



Location of MLRA 94B in Land Resource Region K.

## 94B—Michigan Eastern Upper Peninsula Sandy Drift

This area is in Michigan (83 percent) and Wisconsin (17 percent). It makes up about 9,810 square miles (25,425 square kilometers). The cities of Shawano, Keshena, Pembine, and Wausaukee, Wisconsin, and Menominee, Iron Mountain, Escanaba, Manistique, St. Ignace, Newberry, Seney, Grand Marais, and Sault Ste. Marie, Michigan, are in this MLRA. Interstate 75 terminates in Sault Ste. Marie, and U.S. Highways 2 and 41 cross most of the area. The Menominee and Bay Mills Indian Reservations are in the parts of the area in Wisconsin and Michigan, respectively. The Hiawatha National Forest, parts of the Copper Country, Escanaba River, and Lake Superior State Forests in Michigan, and the Nicolet National Forest in Wisconsin also occur in the area. Most of this area is in the part of Michigan known as the “Upper Peninsula.” Mackinac Island is included in the area, and part of the Mackinaw State Forest is on the island.

### Physiography

Most of this area is in the Eastern Lake Section of the Central Lowland Province of the Interior Plains. The western one-fifth is in the Superior Upland Province of the Laurentian Upland. The area has many glacial landscape features and is dissected by numerous streams and rivers. It is characterized by a mixture of low-relief ground moraines, lacustrine deposits, and glaciofluvial deposits and some higher relief, bedrock-controlled moraines in the extreme southwest part. Elevation ranges from 580 to 1,400

feet (175 to 425 meters). Local relief is mainly 25 feet (8 meters) or less, but some hills and drumlins rise more than 165 feet (50 meters) above the adjacent lowlands.

The extent of the major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA is as follows: Northwestern Lake Michigan (0403), 46 percent; Northeastern Lake Michigan-Lake Michigan (0406), 21 percent; Southern Lake Superior-Lake Superior (0402), 20 percent; Northwestern Lake Huron (0407), 10 percent; and Southwestern Lake Huron-Lake Huron (0408), 3 percent. Numerous rivers drain this MLRA. The Oconto, Peshtigo, and Menominee Rivers in Wisconsin and the Escanaba, Ford, Whitefish, and Manistique Rivers in Michigan empty into Lake Michigan. The Two Hearted, Sucker, and Tahquamenon Rivers in Michigan drain into Lake Superior, and the Munuscong, Carp, and Pine Rivers drain into Lake Huron. The Pine and Pike Rivers are National Wild and Scenic Rivers, and the Wolf River is a National Scenic River in the part of this area in Wisconsin. The Two Hearted River in Michigan is a National Wild and Scenic River. This MLRA has a significant percentage of wetlands.

### Geology

This area is covered about equally with glacial lake plain, till, and outwash deposits. The underlying bedrock is dominantly Silurian, Ordovician, or Cambrian sandstone or limestone bedrock types that are quarried extensively for building materials, steelmaking, and agriculture. Some granitic rocks and metamorphosed sediments and volcanics underlie the western edge of this MLRA.

### Climate

The average annual precipitation in most of this area is 30 to 36 inches (760 to 915 millimeters) but is as low as 28 inches (710 millimeters) in some areas. About two-thirds of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. Snow is common in the winter. The average annual temperature in most of this area is 39 to 42 degrees F (4 to 6 degrees C), but it can be as high as 44 degrees F (7 degrees C) in the extreme southern tip of the area, near Menominee, Wisconsin. The freeze-free period averages about 150 days and ranges from 120 to 180 days. It is longest in the southern end of the area and in a narrow belt along Lake Michigan. The Great Lakes help to moderate

the climate of this MLRA.

### **Water**

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

Public supply—surface water, 39.1%; ground water, 24.7%

Livestock—surface water, 2.3%; ground water, 5.4%

Irrigation—surface water, 2.7%; ground water, 4.1%

Other—surface water, 13.6%; ground water, 8.1%

The total withdrawals average 37 million gallons per day (140 million liters per day). About 42 percent is from ground water sources, and 58 percent is from surface water sources. Many small lakes, a few large lakes, and numerous perennial streams are sources of good-quality surface water in this area.

Ground water is abundant in the unconsolidated sand and gravel and lakebed sands in the glacial deposits that cover almost all of this area. No glacial deposits are used as aquifers in the far eastern tip of the area. The highest yielding wells are in the outwash deposits within the drift, but some domestic water also is pumped from glacial lake sediments and the till itself. This water is suitable for almost all uses with little or no treatment. The median level of total dissolved solids is about 200 to 250 parts per million (milligrams per liter). Glacial drift covers the bedrock aquifers in this area and helps to protect them from contamination. Agricultural activities, municipal and industrial waste discharges, and road salts are the primary sources of contamination.

Three bedrock aquifers, Silurian-Devonian sediments, Cambrian-Ordovician sandstone and dolomite, and Precambrian sandstone, occur in the part of this area in Michigan. The Cambrian-Ordovician sandstone extends south and west into the part of the area in Wisconsin. The water in these bedrock aquifers is similar in quality to the water in the glacial aquifers, but it has slightly more total dissolved solids. It tends to be fresher where the glacial aquifers are in contact with the bedrock aquifers and are recharging the water in the bedrock aquifers. Water from the bedrock aquifers is of good quality and is suitable for almost all uses.

### **Soils**

The dominant soil orders in this MLRA are Alfisols, Entisols, Histosols, and Spodosols. The soils in the area dominantly have a frigid soil temperature

regime, an aquic or udic soil moisture regime, and mixed or isotic mineralogy. They are shallow to very deep, excessively drained to very poorly drained, and sandy to clayey.

Hapludalfs formed in loess over outwash (Nadeau series) on outwash plains, valley trains, and kames and in till or loess over till (Emmet and Onaway series) on till plains, moraines, and drumlins. Glossudalfs formed in till (Pemene, Frechette, Kennan, Ellwood, Crossett, and Oconto series), in till over outwash (Perote series), and in sandy deposits over till (Rabe series) on till plains, moraines, and drumlins. Haplorthods formed in sandy glacial deposits on outwash plains, valley trains, and moraines (Kalkaska, Mancelona, Croswell, Au Gres, and Rubicon series) and in till or loess over till (Trenary, Tilleda, Charlevoix, Greylock, and Shoepac series), sandy deposits over till (Menominee and Iosco series), till over limestone bedrock (Amadon, Longrie, and Reade series), sandy deposits over igneous bedrock (Ishpeming series), and sandy eolian deposits (Rousseau and Eastport series) on dunes and lake plains. Udipsamments formed in sandy eolian deposits on dunes and lake plains (Shawano series) or in sandy outwash on outwash plains, valley trains, and moraines (Menahga series). Haplosaprists (Carbondale, Cathro, Lupton, Markey, and Tawas series) formed in organic material in depressions on lake plains, outwash plains, and till plains.

### **Biological Resources**

The soils on uplands in this area support natural stands of mixed northern hardwoods and pine. Sugar maple, oak, white ash, elm, yellow birch, white pine, jack pine, red pine, and American beech are the principal tree species. Lowland areas support both mixed hardwoods and conifers. Elm, soft maple, black ash, black spruce, tamarack, and northern white-cedar are the major species

Some of the major wildlife species in this area are white-tailed deer, black bear, red fox, raccoon, muskrat, cottontail rabbit, snowshoe hare, squirrel, pheasant, ruffed grouse, woodcock, mallard, blue-winged teal, and wood duck. Fishing occurs in Green Bay, Lake Michigan, Lake Huron, streams, inland lakes, and rivers. The species of fish in the area include lake trout, rainbow trout, brook trout, walleye pike, largemouth bass, smallmouth bass, bluegill, black crappie, yellow perch, and northern pike.

## Land Use

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

Cropland—private, 3%

Grassland—private, 3%; Federal, 1%

Forest—private, 67%; Federal, 16%

Urban development—private, 3%

Water—private, 2%; Federal, 1%

Other—private, 4%

More than 80 percent of this MLRA is forested, and about 80 percent of the forestland is privately owned.

The part of the MLRA in Michigan is about three-fourths forestland and one-fourth cropland. Feed grains and hay are the chief crops. Much of the grain is fed to dairy cattle and other livestock on the farms where it is grown. Fruits and other specialty crops also are important. The rest of the land in farms is about equally divided between pasture and farm woodlots. Recreation is an important land use, especially along the major streams and on sites bordering Green Bay and Lake Michigan.

The major soil resource management concerns are water erosion, excessive soil wetness, soil fertility, and soil tilth. Conservation practices on cropland generally include crop rotations, conservation tillage systems (especially no-till systems), contour farming, contour stripcropping, and grassed waterways. A combination of surface and subsurface drainage systems is needed in most areas of poorly drained soils.