

Section 2

Western Upper Peninsula Forest History

As the climate cooled during the most recent ice age and glaciers expanded south, forest communities moved ahead of the glaciers. When the climate warmed again and the glaciers retreated north, a new landscape was exposed and the complicated pattern of rocks, gravel, soil and water left behind by the glaciers provided a foundation for our contemporary Michigan forests. Not all species recolonized at the same rate – refuge location, seed size, germination requirements, competitive ability and dispersal vectors affected how species responded to the changing climate. Spruce and tamarack were likely the first, soon after the ice sheets receded 10,000-12,000 years ago, followed closely by balsam fir, jack pine, red pine and then white pine. Oak and maple were slower to move, not reaching the northern Lower Peninsula until around 9,000 and 6,000 years ago, respectively. The most recent major forest species to colonize northern Michigan appears to be hemlock. Over thousands of years, forested natural communities formed and re-formed across Michigan, influenced by local geology, soils, hydrology and climate. Fluctuations in climate were reflected by changes in the forest communities, including the advance and retreat of the prairie-forest border, with grassland and savannah occasionally entering Michigan. By the early- to mid-1800s, around 95% of Michigan's vegetation is estimated to have been forest. Many boreal wildlife species, such as Canada lynx and woodland caribou were found statewide. Southern wildlife species, such as Virginia opossum, were entirely absent from the region.

Like the Native Americans before them, early European activities had a nominal impact on the landscape. The first Europeans focused primarily on exploration, military endeavors, missionary work and the fur trade. Their relatively small settlements had a limited, localized impact on the landscape primarily through the extraction of game, nuts, berries and timber for building materials. Until the 1840s, the primary economic activity and the first ever transcontinental-business endeavor was the commercial fur trade. The impact of future settlers was not as benign. The 1800s brought an intensification of settlement, land clearing for farming, intensive timber harvesting and the introduction of mining which changed both forest extent and composition. These activities profoundly impacted the region's economy, hydrologic features and forest landscape and ultimately the array of plants and animals that occupied the region. Although western Upper Peninsula forests have been modified, the forests have not experienced the widespread conversion to non-forest types, agriculture or urban development that most of Michigan and the rest of the Great Lakes region has experienced.

During the early 1800s, major land purchases and various treaties resulted in vast tracts of federally owned land. The responsibility for disposal and settlement of these lands rested on the Commissioner of Public Lands and the General Land Office. Before land could be disposed of, a survey was needed to divide the land into townships and sections. Surveys were conducted in the territory and state of Michigan from 1816 to 1856 by deputy surveyors of the General Land Office. As part of township and section boundary establishment, surveyors established and recorded witness trees, recorded specific trees along section lines (on average, eight to 12 trees per section) and often noted summary information along section lines including tree species (ranked by relative abundance) and general soil character. In addition, recently burned areas, wind throw and beaver floodings were recorded along section lines, as were various cultural features, of either Native American or early European settler origin (Comer et al., 1995).

Ecologists from the Michigan Natural Features Inventory developed a methodology to translate General Land Office notes into a map useful to researchers and land managers. Based on these maps, the most common forest types in the western Upper Peninsula prior to significant European settlement included hemlock-sugar maple, lowland conifer swamp and sugar maple-yellow birch-fir (Figure 2.1). Fir-spruce-cedar swamp, beech-sugar maple and hemlock-yellow birch made up the next most common cover types on the landscape (Figure 2.1). Documented primary forest disturbances included wind throw and wildfire. Wind throw was common on both upland hardwood and conifer forests. Wildfire was important in the jack pine, red pine and white pine dominated forests; but, it also occurred infrequently in hardwood forests mainly as understory burns.

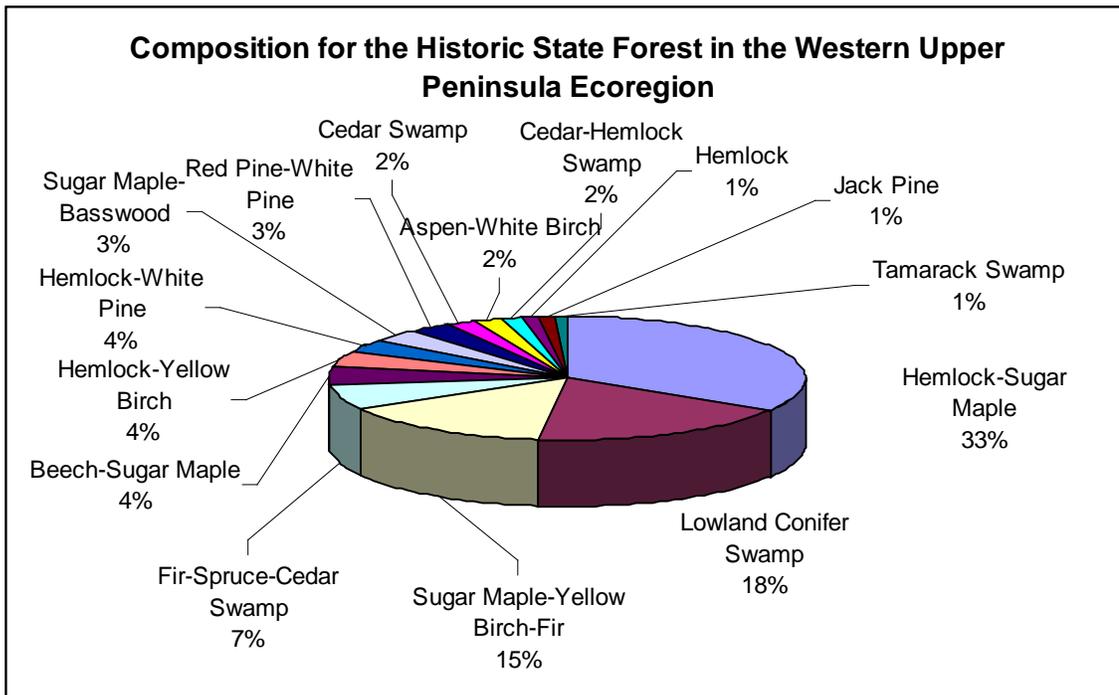


Figure 2.1. Historic state forest cover types in the western Upper Peninsula forested landscape based on General Land Office interpreted data (Michigan Natural Features Inventory, 1995).

Figure 2.1 shows that the historical state forest of the western Upper Peninsula was dominated by conifer species and primarily by upland conifer. The current state forest is still dominated by upland forest; but, the upland forest is dominated by deciduous species (Figure 2.2) and lowland forest has also become dominated by deciduous species. The historic forest on state forest land was dominated by late successional forest conditions (Figure 2.3). While late successional forest conditions on the current state forest still represent a large portion, the early successional conditions have more than doubled since historic times (Figure 2.3) and now are equal in size to the late successional forest area. This is consistent with the harvest history and the desire to maintain early successional habitat for white-tailed deer, ruffed grouse and woodcock.

After exhausting forests in the northeastern U.S., the demand for building materials caused logging activities to move westward. The surveying of Michigan's Upper Peninsula between 1840 and 1856 by the Federal Government's General Land Office led to the European discovery, subsequent speculation and harvesting of Michigan's extensive forests. During the past 150 years, logging has had a profound impact on the western Upper Peninsula economic, cultural and forest landscape.

White pine logging began in Michigan in the 1830s and reached its peak in the Upper Peninsula in the 1890s. By 1910, virtually all merchantable pine in areas with high-pine concentrations had been cut or destroyed by fire. The removal of Michigan's historic pine forests provided an economic return a billion dollars larger than California's gold rush; but, the western Upper Peninsula contribution was limited to approximately 11% of the state total. Unlike other Michigan ecoregions, the western Upper Peninsula landscape was dominated by northern mesic forest of which white pine was a component. The initial "pine" harvest was quite concentrated because lacked vast pine forests. As a result, the western Upper Peninsula does not have the legacy of extensive stump pastures left after the pine was harvested. Typically white pine harvests resulted in second growth forests in the western Upper Peninsula.

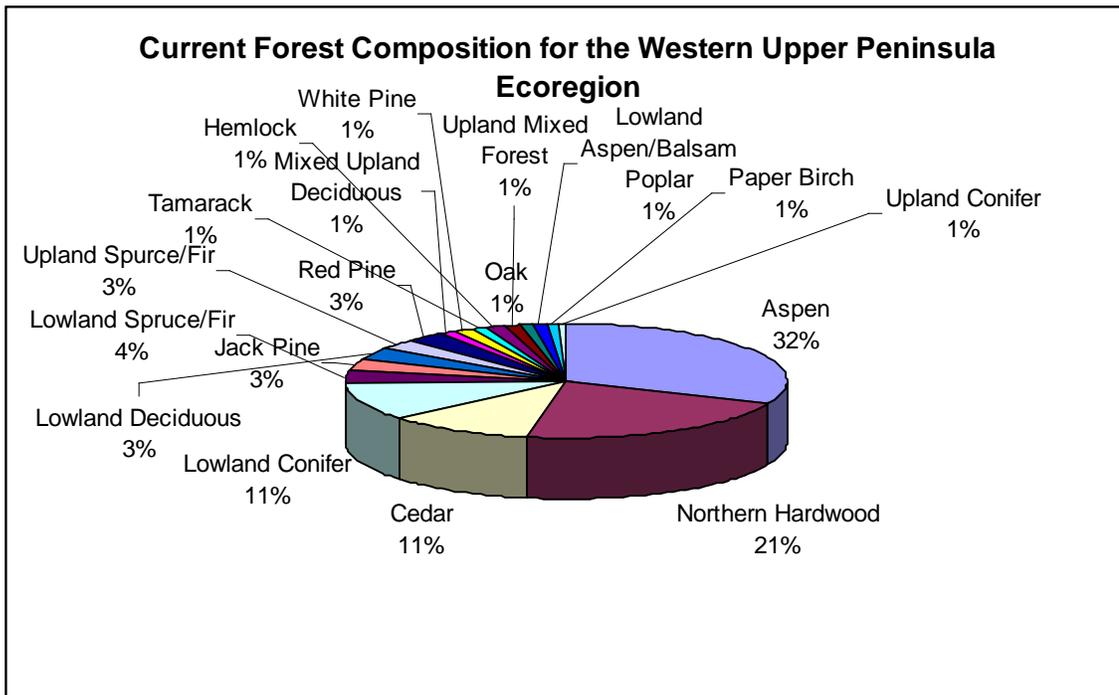


Figure 2.2 Current state forest cover type composition in the western Upper Peninsula ecoregion (2012 Department of Natural Resources inventory data).

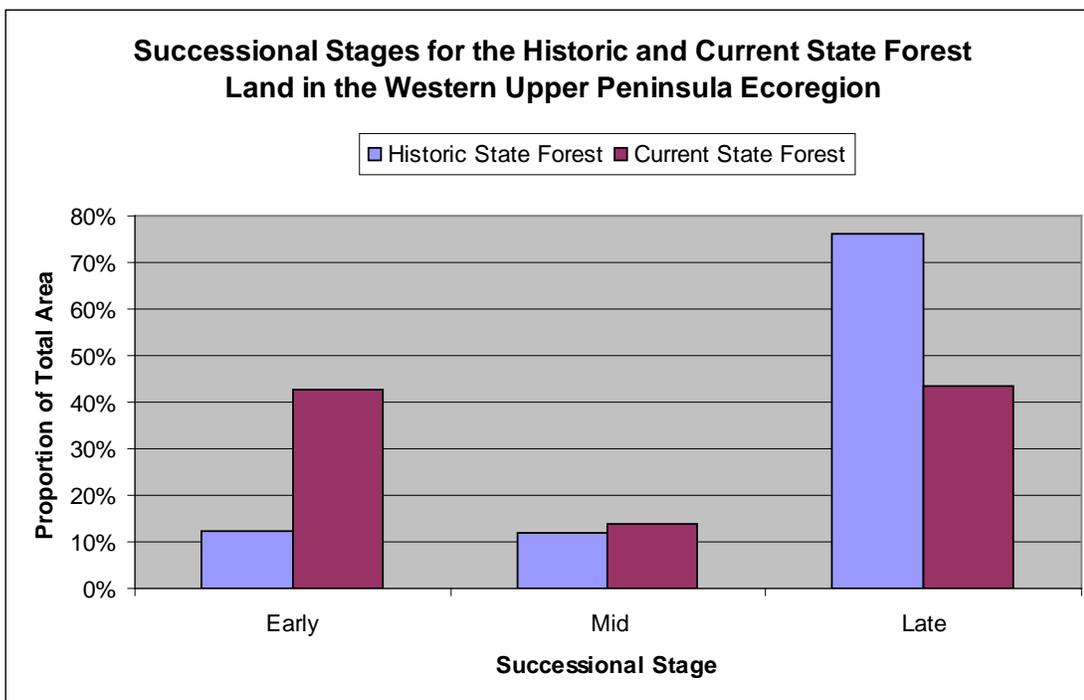


Figure 2.3. Comparisons of successional stages for state forest in the western Upper Peninsula between the historic conditions and the current conditions (Michigan Natural Features Inventory, 1995 and 2012 Department of Natural Resources inventory data).

Few roads and no railroads existed in the western Upper Peninsula throughout much of the 1800s, thus water provided the best means of transporting felled logs to a mill. Initially, pine was harvested from near the Lake Superior shoreline and square timber was exported to Europe for ship building. Prior to railroads, 90% of mills were sited at the mouths of large tributaries and the Great Lakes provided the medium for shipping finished products to expanding timber markets. The impact of the white pine era was generally limited to within 5-10 miles of the rivers and more than 65% of the western Upper Peninsula harvest came from the Menominee, Escanaba, Ford and Sturgeon rivers and their tributaries. Early sawmills were located in L'anse, Baraga, Pequaming and a number in Marquette.

The first major U.S. mining boom began in Michigan's western Upper Peninsula in the 1840s and mining has played a significant role in shaping the region's culture, economy and natural landscape ever since. To date, mining efforts in the region have focused primarily on iron ore and copper, though silver and gold have also been mined. The region still has an abundant mineral wealth. In terms of copper, only 10% of the resource has actually been extracted. Michigan's copper range, the greatest deposit of native copper in the world, extends in a narrow band from just south of Ontonagon to the tip of the Keweenaw Peninsula (Figure 2.4). The Keweenaw copper range was the nation's largest producer of copper from 1847 to the 1880s and a significant contributor to both the regional and state economy. From the 1840s to the 1960s, more than 11 billion pounds (worth \$440 billion in today's dollars) of copper were shipped from the Keweenaw Peninsula and responsible for significant increases in the settlement and development of the peninsula during the 1800s. The discovery of inexpensively extracted surface copper deposits in the western U.S. led to the decline of Keweenaw Peninsula mining and ultimately populations.

The first European discovery of Great Lakes iron ore occurred in 1844 when a surveying party's compass readings began to fluctuate wildly at the site of the present city of Negaunee. Iron ore deposits and mining in Michigan have essentially been restricted to three major ranges, the Menominee, Gogebic and Marquette (Figure 2.4) though the Menominee and Gogebic ranges have essentially closed to mining.

Mining activities have also left significant marks on the western Upper Peninsula landscape. Copper and iron ore are typically separated from extracted rock locally prior to transporting long distances. Keweenaw copper deposits are incredibly pure and were separated by crushing the ore in large stamp mills. A byproduct of the process was crushed basaltic lava or black "stamp sands" that were discarded around the Keweenaw Peninsula, often covering natural Great Lakes shorelines and local streams. Iron ore stamping has also produced vast amounts of "waste" rock that has been deposited in tailings that often disrupt local ecological systems including wetlands and streams.

Large amounts of timber were used by mines to provide shaft supports, construct commercial and residential mine buildings and provide heat. The local smelting of iron ore had a huge impact on the forest resource occurring either at furnaces near mines or along the great lakes shoreline. Smelting was an energy intensive process with some western Upper Peninsula furnaces estimated to have burned about 30 acres of hardwood timber a day. Unlike iron ore, copper was not smelted and therefore vast tracts of hardwood in the Keweenaw were not liquidated to provide smelting charcoal during the short period of the mining boom.

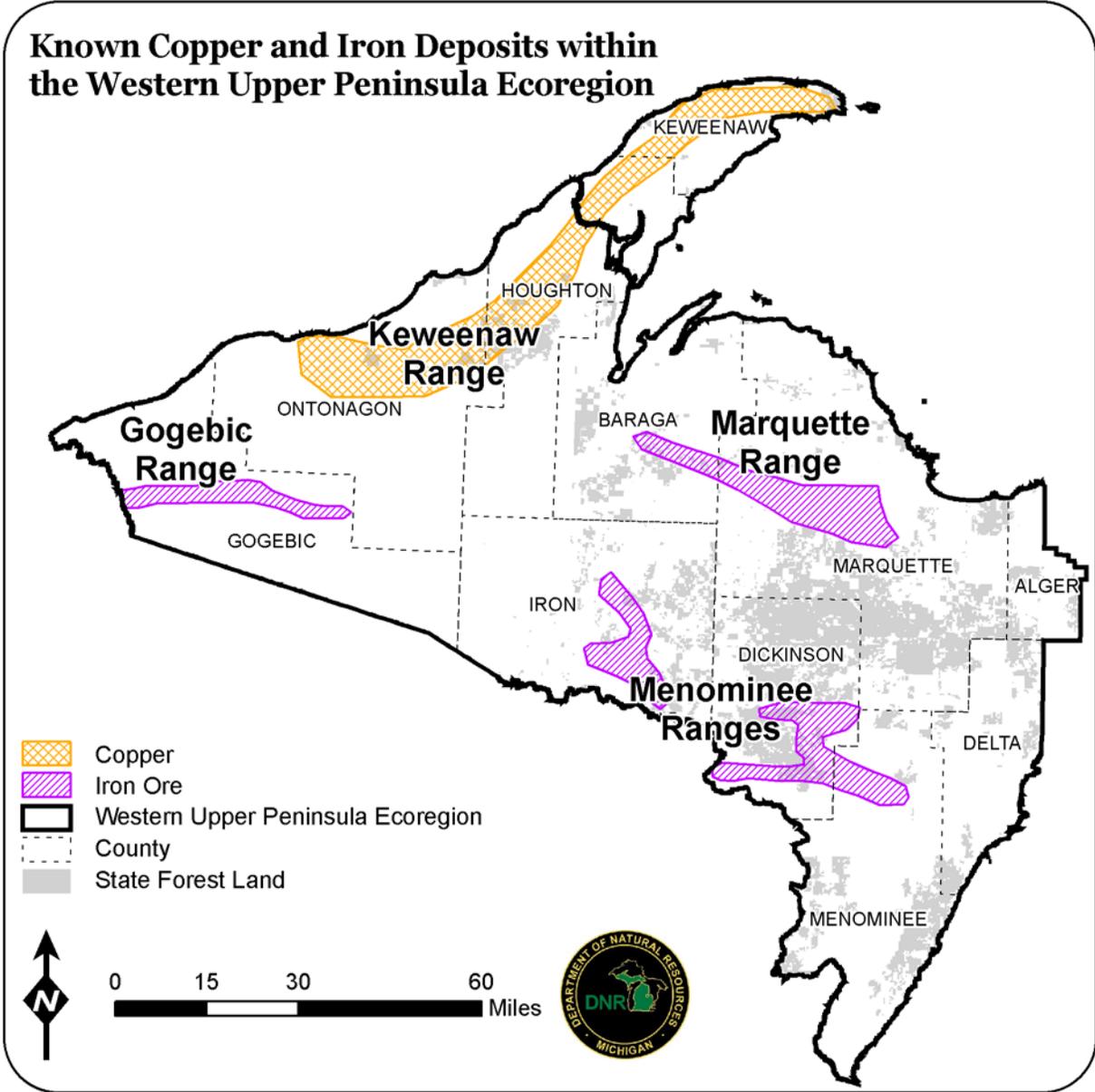


Figure 2.4. A map of the western Upper Peninsula ecoregion showing the location of known iron ore and copper deposits.

Agricultural potential in the western Upper Peninsula is limited due to the climate and soil. Settlers who attempted farming in this harsh agricultural environment often gave up or coalesced to regions with more fertile soils and suitable climates. The present agricultural landscape is portrayed in Figure 2.5 which identifies land-type association units containing greater than 10% agriculture. Unlike other parts of the state, agriculture in the western Upper Peninsula has had very little impact on forest cover.

With the white pine resource declining significantly, lumber barons began to look for greener pastures in the late 1800s and early 1900s. Some looked west for virgin pine forest and sold their lands; or, allowed them to revert back to the state for non-payment of taxes. Others remained in Michigan and shifted their focus to hardwoods and other remaining softwoods, taking advantage of new technologies for harvesting and transporting trees. Across the landscape, this was a gradual process, thus the “hardwood” period is more difficult to define relative to the pine era. Locally, this shift occurred more rapidly as the pine resource was depleted and railroads became available.

Agriculture Land Use within the Western Upper Peninsula Ecoregion

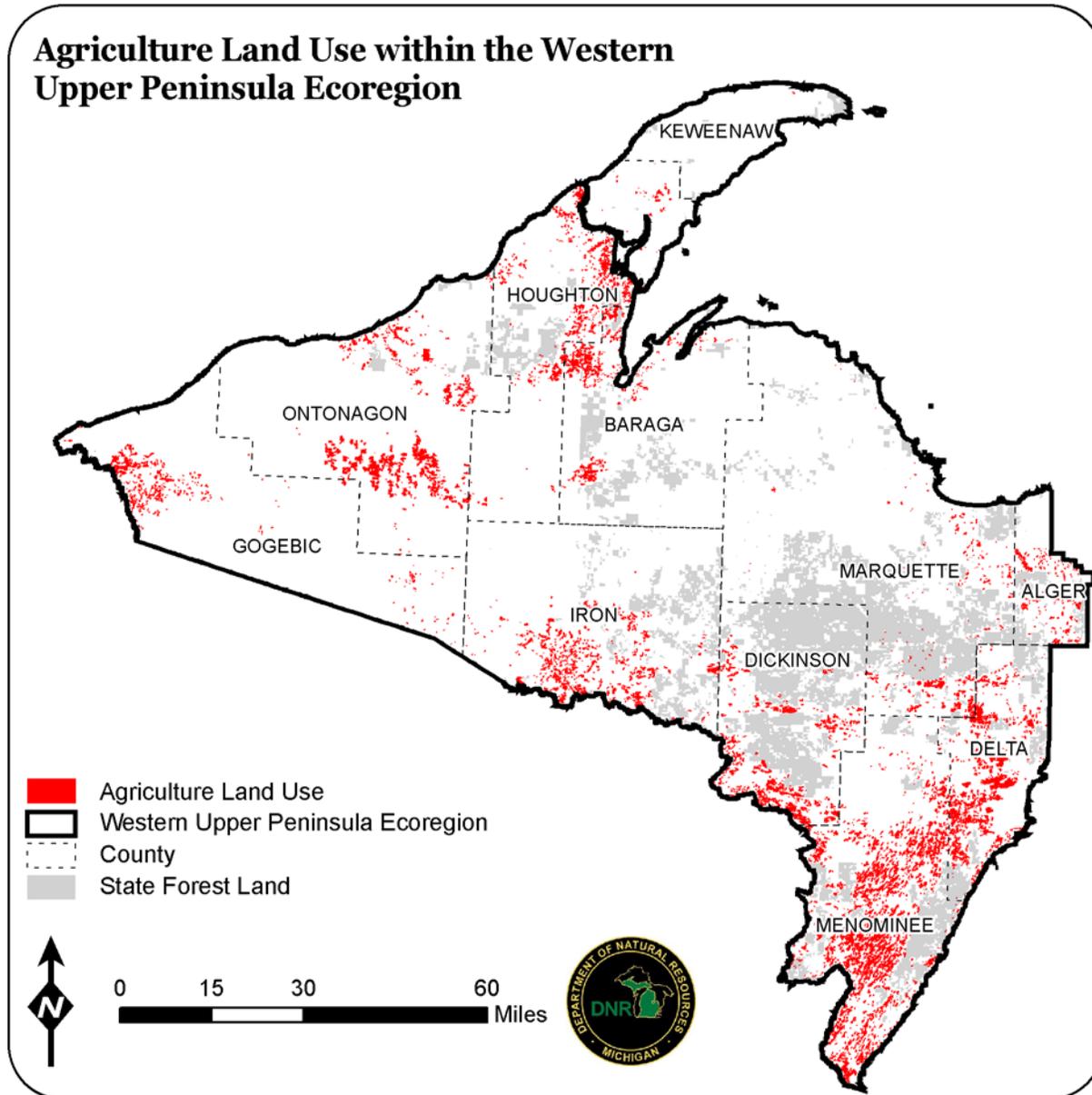


Figure 2.5. A map of the western Upper Peninsula ecoregion showing the land-type associations with greater than 10% agricultural land-uses.

Coarse-grained, splintery hemlock was initially considered to be of little utility as a building material; but, would ultimately be used for mining timbers, railroad ties, rough construction lumber and pulpwood. Once derivatives from hemlock bark were identified for their use in processing animal hides into leather, hemlock were harvested often leaving the wood in the bush to rot. Tanneries were initially placed in close proximity to these hemlock forests because hemlock was so common in northern Wisconsin and the western Upper Peninsula and transportation networks were not nearly as developed as they are today. During the late 1800s and early 1900s with improvements in the transportation network, the tanning industry became increasingly concentrated in Milwaukee along with a corresponding increase in the pressure to harvest hemlock until alternative tanning chemicals were identified in the 1920's. Hemlock changed from being one of most common trees to a very uncommon species in less than a century.

The first railroad in the Upper Peninsula was built in 1857 and was used for moving iron ore from Negaunee to the Marquette harbor. Railroads in Michigan generally gained prominence in the forest industry during the last 30 years of the century; but, it was not until the 1930s that railroads were widely used in the Upper Peninsula for lumber products.

Railroads transformed the timber industry and played a significant role in the transformation of the western Upper Peninsula's social, economic and ecological landscape. Areas that were untouched due to their distance from a "navigable" river could now be cut and all species of trees (hardwoods, softwoods and small pitch pine) could now be

harvested and transported to markets regardless of the weather, season or whether there was daylight outside. As a result, companies increased their annual log output by 10 times previous levels.

Railroads were extended from mills into areas with timber. Once the timber was harvested camps and lines were moved or extended to areas not previously harvested. Mills were no longer restricted to being located on Great Lakes river mouths by transportation limitations. This allowed for the establishment of company towns which could be located closer to timber resources.

New markets and uses for wood such as pulp, veneer, charcoal, hardwood flooring and chemical derivatives from waste materials, meant that mills would increase in complexity in order to process the variety of species coming from mixed-hardwood forest and the diverse array of products produced relative to the pine era. Mills increased in complexity; became more expensive; and the capital required to purchase land, harvest and transport timber and finished products corresponding increased. This precipitated a shift toward corporate ownership of mills and the lands that supplied them during this period.

The impact on the landscape varied across ownerships based on different management practices, local needs and the existence of a transportation network. Some companies purchased large acreages and clearcut most of it. After the product was removed, the cut-over lands became a liability and many companies moved on. Some advertised the cleared land for sale as "prime farm land." By the 1990s, companies, being influenced by science and public and government pressure, moved towards sustained yield forestry practices and developed long-term objectives with an interest in sustainability.

By the 1930s, early timber harvest and wildfires had caused the conversion of vast amounts of coniferous and mixed hardwood forests to early successional forests of aspen and paper birch. Timber markets for these early successional trees were weak despite a few small pulp mills that used leftover pine and hardwood to make pulp.

The maturing of these abundant early successional forests lead to shifts in market demand for pulpwood and aspen become a sought after commodity by an increasingly specialized forest product industry. Initially, western Upper Peninsula aspen went primarily to mills in the Fox River valley and central Wisconsin. In the 1970s and 1980s technology made it easier to use a greater variety of tree species and several large capacity pulp and chipboard mills were built in the ecoregion. Bark no longer had to be peeled off aspen before delivery for processing at local mills, aspen could be used in a wider variety of products (e.g., shredded packing, boxes and pallets) and aspen demand within the region increased significantly. Aspen remains in high demand with regional pulpwood prices fetching some of the highest prices in the country. Although the aspen resource has declined since the 1950s, it remains the most common cover type in the western Upper Peninsula ecoregion. Aspen also provides habitat for highly desired game species and associated recreational opportunities.

With the demand for fiber being high and businesses competing for market share, some paper companies within the region have converted portions of their slower growing hardwood lands to faster growing species. Conversion has been to species such as red pine (*Pinus resinosa*), aspen (*Populus* spp.) or non-native species such as European larch (*Larix* spp.). Conversion to these types has created a patchier landscape in terms of cover type. There has also been a recent shift in mill and land ownership within the region. Most mills have divested their timber lands, which in some instances have changed hands several times over the last five years, resulting in a more complex landscape ownership pattern.

Values have changed as well. An economy of recreational pursuit developed around early successional wildlife species that were able to spread north with the changing forest conditions. The most important of these are white-tailed deer, ruffed grouse and woodcock. The regeneration of historic forest conditions is neither possible nor desirable from an ecological, social or economic perspective. The management challenge is to maintain or enhance the current conditions without losing elements associated with old forests that are still present on the landscape. The current condition of the state forest land is described in more detail in Section 3 of this plan.