



Location of MLRA 88 in Land Resource Region K.

88—Northern Minnesota Glacial Lake Basins

This area is entirely in Minnesota. It makes up about 11,695 square miles (30,300 square kilometers). The towns of Baudette, Big Falls, International Falls, Little Fork, and Warroad are in the northern part of this MLRA. The towns of Floodwood, Meadowlands, and McGregor are in the southern part. Small parts of the Superior and Chippewa National Forests are in this area, but most of the area is in State forests. This MLRA includes the Big Bog and Nett Lake Indian Reservations, part of the Leech Lake Indian Reservation, and most of the Red Lake Indian Reservation.

Physiography

Most of this area is in the Western Lake Section of the Central Lowland Province of the Interior Plains. The eastern one-eighth of the area is in the Superior Upland Province of the Laurentian Upland. This MLRA is in the glacial lakebeds of Agassiz, Upham, and Aitkin. These glacial lake plains have remnants of gravelly beaches, strandlines, deltas, and sandbars. The mostly level or nearly level plains are bordered by some gently sloping strandlines and rolling dune land. Elevation is 1,350 feet (410 meters), decreasing gradually to 900 feet (275 meters) in the north. Ditches have been used in an attempt to drain the many wet areas in the MLRA, but low gradients commonly prevent adequate removal of surface and subsurface water for cropping.

The extent of the major Hydrologic Unit Areas

(identified by four-digit numbers) that make up this MLRA is as follows: Rainy (0903), 48 percent; Red (0902), 24 percent; Western Lake Superior (0401), 14 percent; and Mississippi Headwaters (0701), 14 percent. Most of this area was inundated by glacial Lake Agassiz. The general slope and drainage are toward the north into the Rainy River and eventually into Hudson Bay. The Clearwater, Moose, Red Lake, and Roseau Rivers drain the southwestern part of the area and eventually flow into the Red River. The divide between the Rainy and Red River drainage basins lies in this area. The drainage of the glacial Lake Upham basin is to the east to Lake Superior. The St. Louis, Whiteface, Swan, and Savanna Rivers drain this basin. The drainage of the glacial Lake Aitkin basin is to the south by way of the Mississippi River. Numerous small lakes occur in this area.

Geology

The surface of this area is covered mostly by silty and clayey lacustrine sediments and lake-modified glacial till. Crystalline metamorphic rocks underlie the glacial deposits.

Climate

The average annual precipitation in this area is 20 to 29 inches (510 to 735 millimeters). About 68 percent of the annual precipitation falls as rain during the 5-month growing season (May through September), and about 20 percent falls as snow. The average annual temperature is 36 to 41 degrees F (2 to 5 degrees C). The freeze-free period averages about 135 days and ranges from 115 to 150 days.

Water

Following are the estimated withdrawals of freshwater by use in this MLRA:

Public supply—surface water, 0.0%; ground water, 80.0%

Livestock—surface water, 6.7%; ground water, 13.3%

Irrigation—surface water, 0.0%; ground water, 0.0%

Other—surface water, 0.0%; ground water, 0.0%

The total withdrawals average 1.5 million gallons per day (5.5 million liters per day). About 93 percent is from ground water sources, and 7 percent is from surface water sources. This area has abundant supplies of both surface and ground water that meet all of the current needs of the area. The surface water generally is of good quality, and its use is not limited. Many lakes provide ample opportunities for recreation.

Abundant supplies of good-quality ground water are in both surficial and buried drift aquifers throughout this area. Water from these aquifers is a calcium-magnesium-bicarbonate type that is hard. The median concentrations of total dissolved solids are about 350 parts per million (milligrams per liter) in the surficial drift aquifer and 450 in the buried drift aquifer.

Nitrate concentrations can approach the harmful limit of 10 parts per million (milligrams per liter) in the surficial drift aquifer. Glacial till generally caps the buried drift aquifer, which is thus more protected from contamination by surface activities than the surficial drift aquifer. The deeper aquifer, however, has very high levels of iron.

Ground water for domestic use is obtained from the Proterozoic Metasedimentary aquifer in the southeastern part of this MLRA. This aquifer consists of argillite, slate, and metagraywacke and has calcium-magnesium-bicarbonate type water that is hard. The water has a median level of total dissolved solids of about 250 parts per million (milligrams per liter). This aquifer has the best quality water of all the crystalline rock aquifers in Minnesota.

Soils

The dominant soil orders in this MLRA are Alfisols, Entisols, and Histosols. The soils in the area have a frigid soil temperature regime, an aquic or udic soil moisture regime, and mixed, smectitic, or isotic mineralogy. They are very deep, are sandy to clayey, and are dominantly somewhat poorly drained to very poorly drained. Extensive areas of organic soils occur in the MLRA. Most of the organic soils in the Agassiz Basin are slightly lower on the landscape than the surrounding mineral soils, whereas the large areas of organic soils in the Upham and Aitkin Basins typically are slightly domed and are slightly higher on the landscape than the surrounding mineral soils.

Aqualfs (Chilgren, Indus, and Spooner series) formed in glaciolacustrine sediments or water-worked till. Udalfs (Baudette, Kooch, and Taylor series) formed in water-modified till or glaciolacustrine sediments. Psamments (Clearriver, Cormant, Graycalm, Hiwood, Menahga, Redby, Two Inlets, and Zimmerman series) formed in glaciolacustrine sediments on lake plains. Haplosaprists (Cathro, Berner, Dora, and Markey series) formed in organic material over glaciolacustrine sediments or water-modified till. Haplohemists (Greenwood and Rifle

series), Haplosaprists (Seelyeville series), and Sphagnofibrists (Lobo series) formed in a thick layer of organic material on lake plains.

Biological Resources

Prior to settlement, the vegetation in this area was a mixture of deciduous trees and conifers. White pine and red pine grew on moraines. Jack pine was dominant on outwash plains and sandy lake plains. Red oak, sugar maple, and basswood grew in sheltered areas close to lakes. Forested lowlands were dominated by black spruce, tamarack, white cedar, and black ash. Wetlands that were not forested were dominated by sedge meadow communities. Much of this area remains forested, but small areas of prairie occur in the western part of the area. Aspen is the most common tree species both in pure stands and in mixed stands with birch, maple, oak, white spruce, and red pine.

Some of the major wildlife species in this area are white-tailed deer, black bear, ruffed grouse, and sharp-tailed grouse. Because of its relatively unaltered landscape, this area supports a high percentage of the rare plants and animals that occur in Minnesota. These species include the bald eagle and the eastern timber wolf.

Land Use

Following are the various kinds of land use in this MLRA:

Cropland—private, 7%
Grassland—private, 2%; Federal, 1%
Forest—private, 73%; Federal, 2%
Urban development—private, 1%
Water—private, 11%
Other—private, 3%

About 75 percent of this area is forested, dominantly by the aspen cover type. Hardwood and softwood species are harvested mostly for pulp. Most of the cropland in this MLRA is in the western part of the area. The main crops are alfalfa, barley, oats, sunflowers, and wheat. A short growing season, excessive periods of rainfall, and poor drainage can reduce yields in some years. Specialty crops, including bluegrass seed, foundation seed potatoes, and wild rice, are grown in some areas. Scattered livestock operations are throughout the area. Two large, frequently used lakes are in this MLRA. These are Leech Lake and Cass Lake. Water-based recreation and summer home development are significant economic enterprises.

The major resource concerns are excessive soil wetness, the short growing season, and surface compaction. Some sandy areas are subject to wind erosion. The important conservation practices on cropland include selection of crops that are tolerant of wetness and a short growing season. They also include timely tillage, which improves yields. Cover crops and minimum tillage can help to overcome the effects of strong winds on sandy soils. Timely harvesting of trees can minimize compaction when the soils are wet and can enhance the regeneration of tree species.