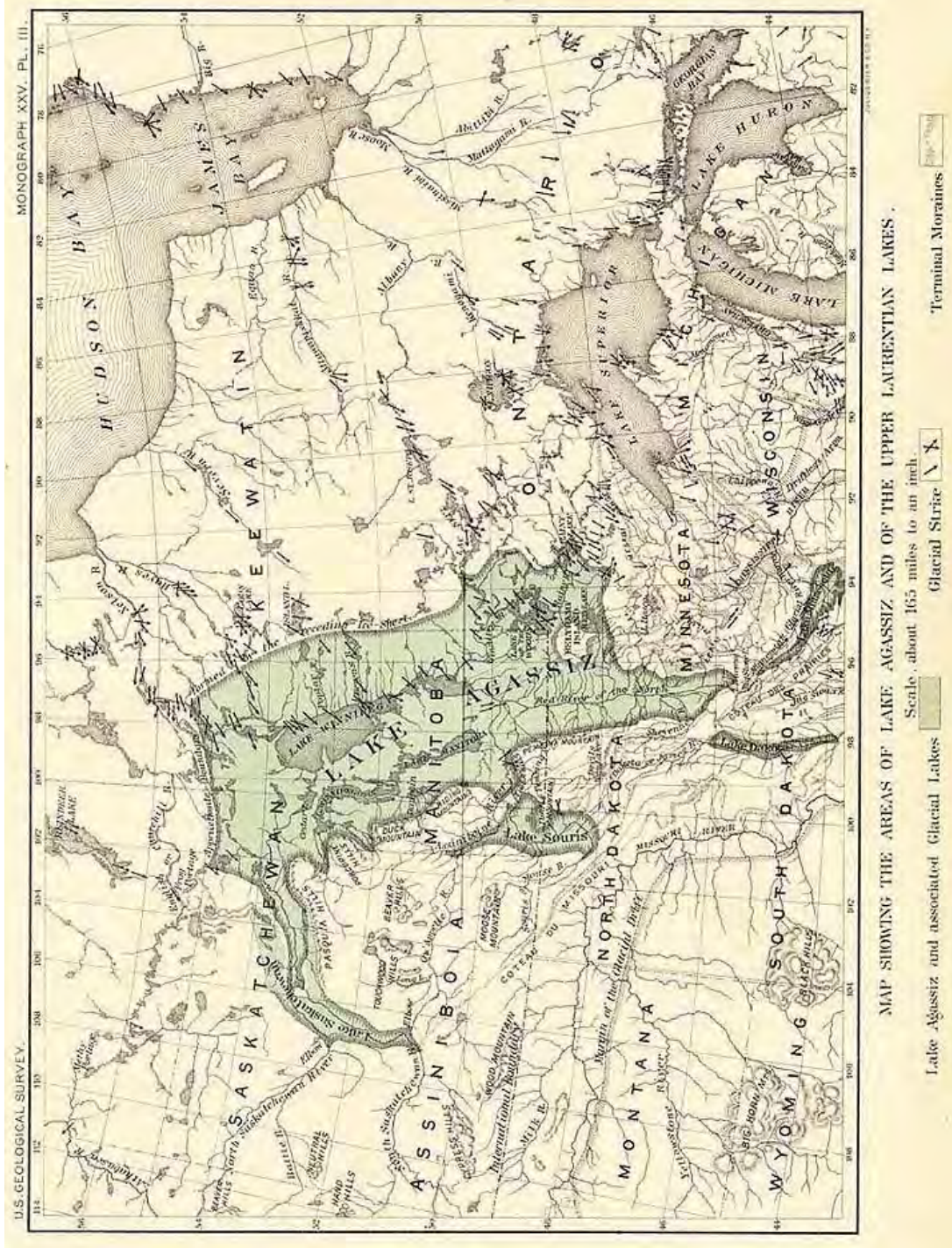


Figure 7
Topography

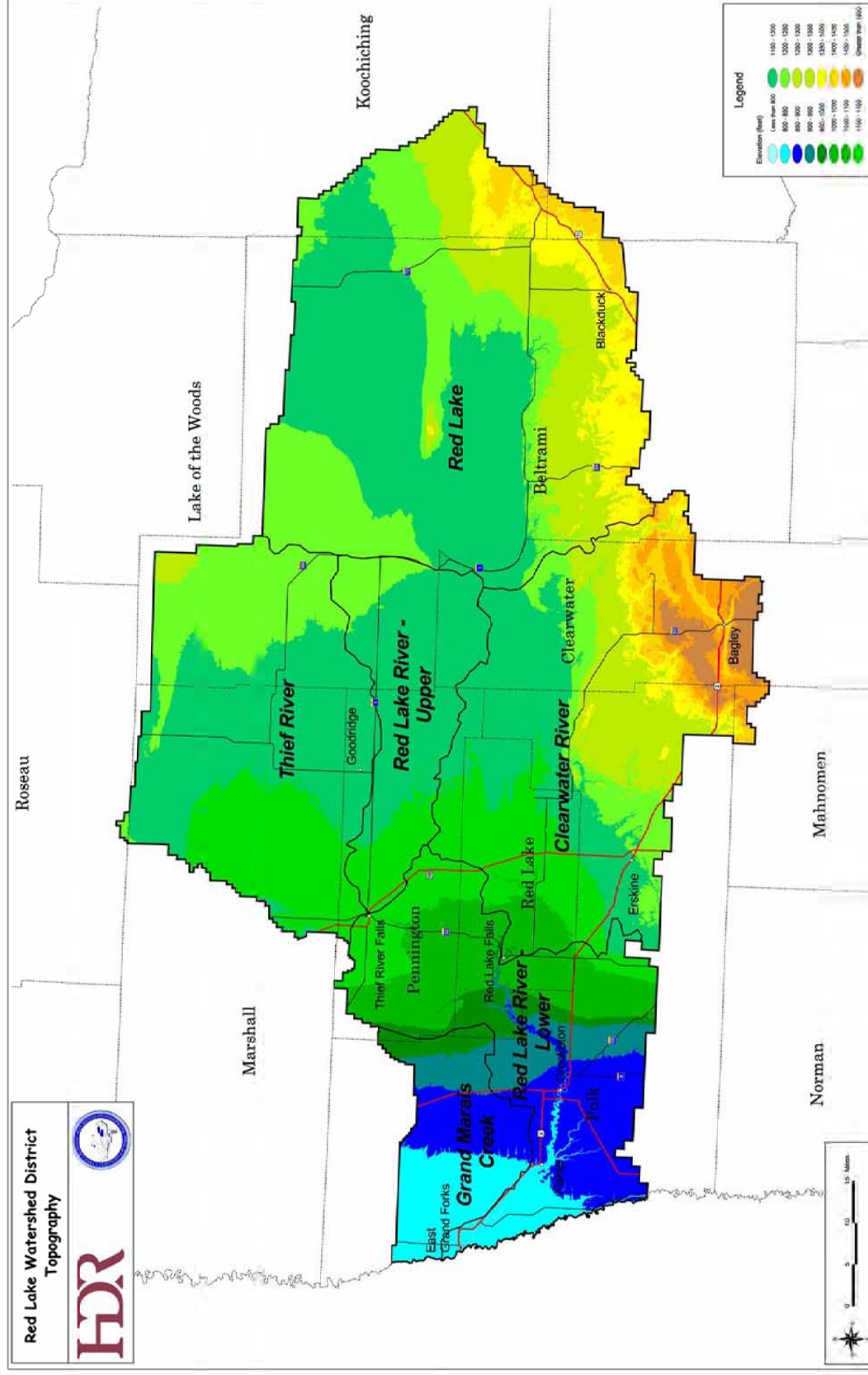
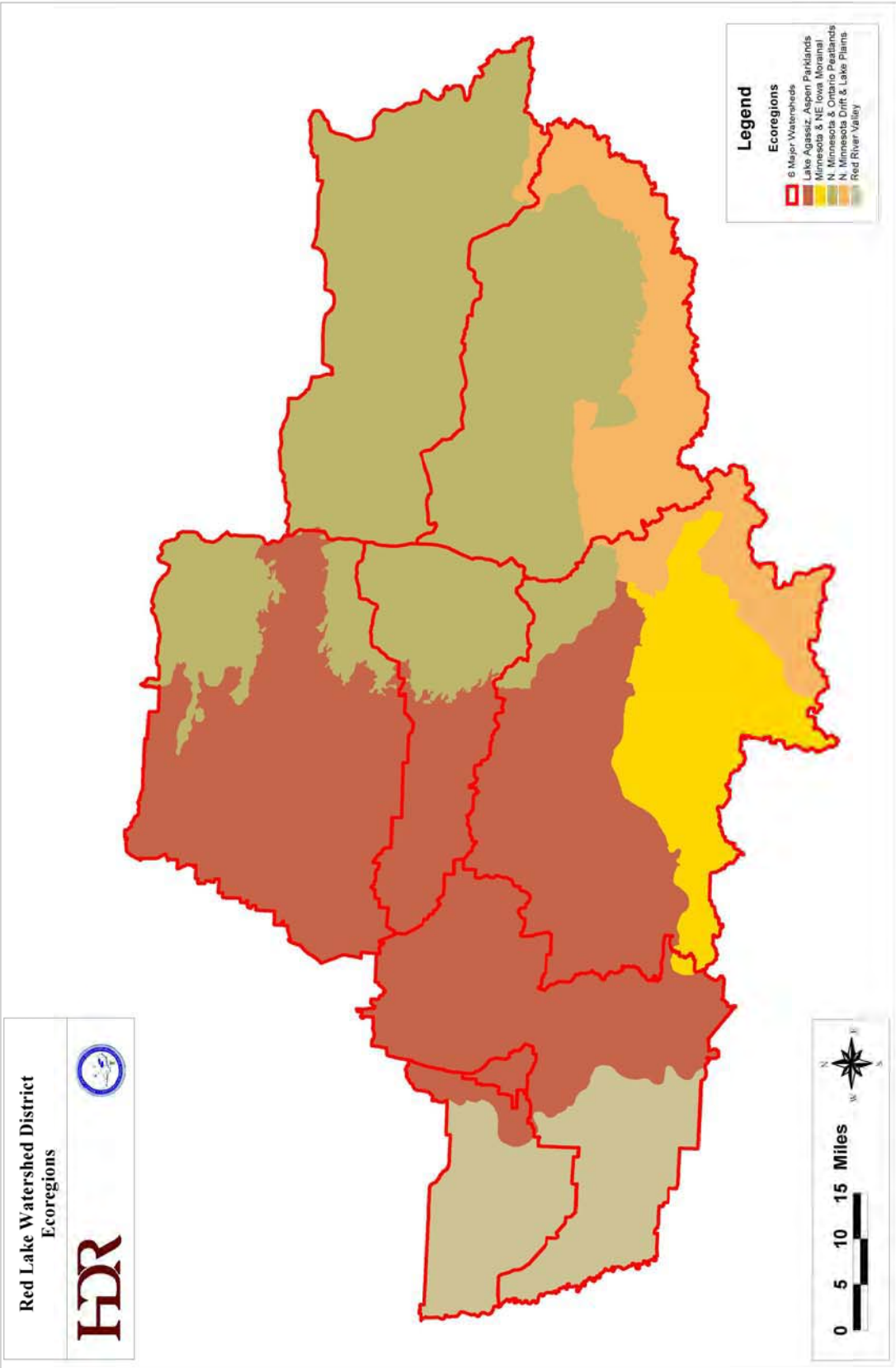


Figure 8
Ecoregions



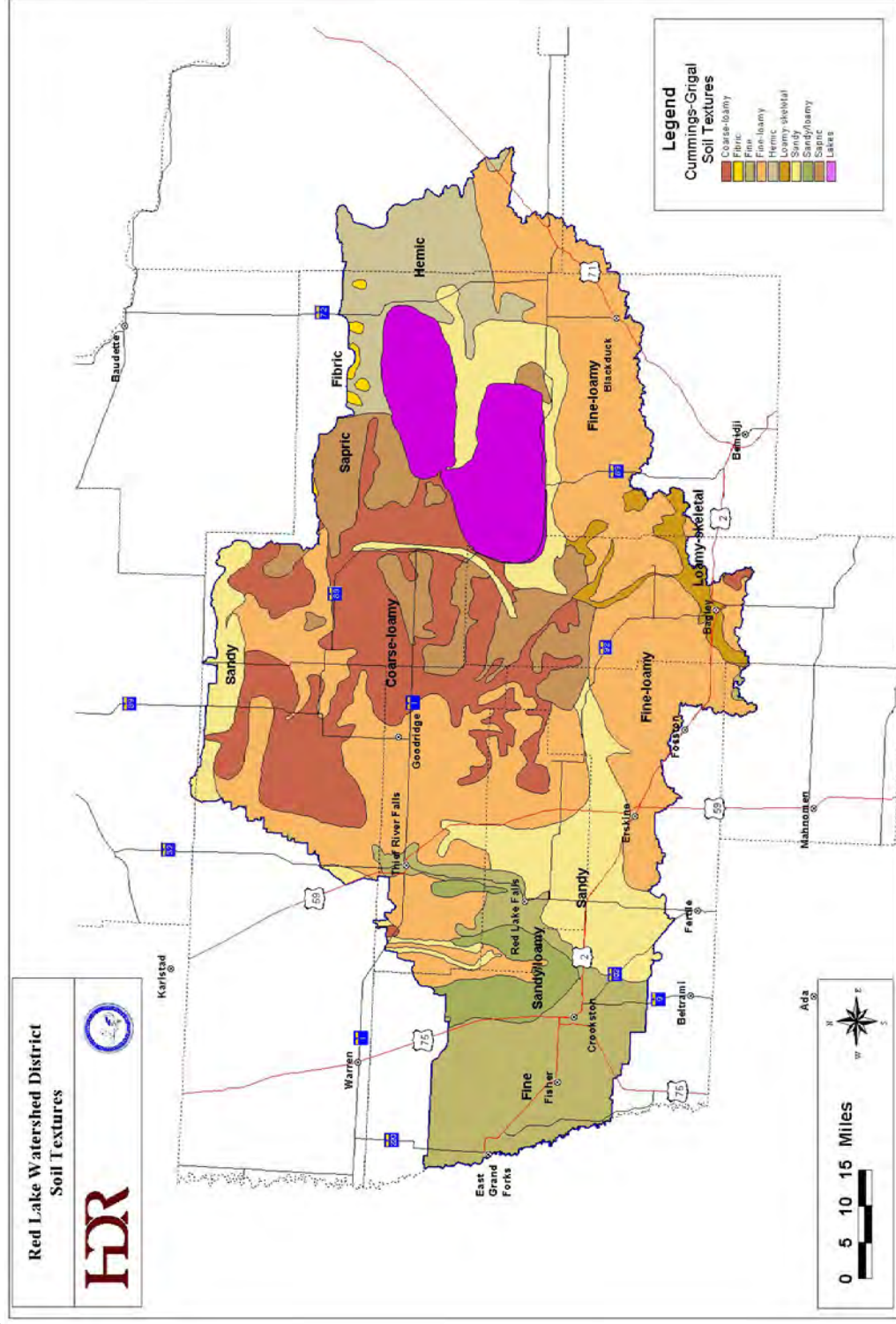
2.4 SOILS

The soils of the RLWD are all based in glacial materials. The soil texture differences depend on the sorting processes that wind and water have applied to the glacial deposits. The unsorted glacial till is a mixture of clay, silt, sand, gravel and rock. The action of running water or waves on the till washed away the smaller particles in some areas, leaving behind the characteristic gravel pit deposits. The clay silt and sand particles were transported by the water to quieter areas within the streams or downstream to a lake area. In general, the fine clay particles were carried furthest and deposited in the depths of the lake. The sands were the first to settle and form deposits in streambeds or near the edges of the lake where wave action further distributed them up and down the shoreline.

Topsoil development may include the addition of windborne deposits and organic remains that accumulate both above ground and within the root zone. Soils of the RLWD have been extensively mapped by the U.S. Department of Agriculture (USDA) primarily to encourage suitable land use applications. Detailed soil surveys have been published covering each of the counties and are available at local USDA Natural Resource Conservation Service (NRCS) and County Soil and Water Conservation District (SWCD) offices. Unfortunately, however, only a portion of the Red Lake Reservation has been mapped for soils.

A reconnaissance soil survey, published in 1939, is available for Polk, Red Lake and Marshall counties. Generalized soil maps are available for all the counties. Statistical maps are available for the entire watershed. Figure 9 is a generalized soil landscape map of the RLWD showing soil textures.

Figure 9
Soil Textures Map



2.5 CLIMATE

2.5.1 Temperature

The climate of this basin is characterized by cold to arctic winters with numerous winter storms and short summers of moderate temperatures. The mean annual temperature of Crookston in the western basin is 39.7 degrees Fahrenheit (F.), compared to 38.4 degrees F. at the Red Lake Indian Agency in the extreme eastern end. January and February are the coldest months and have mean monthly temperatures of 4.0 degrees F. and 10.1 degrees F., respectively. A record -51 degrees F. at Crookston and -50 degrees F. at the Red Lake Indian Agency have been recorded.

The mean monthly temperatures from April to September vary from 59 degrees F. in the west to 57 degrees F. in the east end of the basin. July and August are the warmest months, averaging 70 degrees F. and 68 degrees F. Temperatures of 100 degrees F. and higher have been recorded 12-15 times during the past 60 years. The frost-free period (32-31 degrees F.) in the western end is 124 days compared to 117 in the eastern edge of the watershed.

2.5.2 Precipitation

The annual precipitation increases from 19 inches in the northwestern corner to 23 inches on the eastern edge of the basin. Approximately 75 percent falls as rain and the remainder as snow. The greatest amount of moisture, 31-33 percent of the total precipitation, is recorded during June and July. The least amount, 1.75 inches, occurs during December, January and February, as snowfall. Much of the winter's snowfall runs off during the spring breakup (Figure 10 and Figure 11).

2.5.3 Rain, Snow and Stream Gage

Since 1978, the RLWD has kept track of rain, snow and stream gage sites covering 4,049 miles. Records are taken by voluntary readers. There are 100 stream gage sites with 51 readers; 21 rain gage sites with 21 readers; and three snow gage sites that are read by the RLWD staff.

Figure 10
Precipitation

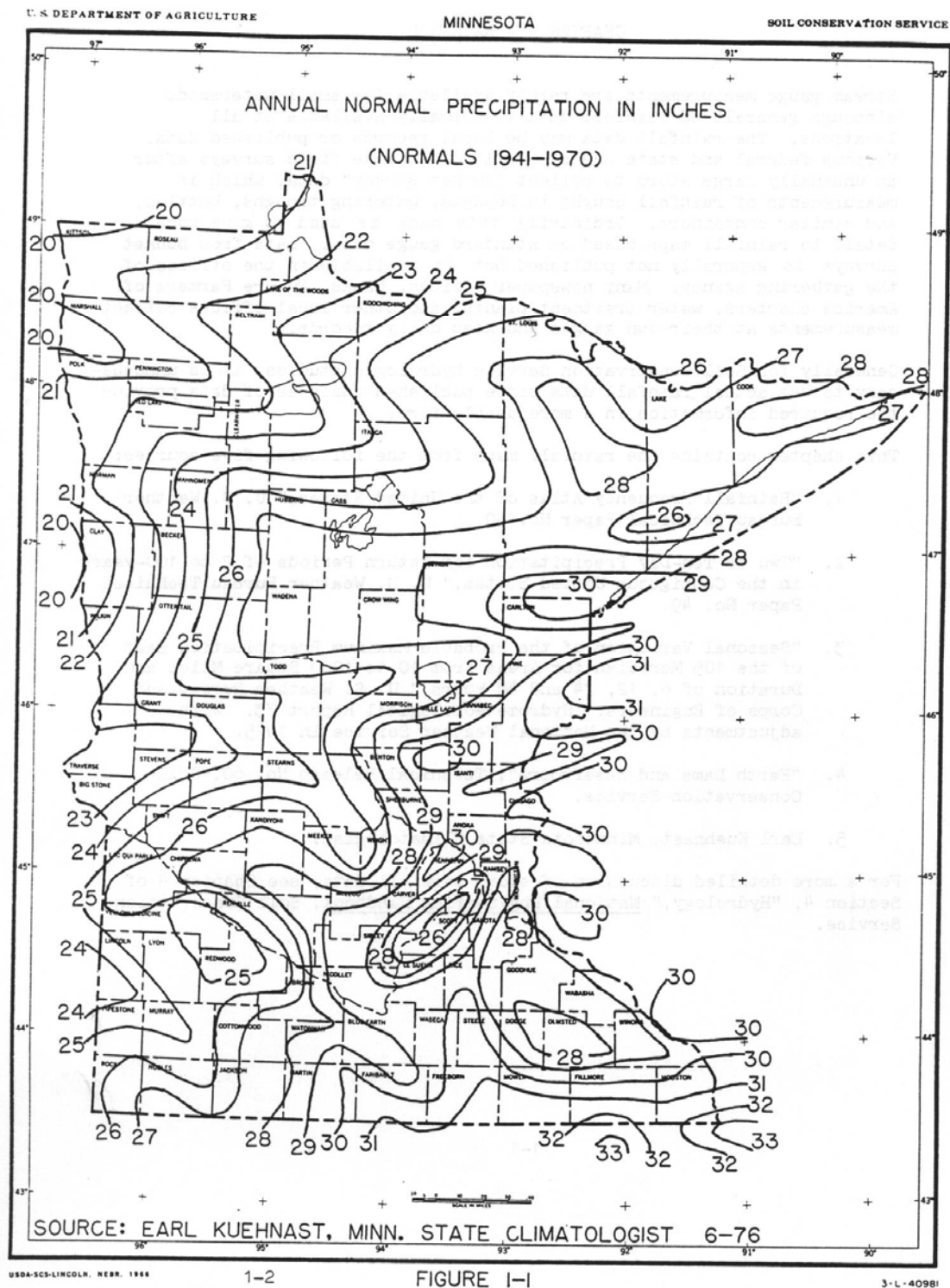
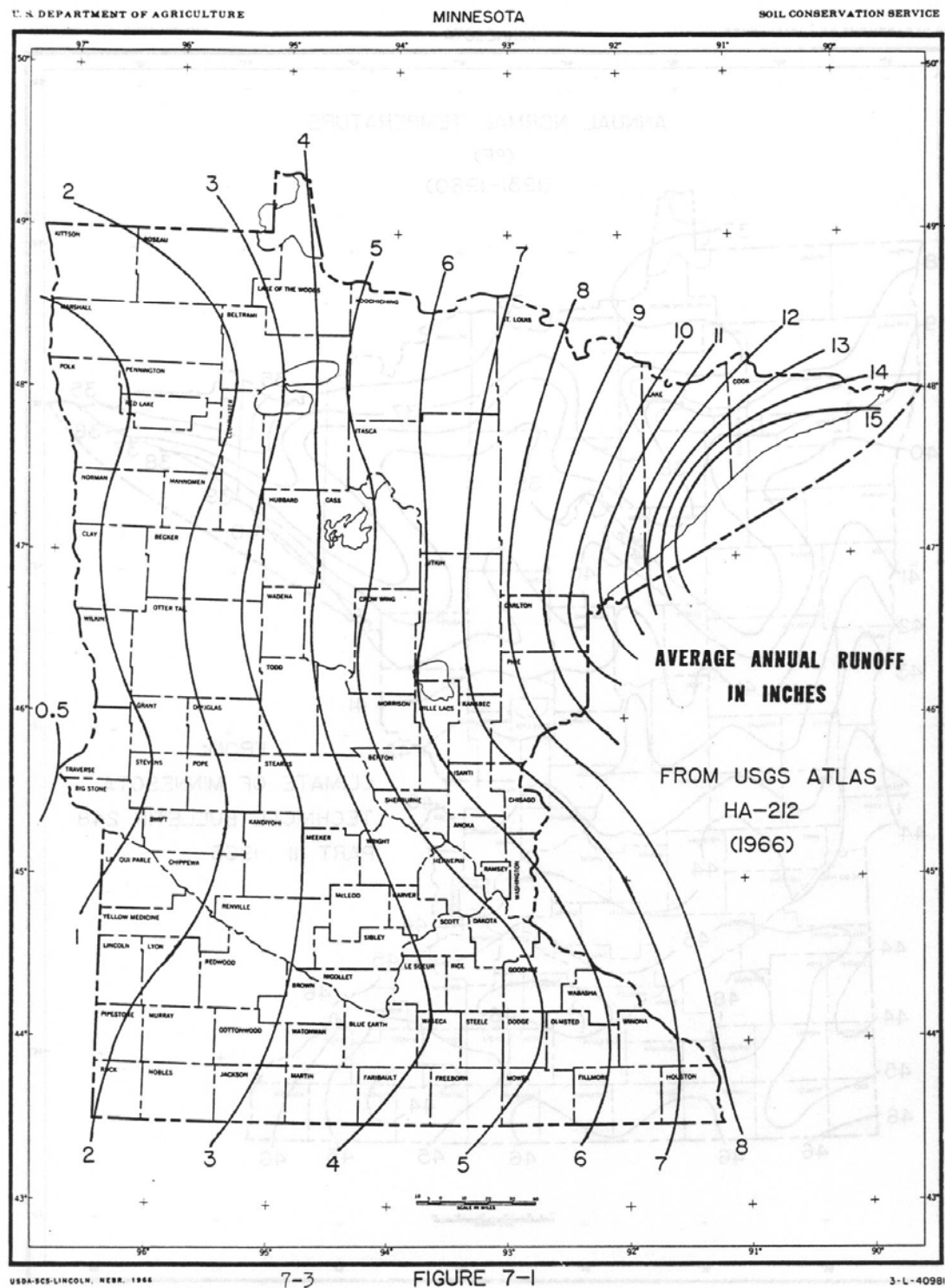


Figure 11
Runoff



2.6 POPULATION

The estimated population of the RLWD, using 2003 census data, is about 74,000. The largest cities within the RLWD are East Grand Forks (population 7,616), Crookston (population 8,104), Thief River Falls (population 8,488) and Red Lake Falls (population 1,601).

In general, census statistics indicate that the northwestern region of the state continues to slowly decline in population and that the population is continuing to age. The continued shifting of population out of the watershed and the region may lead to improvements in water quality due to lower human impacts. However, it is very difficult to measure these impacts and they would only be implied. It may be possible for the district to statistically compare population trends to land use and water quality to see if a linkage between human population and water quality exists.

Agriculture and related businesses are the prime sources of income within the RLWD. Major industrial employers include Digi-Key Corporation and Arctic Cat, Incorporated. In general, household mean and median incomes tend to be below the state-wide average. Job-Z and other economic development incentive programs have been created in an attempt to introduce more jobs within the region.

Table 1
Total Population by County for Northwestern Minnesota

COUNTY	2000 TOTAL POPULATION	2010 POPULATION ESTIMATE	PERCENT CHANGE	2000 URBAN POPULATION	2000 RURAL POPULATION
Beltrami	39,650	45,040	12.0	12,492	27,158
Clearwater	8,423	8,810	4.0	0	8,423
Itasca	43,992	47,590	7.5	8,530	35,462
Koochiching	14,355	13,570	-5.8	7,790	6,565
Mahnomen	5,190	5,360	3.0	0	5,190
Marshall	10,155	9,500	-6.9	0	10,155
Pennington	13,584	14,000	3.0	9,164	4,420
Polk	31,369	30,830	-1.7	15,385	15,984
Red Lake	4,299	4,310	0.0	0	4,299

Minnesota Department of Administration, Land Management Information Center, 2000 Census Information

2.7 LAND USE

Exclusive of Red Lake Nation lands, a large portion of the land of the RLWD is devoted to agriculture. The Red Lake Nation manages its lands predominantly for fish and wildlife habitat and timber production. Most of the area is cropland with a small percentage of pasture, wetland areas and woodlands. A variety of crops are produced in the area including corn, wheat, barley, soybeans, alfalfa, wild rice and sugar beets. The long-range trends in agricultural land use have been increased size of farms and fields and a reduction in livestock. A consequence of these trends has been a reduction in the suitability of land use relative to landform. For example, highly erodible, steeply sloping, flood prone or wetland areas may be included in a field devoted to cropland in order to make farm equipment operations more convenient. Figure 12 shows the existing land uses within the RLWD. Figure 4 shows public land ownership and Red Lake Band of Chippewa lands within the RLWD. Table 2 and Table 3 show land areas within the RLWD.

Figure 12
Existing Land Use Map

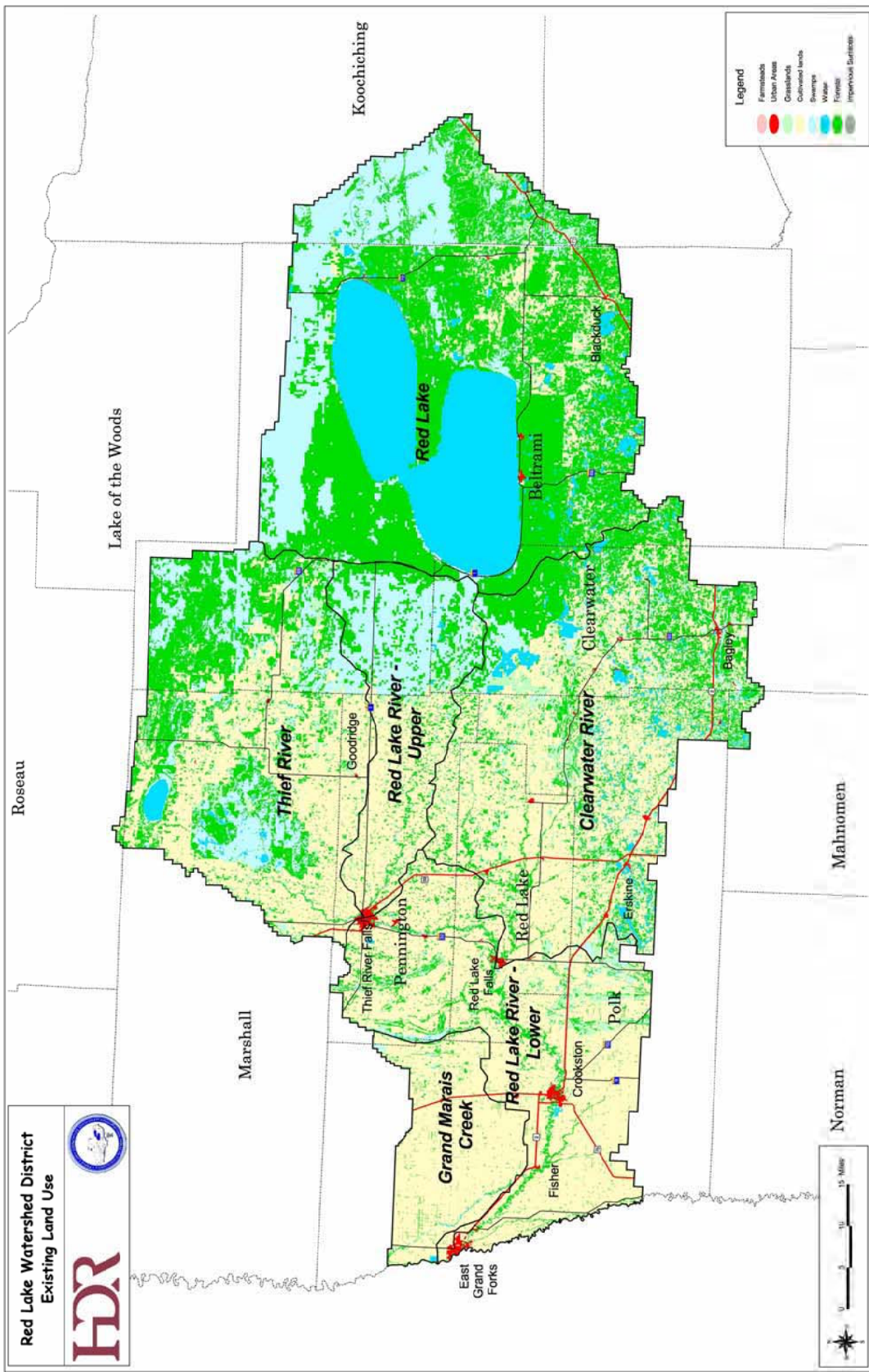


Table 2
Planning Basin Characteristics Area

Planning Basins	Cleanwater	Grand Marais	Lower Red Lake River	Upper Red Lake River	Red Lakes	Thief	Total RLWD
Basin Area (sqmi)	1,362	317	874	457	1,929	1,068	6,020
Basin Area (acres)	871,387	202,663	559,091	292,443	1,234,747	683,408	3,852,739
Wetland Area - NWI (acres)							
Min wetland Type							
1	144,460	3,236	34,994	153,118	855,675	349,665	1,541,147
2	2,324	284	1,430	929	3,878	3,450	12,275
3	40,319	1,173	18,205	86,007	28,221	79,077	253,003
4	25,968	1,121	5,350	1,099	22,087	37,816	93,441
5	1,820	22	138	1,979	2,416	5,218	11,583
6	19,663	37	932	1,706	299,716	9,563	331,617
7	36,740	194	3,979	23,554	139,141	106,567	310,176
8	9,660	424	4,940	32,379	60,323	93,398	201,124
	7,965	-	20	5,465	299,894	14,574	327,919
Lakes/Rivers (acres)	23,454	1,947	4,556	2,844	302,962	10,133	345,896
EcoRegions of RLWD (Acres)							
Lake Agassiz, Aspen Parklands	384,431	44,472	356,727	139,242	704	513,680	1,439,256
Minnesota & NE Iowa Moraine	304,853	-	3,358	-	-	-	308,212
N. Minnesota & Ontario Peatlands	55,386	-	-	153,201	988,851	189,728	1,367,167
N. Minnesota Drift & Lake Plains	126,687	-	-	-	254,191	-	380,879
Red River Valley	29	165,553	190,598	-	-	-	356,180
Landuse (Acres)							
Cultivated Land	471,450	191,980	456,095	117,023	62,972	294,904	1,594,424
Forest land	245,555	4,395	40,927	62,290	610,310	185,103	1,148,590
Grass/Brush land	60,435	3,163	39,168	11,440	21,819	60,241	196,266
Mines	1,078	58	1,901	40	172	185	3,434
Water	24,738	780	4,331	1,815	304,735	11,515	347,914
Developed land	7,101	1,355	7,744	1,140	3,579	813	21,732
Wetlands	60,944	930	8,882	98,695	240,160	130,599	540,210
Other	86	-	43	-	-	50	179

Table 3
Planning Basin Characteristics Percent of Area

Planning Basins	Cleanwater	Grand Marais	Lower Red Lake River	Upper Red Lake River	Red Lakes	Thief	Total RLWD
Wetland Area - NWI (%)	16.58%	1.50%	6.26%	52.36%	69.30%	51.16%	40.00%
Mn wetland Type							
1	0.27%	0.13%	0.26%	0.32%	0.31%	0.50%	0.32%
2	4.63%	0.58%	3.26%	29.41%	2.29%	11.57%	6.57%
3	2.98%	0.55%	0.96%	0.38%	1.79%	5.53%	2.43%
4	0.21%	0.01%	0.02%	0.68%	0.20%	0.76%	0.30%
5	2.26%	0.02%	0.17%	0.58%	24.27%	1.40%	8.61%
6	4.22%	0.10%	0.71%	8.05%	11.27%	15.59%	8.05%
7	1.11%	0.21%	0.88%	11.07%	4.89%	13.67%	5.22%
8	0.91%	0.00%	0.00%	1.87%	24.29%	2.13%	8.51%
Lakes/Rivers (%)	2.69%	0.96%	0.81%	0.97%	24.54%	1.48%	8.98%
Total Wetlands/Lakes/Rivers	19.27%	2.56%	7.07%	53.33%	93.84%	52.65%	48.96%
EcoRegions of RLWD (%)							
Lake Agassiz, Aspen Parklands	44.12%	21.94%	63.80%	47.61%	0.06%	75.16%	37.36%
Minnesota & NE Iowa Moraine	34.98%	0.00%	0.60%	0.00%	0.00%	0.00%	8.00%
N. Minnesota & Ontario Peatlands	6.36%	0.00%	0.00%	52.39%	80.09%	24.84%	35.49%
N. Minnesota Drift & Lake Plains	14.54%	0.00%	0.00%	0.00%	20.59%	0.00%	9.89%
Red River Valley	0.00%	81.69%	34.09%	0.00%	0.00%	0.00%	9.24%
Landuse (%)							
Cultivated Land	54.10%	94.73%	81.58%	40.02%	5.10%	43.15%	41.38%
Forest land	28.19%	2.17%	7.32%	21.30%	49.43%	27.08%	29.81%
Grass/Brush land	6.94%	1.56%	7.01%	3.91%	1.77%	8.81%	5.09%
Mines	0.12%	0.03%	0.34%	0.01%	0.01%	0.03%	0.08%
Water	2.84%	0.38%	0.77%	0.62%	24.68%	1.68%	9.03%
Developed land	0.81%	0.67%	1.39%	0.39%	0.29%	0.12%	0.56%
Wetlands	6.99%	0.46%	1.59%	33.75%	19.45%	19.11%	14.02%
Other	0.01%	0.00%	0.01%	0.00%	0.00%	0.01%	0.00%

2.8 FISH AND WILDLIFE

Fish and wildlife are important resources of the area. Hunting, fishing, trapping and wildlife viewing provide recreation for area residents and bring in people from outside the area, with significant benefits to the local economy. Waterfowl, ruffed and sharp-tailed grouse, white-tailed deer and snowshoe hare are commonly hunted species. Walleye, northern pike, crappie, channel catfish, smallmouth bass, bullhead and rough fish are all important recreational fisheries. Lake sturgeon were once abundant in the Red River Basin and there are historical accounts of them being present upstream into the Upper and Lower Red lakes. The deep scour hole located at the confluence of Clearwater River and Red Lake River was reported to be the largest lake sturgeon spawning location in the Red River Basin. However, by the mid-1900's, lake sturgeon had effectively been extirpated from the basin as a result of over exploitation, dam construction and declines in water and habitat quality. The Minnesota Department of Natural Resources (MnDNR) currently stocks lake sturgeon fry in the above-mentioned scour hole as part of a cooperative lake sturgeon restoration plan. The Upper and Lower Red lakes are the largest walleye lakes in Minnesota. The Upper and Lower Red lakes have been identified as unique resources for their size and their history. The RLWD will seek to actively work with the Red Lake Band of Chippewa Indians and the MnDNR in the management of the lakes and their outlet.

The RLWD lies along a major flyway for migratory birds. Species that migrate through and stay in the area include the bald eagle, burrowing owl and peregrine falcon. Federally, bald eagles are listed as threatened. Gray wolves present in the area are listed as threatened. Burrowing owls are not listed federally, but are listed by Minnesota as endangered. Minnesota lists bald eagles as a species of special concern and peregrine falcons as threatened. Agassiz National Wildlife Refuge (NWR) is home to the largest nesting colony of Franklin's gulls in North America. The U.S. Fish and Wildlife Service (USFWS), the MnDNR and the U.S. Army Corps of Engineers (USACE) are involved in wildlife management within the RLWD. Their efforts have been primarily aimed at waterfowl production, migration habitat, resident deer, grouse, elk and numerous other upland game and non-game species. Wildlife management efforts are focused on maintaining a variety of habitats, which include a variety of wetlands, brushlands, timbered areas and prairies and savannahs to benefit a variety of resident and migratory wildlife. Their programs include land acquisition and easements. The Red Lake Band of Chippewa Indians and a number of private organizations are also involved.

The Minnesota Center for Environmental Advocacy (MCEA) completed a detailed assessment of natural resources within the RLWD as a part of the Overall Plan update. A copy of the assessment report is available for review at the RLWD offices.