



Location of MLRA 93A in Land Resource Region K.

93A—Superior Stony and Rocky Loamy Plains and Hills, Western Part

This area is entirely in northeast Minnesota. It makes up about 8,570 square miles (22,205 square kilometers). The towns of Ely, Finland, Grand Marais, Two Harbors, and Cloquet are in this MLRA. The main highways through the area are U.S. Highway 53 and Minnesota Highways 1 and 61. Most of the area is in the Superior National Forest, and the Boundary Waters Canoe Area Wilderness is in this MLRA. Because of its shape, this area is called the “Arrowhead region” of Minnesota. The Grand Portage Indian Reservation is at the tip of the “arrowhead.” Part of the Fond du Lac Indian Reservation is in the southeast tip of the area, and the Vermilion Lake Indian Reservation is in the central part of the area.

Physiography

This area is in the Superior Upland Province of the Laurentian Upland. It was glaciated by numerous advances of the Superior, Rainy, and Des Moines glacial lobes during the Wisconsin and pre-Wisconsin glacial periods. Most of the surface of this area is young, dominated by drumlin fields, moraines, small glacial lake plains, outwash plains, and bedrock-controlled uplands. Elevation generally ranges from about 600 to 2,100 feet (185 to 640 meters). Eagle Mountain, at an elevation of 2,301 feet (701 meters), is the highest point in Minnesota. Closed depressions, lakes, ponds, and bogs are throughout the area. The several thousand lakes within the Boundary Waters Canoe Area Wilderness were formed by the scouring of the bedrock landscape by glacial ice. Local relief ranges from 10

to more than 100 feet (3 to 30 meters). It can be 600 feet (185 meters) or more in some areas adjacent to Lake Superior.

The extent of the major Hydrologic Unit Areas (identified by four digit numbers) that make up the MLRA is as follows: Rainy (0903), 53 percent; Western Lake Superior (0401), 45 percent; Mississippi Headwaters (0701), 1 percent; and St. Croix (0703), 1 percent. The surface drainage network in this area is immature. It is made up primarily of remnants of glacial meltwater channels. The major channels are occupied by the Vermilion, Whiteface, and St. Louis Rivers. Many small tributaries drain into Lake Superior from the uplands to the west, including the Lester, Baptism, and Temperance Rivers.

Geology

This area is covered by glacial till, drift, and outwash and by lake sediments, alluvium, and thin layers of loess. These deposits range from only a few inches to several hundred feet in thickness. Bedrock is on the surface or at a shallow depth in many areas. The bedrock formations in this area include Middle Precambrian graywacke and mudstone and their metamorphic equivalents, Upper Precambrian basalts, gabbroic rocks, including the Duluth complex, and Lower Precambrian granitics, metabasalt, and graywacke. Iron ore is mined in this area.

Climate

The average annual precipitation in almost all of this area is 25 to 30 inches (635 to 760 millimeters). It is as much as 33 inches (840 millimeters) at the tip of the “arrowhead.” About 65 percent of the precipitation falls as rain during the growing season (May through September), and about 21 percent falls as snow. The average annual temperature is 36 to 40 degrees F (2 to 4 degrees C). The freeze-free period averages about 150 days and ranges from 120 to 175 days.

Water

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

Public supply—surface water, 8.4%; ground water, 0.0%

Livestock—surface water, 4.2%; ground water, 9.1%

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

Other—surface water, 78.3%; ground water, 0.0%

The total withdrawals average 19 million gallons per day (72 million liters per day). About 9 percent is from ground water sources, and 91 percent is from surface water sources. The numerous lakes and streams are sources of water. The timber and mining industries use most of the surface water that is used in this area. This water is of very good quality and is suitable for most uses.

Ground water occurs in joints, fractures, and bedding planes in the Precambrian crystalline rocks underlying most of this area. This water typically has more than 500 parts per million (milligrams per liter) total dissolved solids and is hard. The median level of iron exceeds the national secondary standard for drinking water of 300 parts per billion (micrograms per liter). This aquifer may be the only source of ground water for domestic use and livestock in most of this area. Volcanic rocks along the shore of Lake Superior also contain ground water. The water in these basalt flows generally has a median level of total dissolved solids of about 200 parts per million (milligrams per liter) and is moderately hard. This aquifer provides water mostly for domestic use and livestock. Naturally occurring areas with very saline water are not used.

Soils

This MLRA is dominated by Entisols, Inceptisols, and Histosols. The soils have a frigid soil temperature regime, a udic soil moisture regime, and isotic or mixed mineralogy. The parent material is dominantly dense loamy till, coarse glacial drift and outwash, silty glaciolacustrine sediment, local loess, alluvium, and organic material. The soils are dominantly shallow or moderately deep in the northern part of the area and very deep in the southern part. They are very poorly drained to excessively drained and are level to very steep. Eutrudepts (Ahmeek, Brimson, Eveleth, Hermantown, Normanna, and Toimi series) formed in till. Dystrudepts (Conic, Insula, and Mesaba series) formed in till over bedrock. Udorthents (Quetico series) formed in loamy and very shallow loamy material over bedrock. Udipsamments (Grayling and Mahtomedi series) formed in sandy outwash. Haplohemists (Rifle and Greenwood series) formed in thick layers of organic material.

Biological Resources

This MLRA makes up the true forested region of Minnesota. Prior to settlement, the vegetation consisted almost entirely of forest communities. The forest types included white pine-red pine forest,

aspen-birch forest, mixed hardwood-pine forest with sugar maple on ridges, and jack pine barrens in the uplands. Conifer swamps or bogs occupied the depressions and areas of outwash. Fire dependence characterizes all of these forest types. This MLRA is still dominantly forested. Much of the land is in public ownership and managed for wood products and recreation. Many areas on uplands support quaking aspen and paper birch. Some scattered areas have old-growth pine stands.

Some of the major wildlife species in this area are white-tailed deer, moose, and ruffed grouse. Because of its relatively unaltered landscape, this MLRA supports a high percentage of the rare plants and animals that occur in Minnesota. Such species include the bald eagle, the Canada lynx, and the eastern timber wolf. The thousands of kettle and bog lakes in this area support populations of common game fish, such as walleye, northern pike, and smallmouth bass. Numerous short, high-gradient streams lead directly from the highlands to the shores of Lake Superior. These cold-water streams support native, sustaining populations of brook trout and rainbow trout and also serve as breeding waters for several species of anadromous fish common to Lake Superior, including steelhead trout and lake trout.

Land Use

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

Cropland—private, 1%
Forest—private, 44%; Federal, 31%
Urban development—private, 2%
Water—private, 10%; Federal, 8%
Other—private, 2%; Federal, 2%

About 75 percent of this MLRA is forested, and nearly all of the forestland consists of county, State, or national forests. Lumbering, iron mining, and recreation are important. The many bodies of surface water in the area provide opportunities for recreation.

The major resource concerns include the water erosion and reduced water quality caused by timber harvesting. They also include management of wildlife habitat and riparian areas. Conservation practices on forestland generally include forest stand improvement and forest trails and landings. These practices reduce the impacts of timber management activities on water quality. Riparian forest buffers help to protect streams and rivers from timber harvesting activities, improve wildlife habitat, and protect water quality.