

Chapter 4 - Natural Resources

The woodlands, open spaces, wildlife, water, and rolling hills are several key resource values that draw people to both recreate and live in the Township. Abundant public lands offer access to thousands of acres of recreational lands for hunting, hiking, wildlife viewing and snowmobiling. Several small lakes and the Au Sable River provide opportunities for fishing, boating and water sports. The Mason Tract is clearly center piece of the Township.

A rural landscape, abounding with views of forestlands and wetlands, typifies the community character of South Branch Township. Forestlands are important to the local economy; recreational use and production of forest goods bring dollars into the Community. Many long time visitors decide to move to the area upon retirement. These renewable yet priceless resources warrant special considerations when planning for future growth.

The protection and wise use of these natural resources are central to maintaining a sustainable community. Along with planning for the built-up infrastructure like roads and utilities, a community needs to plan for the green infrastructure; the forests, wetlands, farmland and water. Development, without consideration of carrying capacity of the land, can have long term negative impacts on the resources. When planning for future growth, the community must identify environmental constraints, such as wetlands, steeply sloped areas, ecological corridors and ground water recharge zones. This chapter will analyze the physical environment to assist local officials in developing a desired future of the Township. Natural resources addressed include climate, geology, topography, soils, water, vegetation and wildlife.

Climate

The climate is yet another reason why people are drawn to the area. Typical of northern Michigan, the distinct four seasons offer an ever-changing landscape. Long snowy, cold winters; and moderately warm summers are separated by a cool, green spring and a cool colorful fall. Located in the north central part of the northern lower peninsula, the Township is approximately 50 miles inland from Lake Michigan and 65 miles inland from Lake Huron. Given this geographic location, with the exception of lake effect snowfall, the weather is not significantly influenced by the lake moderating effect of both Great Lakes.

According to the USDA Soil Survey of Crawford County, the average annual precipitation is 31.95 inches (includes water equivalent of snowfall). Precipitation is heaviest during the summer months with 62 percent of the annual precipitation from April through September. The average annual snowfall is 92.9 inches. Records show a long term average of 127 days or 1/3 of the year, there is at least one inch of snow on the ground. Of course, the number of days varies greatly from year to year. The average daily temperature ranges from 67.5 °F for the Month of July to 17.7 °F during January. The average mid-afternoon relative humidity is 63 percent. Since humidity levels are highest at night, the average relative humidity at dawn is 85 percent.

Geology

The rolling hills, river valleys, swamps and lakes were created by glacial activity as the last continental glacier left the landscape some 12,000 years ago. Beneath a thick mantle of the glacial deposits lays a foundation of layered sedimentary bedrock. This section will describe the glacial landforms or quaternary geology and the underlying bedrock geology.

Starting some 2 million years ago, during the Pleistocene era, continental glaciers formed in the Hudson Bay area. Several times, over this two million year period, the massive sheets of ice built up and inched their way south across what is today Michigan. The massive ice sheets, more than one mile thick, advanced in a southerly direction, bulldozing their way across the landscape. The glacier pushed material in front of it, incorporated rocks and soil into the debris laden ice; and scraped, ground and broke apart the sedimentary bedrock of the Michigan Basin.

Each advance and retreat of the continental glaciers took tens of thousands of years. This reoccurring process shaped and reshaped the land; obliterating and then creating hills, valleys, rivers and lakes, swamps and marshes. The last glacial period, called the Wisconsin era, created the landscape we know today. The glacier left behind boulders, rocks, cobble, sand, gravel, silt, clay and loam. In some areas the material was deposited in unsorted masses called till plains, ground moraines and end moraines. Water flowing from the melting glaciers also sorted materials, creating outwash channels, sand deltas, kames and eskers. Fine materials, captured in the fast moving glacial meltwater, settled to the bottom of expansive glacial lakes creating lacustrine clay and silt plains. **Figure 4.1** shows the formation of glacial landforms.

According to the USDA Crawford County Soil Survey, South Branch Township consists of nearly level to gently sloping plain that is interrupted by a series of high kame moraines. Much of the gently sloping plain is over washed with sand. The kame moraines have a general east-west orientation. Some of the highest elevations in the county and township are found on these moraines. There two small postglacial lake plains in the southern parts of the township.

During some periods the continental glacier's advance and retreat stagnated, that is to say, the ice at the face of the glacier melted as fast as it advanced south from the polar ice cap. The debris laden, glacial ice then deposited large amounts of materials in one locale. Acting like a large conveyer belt, the materials piled up at the front of the glacier forming moraines or glacial hills.

At the front of the massive retreating glaciers, large streams originated from the melting ice. The debris laden water carved through moraines creating wide drainageways and outwash channels. The Au Sable River and Manistee River further to the west are located in the glacial drainageways. These areas are dominated by sands and organic muck soils.

As the continental glaciers melted, huge blocks of ice became separated from the retreating ice front. The ice blocks became embedded in the glacial debris deposited by the retreating glacier. The embedded ice blocks eventually melted and left depressions (kettle holes) which are today's inland lakes, associated wetlands and bogs. Kellogg Lake, Hiscock Lake, West Lake, Hunters Lake, and Conner's Marsh were created by this process.

Beneath the glacial deposits, some 200 to 300 feet below the surface, is sedimentary bedrock that was created during the Late Mississippian ages of the Paleozoic Era. The bedrock was formed in ancient seas, which covered the area some 310- 345 million years ago. The shallow marine seas deposited layers of silt, clay, sediments, marine animals, plants, coral, and other calcareous materials. These deposits formed shale, sandstone and limestone bedrock.

According to the 1987 Bedrock Geology of Northern Michigan map, prepared by the Geological Survey Division of the Michigan Department of Environmental Quality, the upper layer of bedrock is Coldwater shale. Other bedrock formations beneath the glacial overburden include the Michigan Formation and Marshall Formation. Natural gas deposits have been discovered in the Michigan and Marshall formation. Recent proposals to explore for gas adjacent to the Mason Tract have caused concerns with many groups. Concerns are the proposed drilling and associated road widening, flow line/pipeline burying, and constructed facilities (if needed) would reduce the quality of the outdoor recreation experience of visitors to the Mason Tract. The US Forest Service completed an Environmental Assessment in the fall of 2004 and authorized drilling adjacent to the Tract. The authorization is being appealed.

Topography

South Branch Township is dominated by nearly level to gently sloping plains that is interrupted by a series of high kame moraines. The moraines consist of steeply sloping hills that have an east-west linear orientation. The highest elevations are found at the tops of these kame moraines with elevations ranging from 1,300 to 1,480 feet above sea level. Land elevations are higher in the southern part of the township with a gradual drop in elevation in a northeasterly to southerly direction. The direction of the flow of water in the rivers is evidence of this general gradient to the north and east.

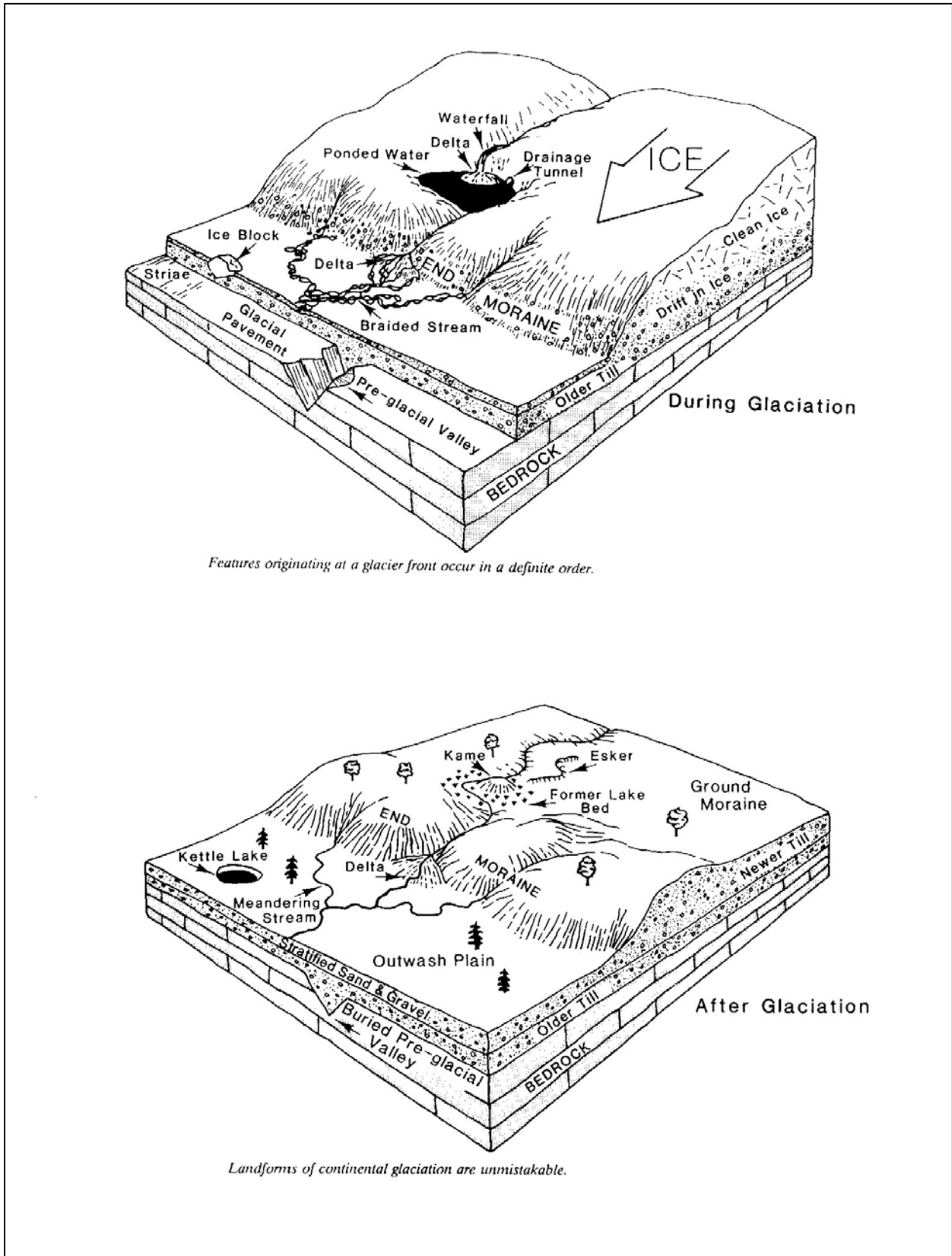
The highest point in the Township is in Section 36 of T.25N. – R.1W. with elevations in excess of 1,480 feet above sea level. The lowest elevation of 1,010 feet above sea level, noted on USGS quadrangle maps, is located in the northeastern corner of the Township where the main branch of the Au Sable River flows eastward towards Mio.

Soils

When planning for types and intensity of future land uses, soil types and slopes are two important factors that determine the carrying capacity of land. The construction of roads, buildings and septic systems on steeply sloped areas or areas with organic and hydric soils require special design considerations. In addition, costs for developing these sensitive areas are greater than in less constrained parts of the landscape. If developed improperly, the impacts to natural resources can be far reaching.

The Natural Resource Conservation Service completed a detailed soil survey of Crawford County. A digital or computerized version of the soil survey maps was acquired from the Michigan Department of Natural Resources, MIRIS program. Using information contained within the published soil survey book, a series of maps are presented that depict hydric soils, steep slopes, soils with building limitations and soils with septic system limitations.

**Figure 4.1
Glacial Landforms**



Hydric Soils and Steeply Sloped Areas

Figure 4.2 is a color thematic map that classifies hydric soils and soils on steep slopes. Lower density and less intensive development should be directed to these areas with severe building constraints. Hydric soils are saturated, flooded or ponded during part of the growing season and are classified as poorly drained and very poorly drained. Hydric soils have poor potential for building site development and sanitary facilities. Wetness and frequent ponding are severe problems that are difficult and costly to overcome. Sites with high water tables may be classified as wetlands and a wetlands permit would be required to develop these areas.

Less than ten percent of the Township's surface area is mapped as hydric soils with a high potential for wetlands. The hydric soils are mainly located adjacent to streams and lakes. The largest concentrations are found in the central portions and northern portions of the community. Note the green areas or hydric soils are typically drained by creeks and streams that in turn empty in the Au Sable River. This connectivity of riparian wetlands and surface water features can be seen throughout the landscape.

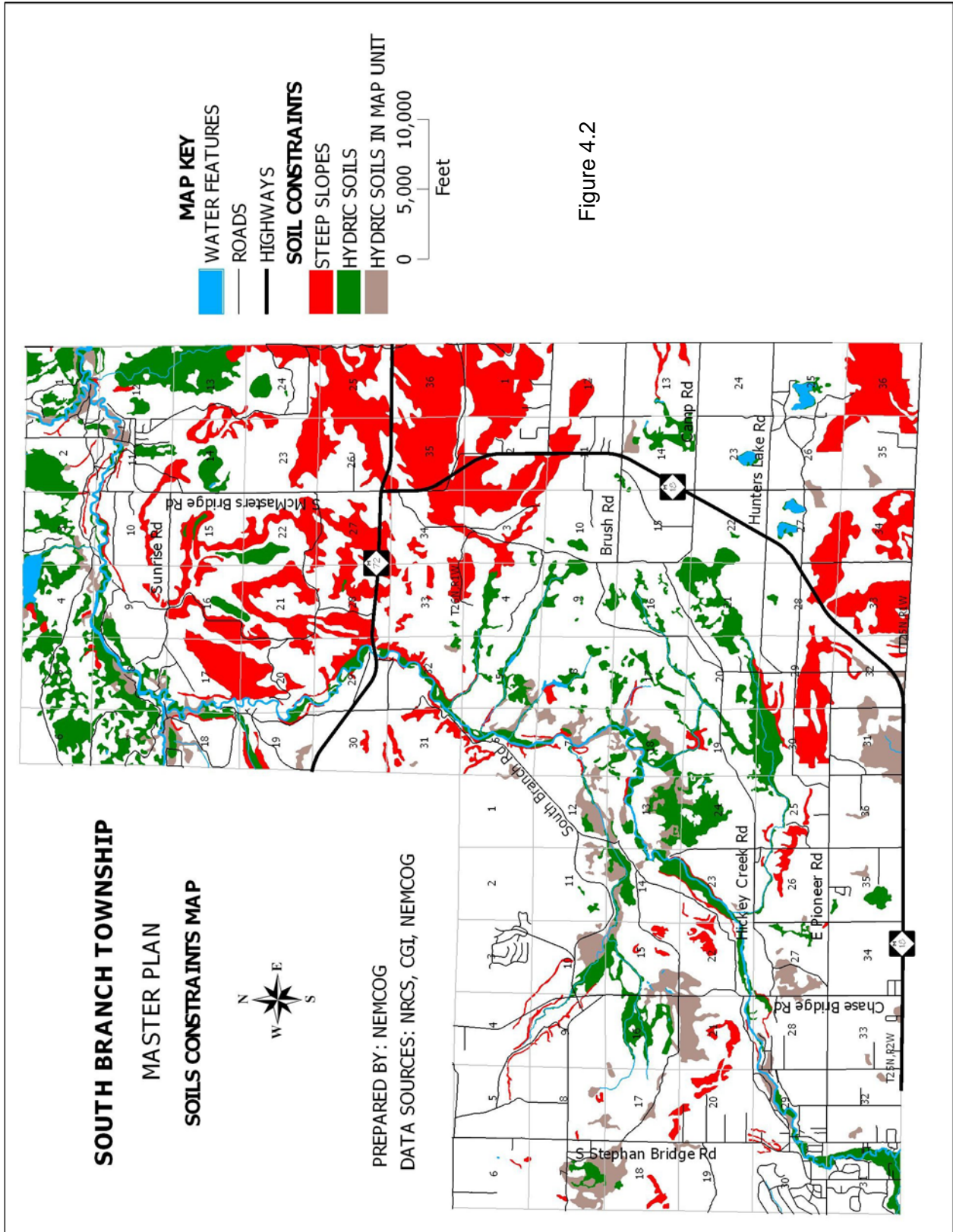
Hills and steeply rolling terrain may provide opportunities for spectacular views of the landscape. However, steeply sloped sites have severe building constraints, are more difficult and costly to develop. Maintenance costs tend to be higher on steeply sloped terrain. Special design standards such as erosion control measures, limiting size of disturbed areas, retaining natural vegetation, revegetation, slope stabilization and on-site retention of water run-off from impervious surfaces would all serve to minimize resource impacts. According to information presented in the Crawford County Soil Survey areas with slopes 18 percent and greater are minimal. Of greatest concern are steeply sloping hillsides adjacent waterways. Steeply sloped areas are depicted in red on **Figure 4.2**.

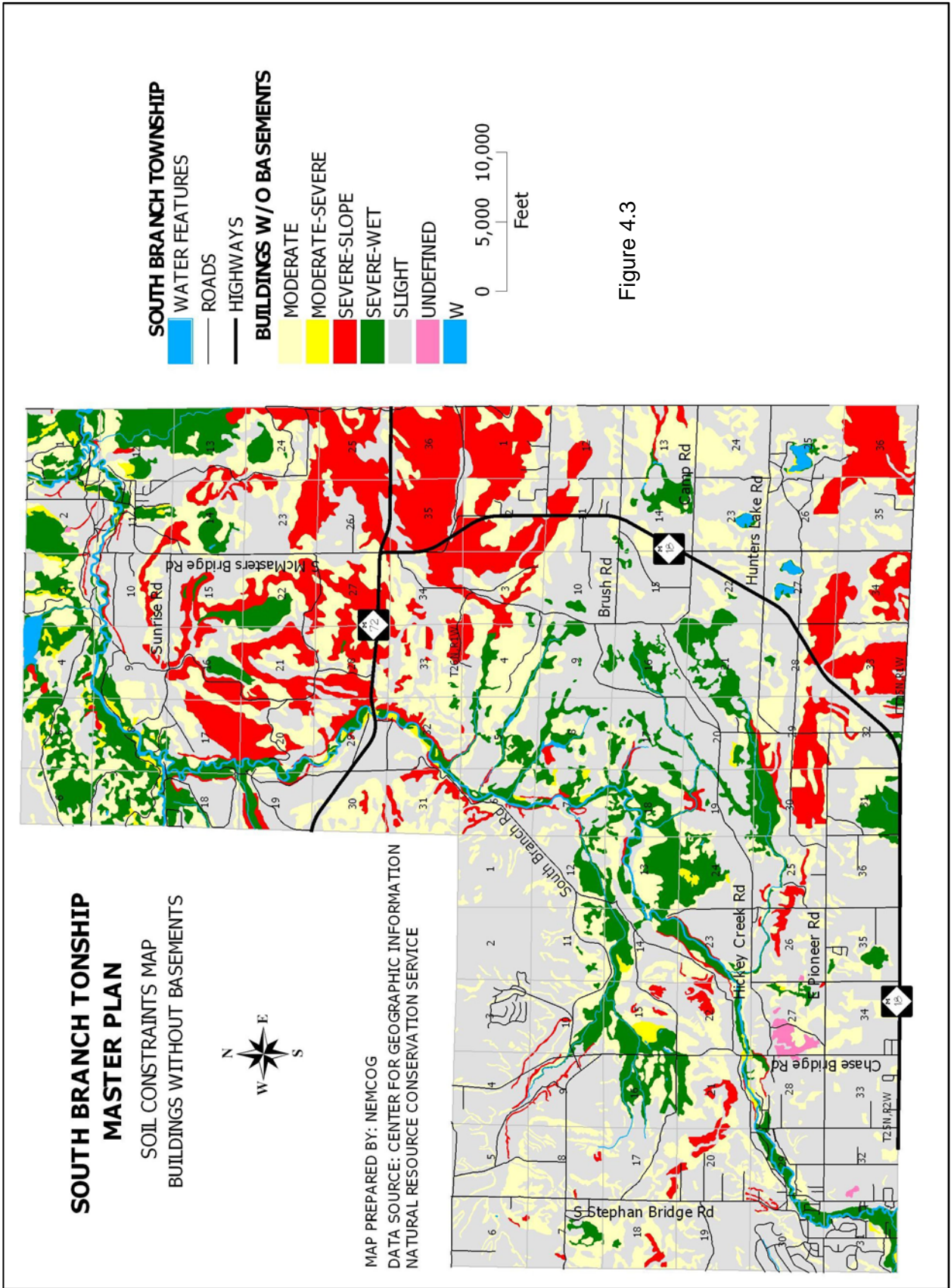
Building Site Development

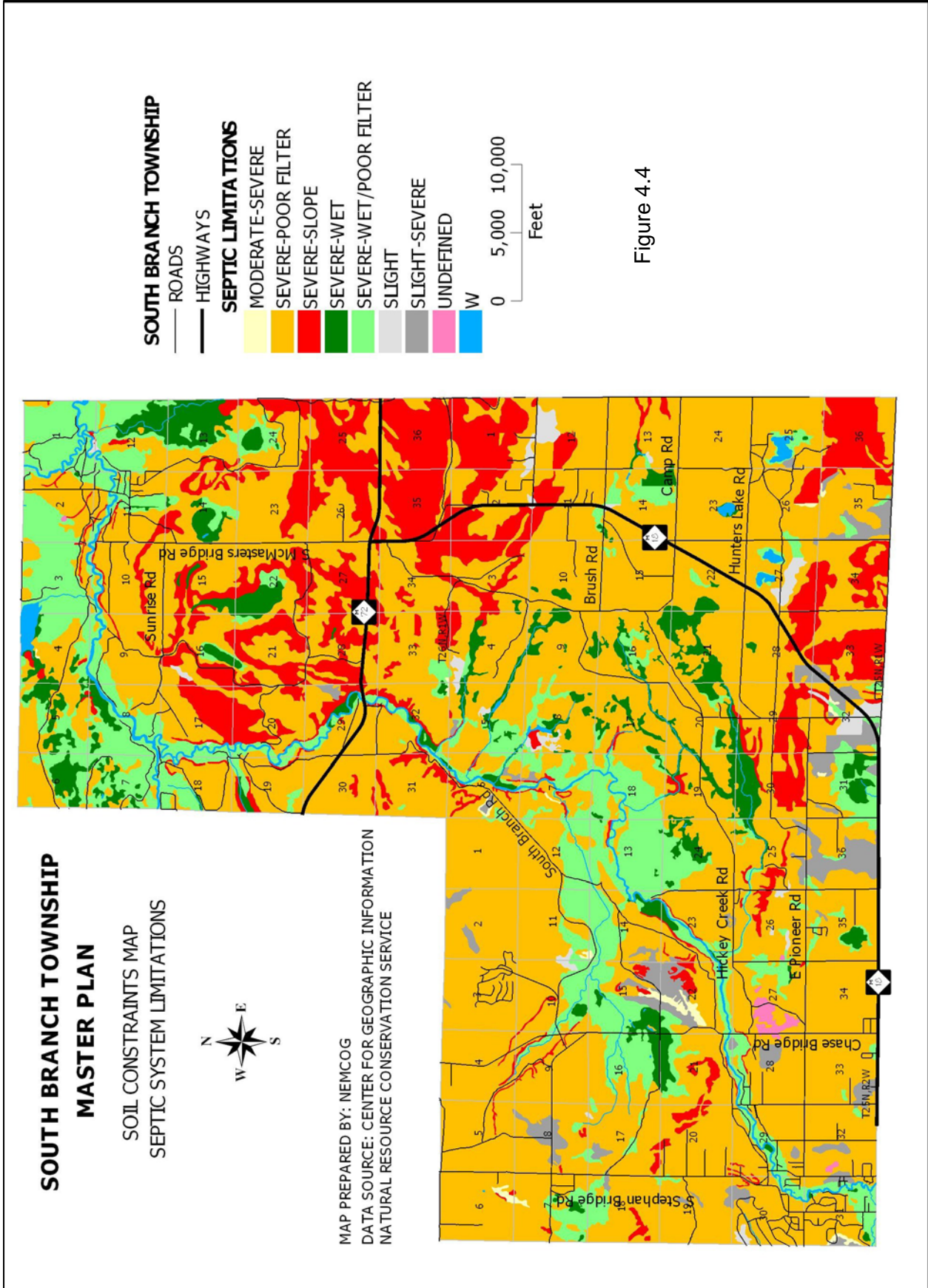
The USDA soil survey of Crawford County rates soils for various uses such as building site development and identifies the limiting factors such as steep slopes or high water table. The rating system is slight, moderate and severe limitations. Using the rating system developed by USDA, soil limitations for buildings without basements have been mapped and are displayed in **Figure 4.3**. Areas with well drained soils and slopes less than 10 percent tend to have slight limitations for building development. Areas with steep slopes, high water tables and organic soils have severe limitations. Lands with severe constraints are scattered throughout the Township, but tend to be more prevalent near streams and in T.26N-R.1W. in the northern half of the Township. Due to the prevalence of sandy soils in South Branch Township, large areas have slight to moderate limitations for buildings.

Septic Systems

Using a computer mapping system soils maps have been color coded to show areas with slight to severe septic system limitations as defined by the USDA Natural Resource Conservation Service. Criteria include depth to water table, wetness, filtering capacity and ability to perc water. **Figure 4.4** is a septic system limitations map. Much of the township is classified as having severe limitations. Clearly the greatest limiting factor is the prevalence of sandy soils with severe limitations due to poor filtration of septic effluents. This is a critical issue when the water table is close to the surface or when high density development occurs. Limiting types and density of development or making public water and sewer available for high density development are likely







the best options for protecting the groundwater resources in these areas. Other severe limiting factors include steep slopes.

Water Resources

One of the most valuable and most sensitive natural resource in South Branch Township is water. Maintaining high quality groundwater and surface water is vital to the long term sustainability of the community. Residents of the Township must rely on individual wells for drinking water. Streams and lakes provide scenic values and recreational opportunities for residents and visitors. The water resources provide critical habitat components for a wide range of fish and wildlife species. Most importantly, these resources extend far beyond the Township boundaries, as a result, impacts to these resources can have far reaching implications.

Groundwater

Two factors used to evaluate groundwater are the quantity and quality of the water. The thick mantel of glacial till contains vast underground aquifers that provide residents with sufficient water quantities. Water availability will not be a limiting factor in community growth. In general, South Branch Township has good ground water quality. Small lots adjacent to lakes present additional problems related to siting on-site septic systems and on-site water wells.

The vulnerability of drinking water aquifers to surface contamination is high in the Township due to highly permeable soils. A review of the *Aquifer Vulnerability to Surface Contamination in Michigan Map* prepared by the Center for Remote Sensing and Department of Geography at Michigan State University shows the vulnerability classification as highly permeable soils over highly sensitive drift lithology. Therefore, in South Branch Township, water quality is potentially more of a limiting factor than water supply. For example, the combination of highly permeable soils, shallow wells, on-site septic systems and dense residential development can result in high nitrate levels in drinking water.

Surface Water Resources

In the Great Lakes Region, rivers were the main thoroughfares of the pre-European inhabitants. The indigenous people used the Manistee and Au Sable Rivers for long distance trips and transporting large cargoes. These same rivers brought the "landlookers" and lumberman from the Great Lakes coastal communities to the interior of expansive, uncut forests. In turn, these water highways transported the raw materials to the coastal communities and sawmills, hungry for old growth pine logs.

South Branch Township is located in the Au Sable River Watershed. Without question, the Au Sable River is the center piece and lifeblood of the community. **Figure 4.5** is a map that shows the water resources and watersheds in the Township. The South Branch of the Au Sable flows from the southwest corner in a northeasterly direction, emptying into the Main Branch of the Au Sable in Section 8 of the N.25N. – R.1W. The main stream of the Au Sable River flows in a easterly direction through the northern part of the Township. Additionally, the North Branch empties into the main stream in Section 1 of T.25N. – R.1W.

<u>Streams</u>	<u>Distance in Township</u>
South Branch of Au Sable	20.0 miles
North Branch of Au Sable	1.8 miles
Main Stream of Au Sable	8.6 miles
Minor tributaries and intermittent	30.0 miles

The Au Sable River is a nationally recognized, blue ribbon cold water fisheries that supports resident brook, rainbow and brown trout populations. The stretch of the South Branch that flows through the Mason Tract has special fishing restrictions. The streams are prime recreational canoeing waters, as evidenced by the numerous canoe liveries.

Lakes in the Township are relatively small, ranging in size from 16 acres to 42 acres. Kellogg Lake, Hiscock Lake, West Lake, and Hunters Lake are kettle depressions lake with no inlets or outlets. Importance of protecting water quality in these lakes is extremely critical, since in the absence inflow and outflow, there is no ability to flush nutrients or contaminates from the water bodies. All of the lakes support warm water fisheries of bass, pan fish, perch and northern pike.

Au Sable River Watershed Restoration Committee¹

The Au Sable River Watershed Restoration Committee has been instrumental in developing numerous restoration and conservation projects aimed at protecting the cold water fishery of the Au Sable River. The committee is comprised of local volunteers and resource professionals who meet twice a year to review past projects and develop future ideas. Huron Pines RC&D, a non-profit, non-governmental conservation organization based in Grayling coordinates the committee and administers project funding. Below are descriptions of some of the projects the committee is currently working on.

Headwaters Large Woody Debris

This is a ten year project designed to improve the in-stream fish habitat and hydrology within the Upper Au Sable River Watershed. Large Woody Debris (LWD) structures are created in the riparian system using whole trees from the surrounding areas. The trees are placed in strategic locations (through the use of field crews along with heavy-lift helicopters) to provide in-stream cover and to facilitate in the diversification of stream hydrology. The structures are created without using any connection hardware or any cable to anchor the structure in place. This creates a more natural appearing structure and allows the material to move over time. Funding for this project is supplied through the Michigan Department of Natural Resources, along with funding from the North Branch Area Property Owner's Association and Anglers of the Au Sable. (Huron Pines conducts similar work on the lower Au Sable in cooperation with the US Forest Service.) In the upper watershed, work crews were active on the South Branch of the Au Sable in 2003 and 2004. Much of the focus the last four years, however, has been on the North Branch of the Au Sable, where in a 20 mile stretch of the river, 4,800 trees have been placed, creating at least 800 new structures.

Grayling Stormwater Project

When completed, this project will eliminate 80% of direct stormwater discharge to the AuSable River from the City of Grayling through a hybrid approach that uses Low Impact Development (LID) techniques, such as "rain gardens," as well as end-of-the-pipe Best Management Practices where necessary. The work-plan calls for using the combination of techniques in all of the 11 major stormwater drainage zones within the city. Following completion of the three-year, one-million dollar project, contaminants such as oils, sediment, trash and other items will no longer be carried directly into the Au Sable River every time it rains or the snow melts

Construction is scheduled to begin on Phase I (of the three phase project) this spring with Phase II construction scheduled for late Summer/Early Fall 2005. Stormwater discharge from Phase I will be eliminated through the use of three different Best Management Practices; over sixty Rain Gardens, one Detention Basin, and three End of the Pipe Treatments. As part of the

¹ Information provided by Huron Pines RC&D Council

project, the City of Grayling recently adopted a stormwater runoff control ordinance. Funding is provided for this project through the Clean Michigan Initiative, City of Grayling, and private conservation and angler groups.

Au Sable Easement and Stewardship Project

The two components of this nonpoint source project are designed to complement one another and address some of the major threats within the watershed—rapidly increasing development within the critical areas, and poor land use stewardship practices. Two concrete objectives correlate to each of the project components. These objectives include achieving the following: 1) Working with HeadWaters Land Conservancy to ensure that ten conservation easements will be implemented on environmentally sensitive parcels within the watershed. 2) At least 90% of all riparian property owners will receive information regarding streambank Best Management Practices and other related homeowner stewardship practices.

Other Projects

The restoration committee and the partners that comprise it are also helping with several other projects in the upper watershed. Some of these are lowering of the Grayling Millpond Dam, planting of Cedars to provide riparian habitat, using sod docks as an alternative to the traditional waterfront docks, and improvement of road-stream crossings contributing sediment to the river.

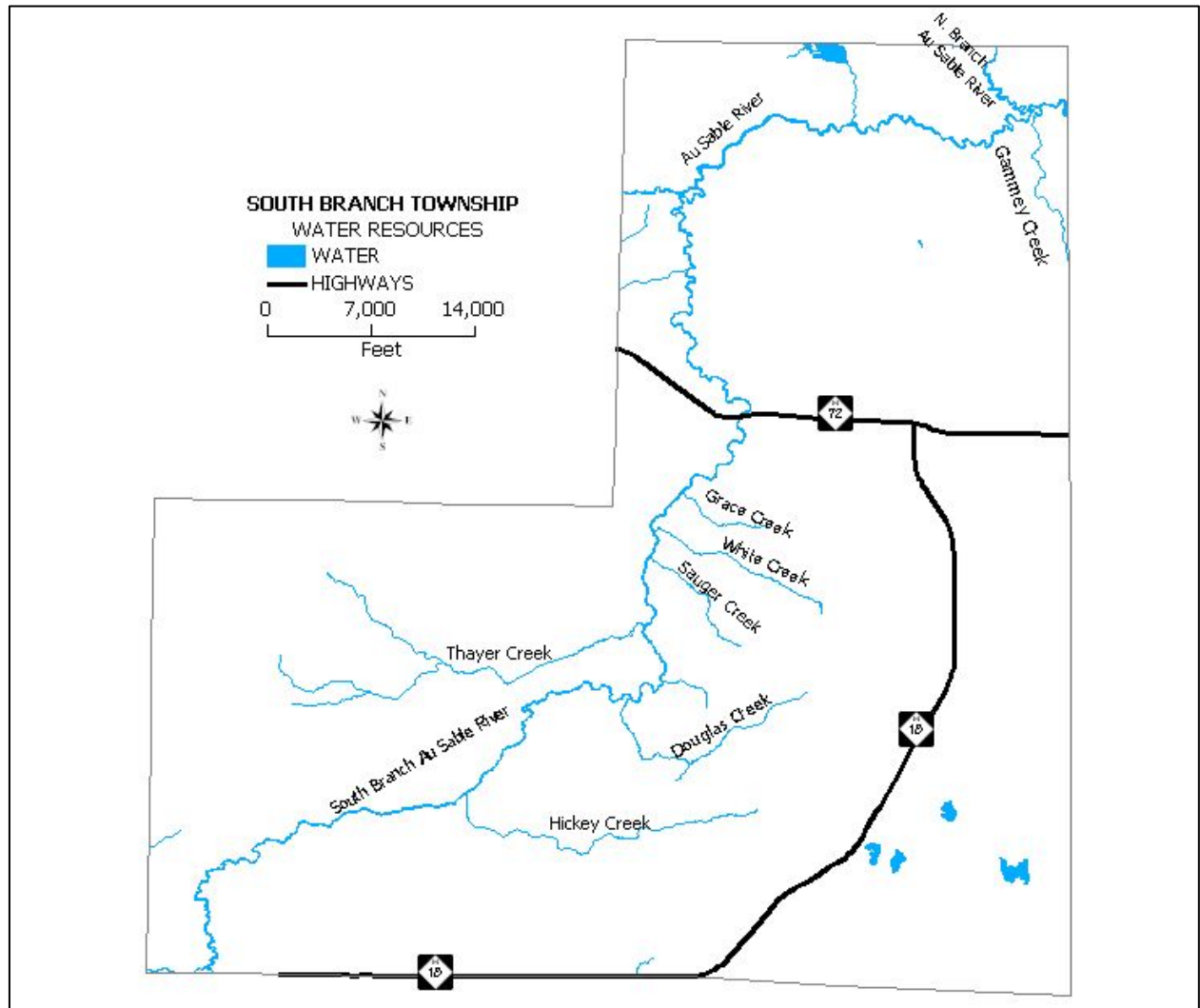
Forests and Wetlands

Approximately 92 percent of the Township is covered with forests. Tree species vary depending upon the soils, moisture and past activities such as logging, fires and land clearing. For example areas with sandy soils and a history of wildfires support dense stands of jack pine; critical habitat for the Kirtland's Warbler. Pine and oak forests are the dominant plant communities found in South Branch Township. According to the MIRIS Land Cover/Use Inventory, the most prevalent forest type is jack pine, covering over 41 percent of the forestland. Red Pine accounts for another 11 percent of the forestland. Oak forests cover 26 percent of the forested areas. In summary, 78 percent of the forestland are covered by pine and oak forests. **Figure 4.6** shows the forests in South Branch Township.

Forest fires have been identified as the number one natural hazard in the Crawford County Hazard Mitigation Plan. Under dry spring conditions forest fires can occur in any forests type. However some forest types have higher risks. Jack and red pine forests have a high risk for wildfires. Oak and white pine forests have a moderate risk for wildfires. Draughty, low fertility sandy soils, found in outwash plains and channels, supported pre-settlement pine forests that for thousands of years were perpetuated by wildfires. According to the pre-settlement vegetation map of Crawford County, pine forests covered 80 percent of the land area in South Branch Township. Logging, wildfires and land clearing converted some of these areas to forests dominated by oak and aspen-birch forests. Today, residential development has occurred within these same wildfire prone areas. A community-wide Firewise program will lessen the risk for loss of property and life.

Poorly drained, lowland areas support northern white cedar, tamarack, balsam fir, black spruce, eastern hemlock, white pine, balsam poplar, trembling aspen, paper birch, black ash, speckled alder and shrub willows. Northern white cedar dominates the wetland areas where there is good lateral water movement and the soils are high in organic content. Lowland forests are typically located adjacent to water features and function as riparian forests and water quality buffers. The network of lowland forests, associated with rivers and creeks, also function as wildlife corridors and are the backbone of large regional ecological corridors. Lowland forests adjacent to the

Figure 4.5
Water Resources

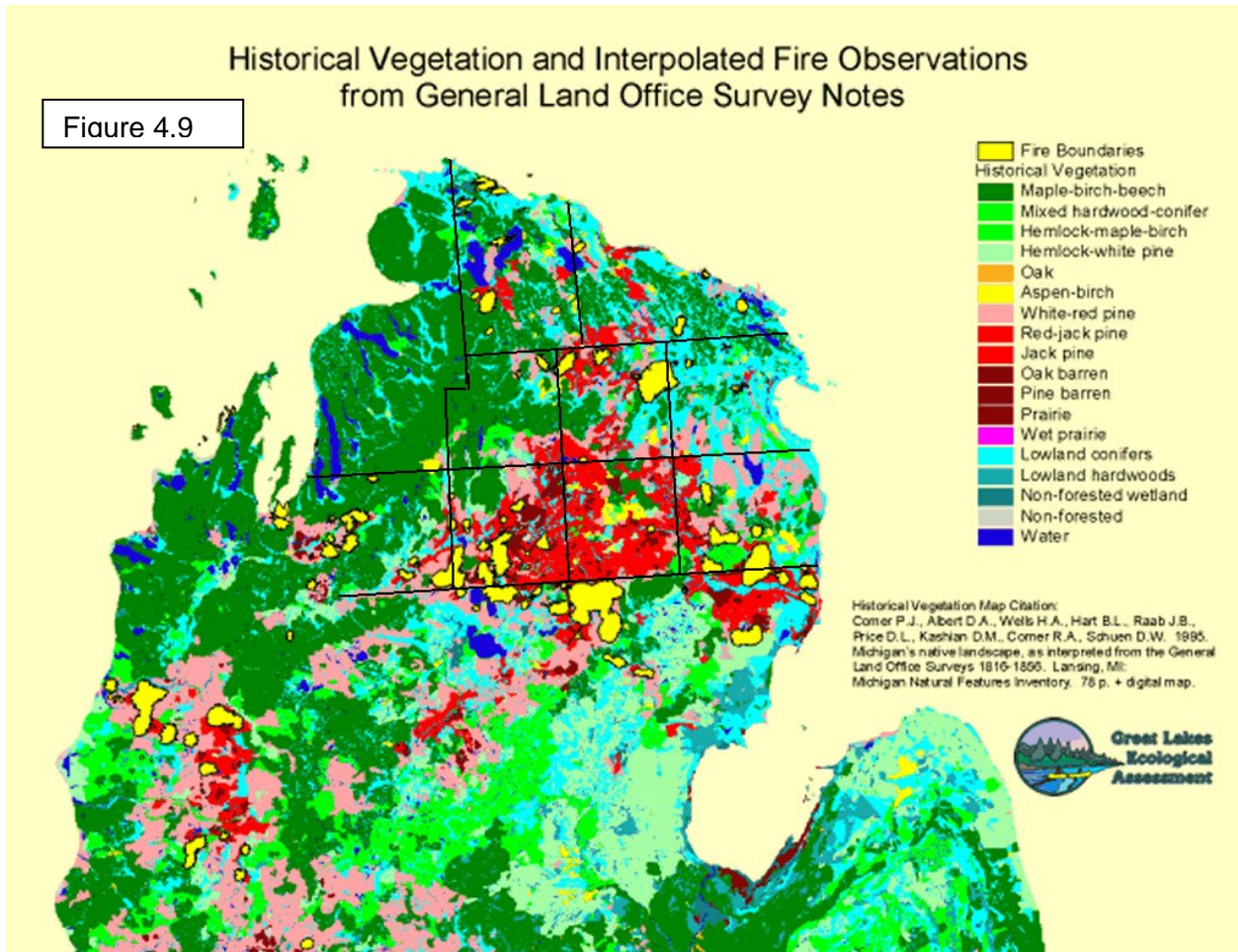


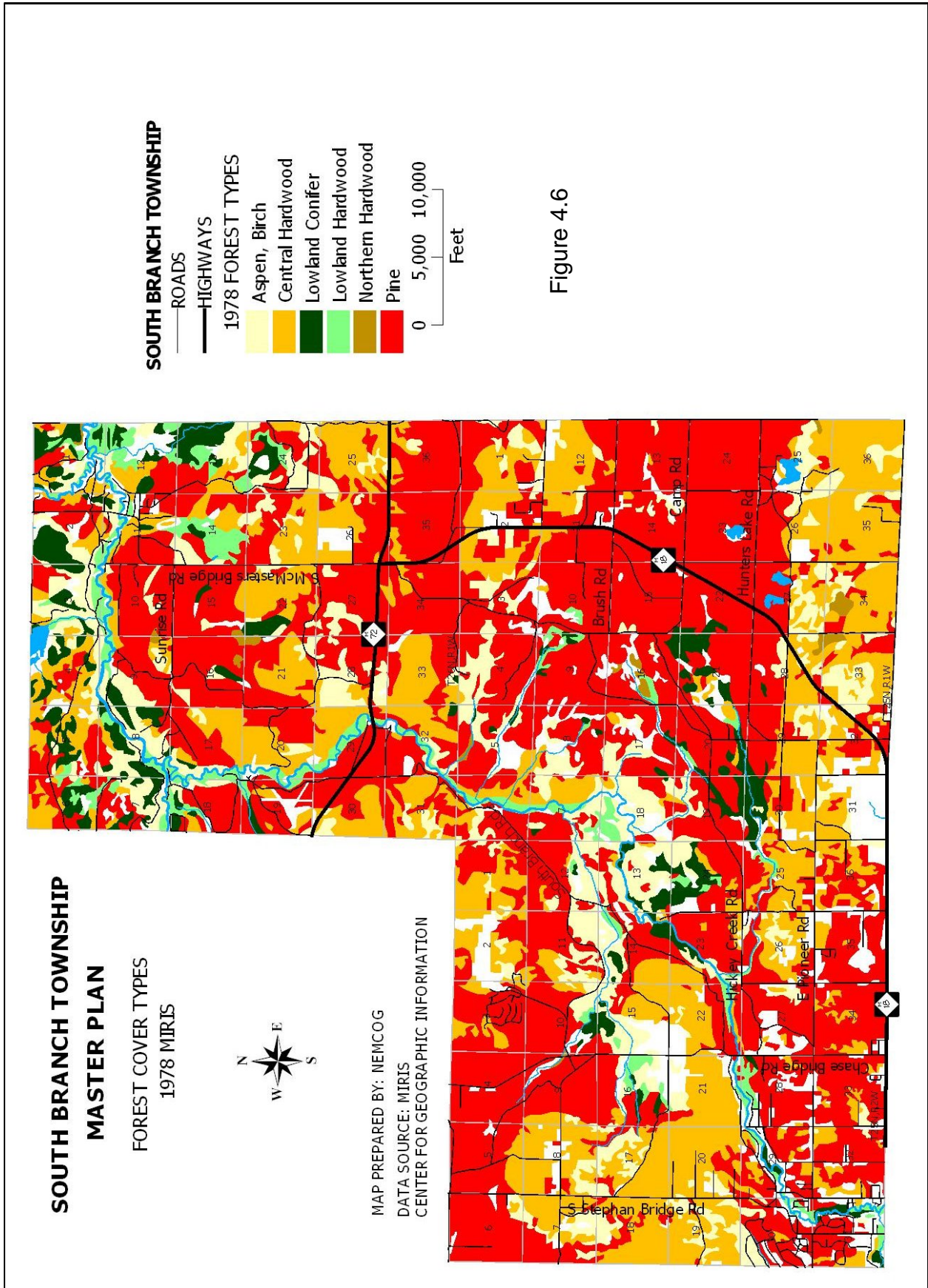
Lowland forests adjacent to rivers and streams may be prone to flooding during the spring snow melt, particularly when combined with heavy spring rains. Forested and nonforested wetlands are a finite resource in the township. Land use planning activities should focus on protecting and preserving these limited and critical resources.

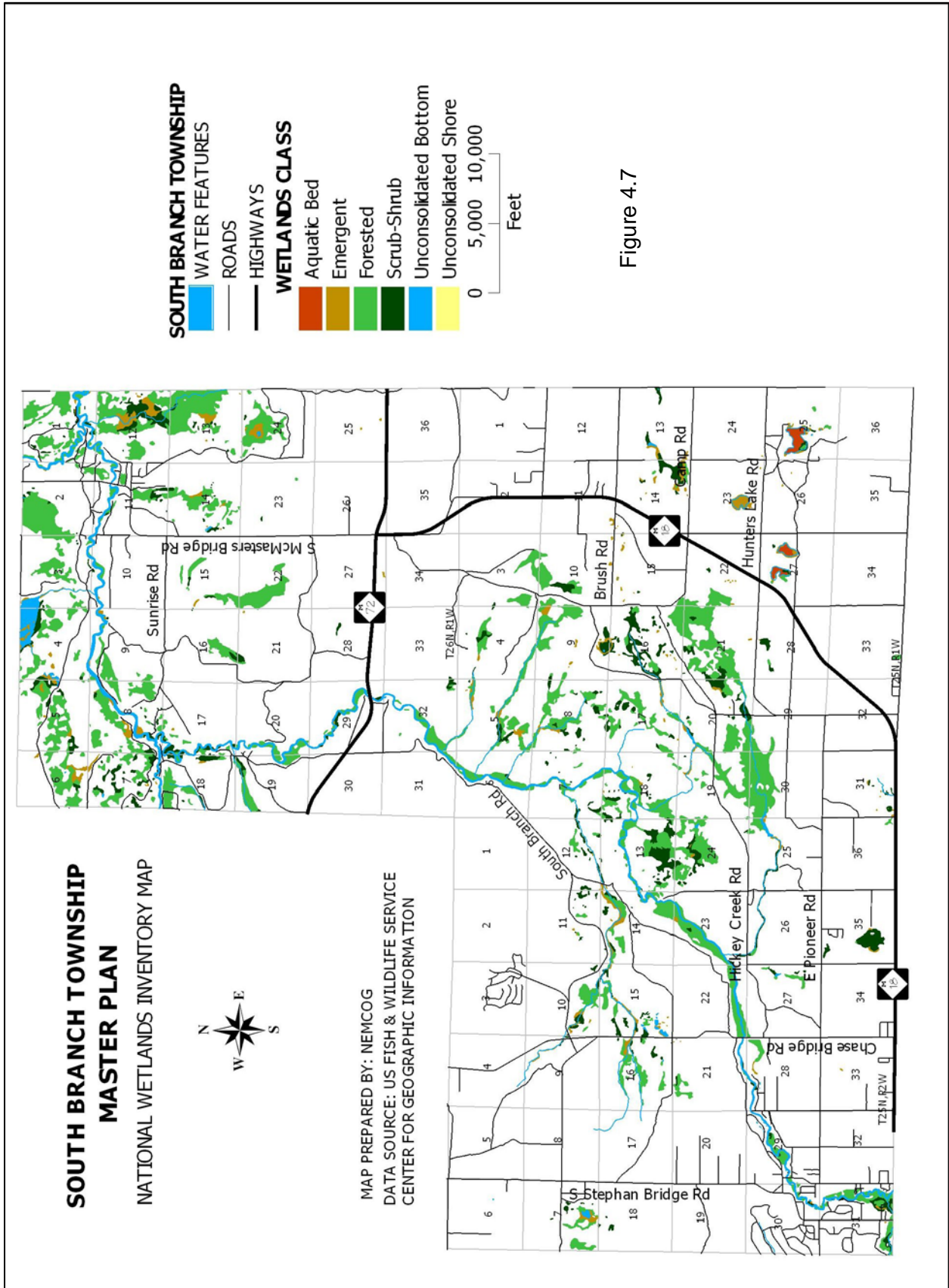
The U.S. Fish and Wildlife Service developed national wetlands inventory program in the 1980's. Through this effort a national wetlands inventory map was compiled for Alcona County. The digital data was acquired from the Center for Geographic Information, State of Michigan, and used to compile **Figure 4.7**. The map depicts forested and non-forested wetlands.

Pre-Settlement Vegetation

The Michigan Department of Natural Resources has compiled pre-settlement vegetation maps of counties in Michigan. The maps were generated from information contained in the first government land survey notes in the 1800's along with information such as current vegetation, land forms and soils, **Figure 4.8**. A review of the pre-settlement vegetation map of South Branch Township shows extensive areas were covered with pine and oak forests. This clearly shows a long history of wildfires in the area. The map delineates jack pine-red pine forest, white pine-red pine forest, pine barrens, pine-oak barrens and pine-oak forests, which combined, covered 83 percent of the land area. Jack pine forests were estimated to cover 70 percent of the township. In the late 1800's extensive logging and subsequent wildfires altered the forest make-up, yet still today as noted on the 1978 forest vegetation map, jack pine covers 38 percent of the township. **Figure 4.9** shows historical vegetation and interpolated fire observations from General Land Office Survey Notes. This map again supports that jack pine and wildfires have long been a part of life in this part of the state. Today, the concern lies in residential development within these historic fire prone areas.







Figures 4.8
Pre-Settlement Vegetation Map (to be provided at a later date)



Wildlife Habitat

Within the Township, there are a variety of wildlife habitats, ranging from upland forests to flowing cold water bordered by marshes, lowland brush and floodplain forests. The significance of these resources extends beyond South Branch Township. The predominance of upland pine and hardwood forests provide extensive natural areas for wildlife. Habitat for wildlife that require wetlands such as marshes and cedar swamps is limited. Additionally, natural openings or pine barrens, once more common during pre-settlement times, are limited in today's landscape. Land use planning should consider protecting these finite resources.

Conifers provide important winter (thermal) cover for wildlife, particularly, when located next to winter food sources. The gray jay, pine grosbeak, evening grosbeak, red crossbill, purple finch, boreal chickadee, and pine siskin frequent upland conifer stands during the winter months. The black-backed woodpecker, long-eared owl, solitary vireo, and red crossbill prefer pine forests. The porcupine, long-tailed shrew, deer mouse, woodland jumping mouse and bobcat inhabit pine forests. This cover type also offers opportunities for viewing migratory birds in the spring and fall. These species include the golden-crowned kinglet, ruby-crowned kinglet, Swainson's thrush, blackburnian warbler, magnolia warbler, bay-breasted warbler, Canada warbler, hermit thrush and winter wren.

The Kirtland's Warbler is a rare and endangered songbird that resides in a very limited area of the State. Its summer/nesting range includes ten counties in the northern lower peninsula and four counties in the upper peninsula. According to a census taken in 1999, Alcona, Crawford, Oscoda and Ogemaw Counties have the highest number of Kirtland's Warblers. Approximately 150,000 acres are managed for the species. Many birdwatchers come to this area in order to view this bird. A "Kirtland's Warbler Festival" is being held annually at the Kirtland Community College (near Roscommon) as a tribute to this bird. This weekend festival includes many activities for individuals and families designed for better environmental awareness and appreciation.

According to the US Fish and Wildlife Service, *"This species tends to nest in groups; nests are placed on the ground among grass or other plants like blueberries and under limbs of jack pine 5-to-16-feet tall. As jack pine trees mature, upper branches block the sun and the lower branches die; warblers cease to use the area."*

The jack pine habitat used by Kirtland's warbler is also used by a number of other bird species, including spruce grouse, Nashville warbler, yellow-rumped warbler, eastern towhee, eastern bluebird, black-backed woodpecker, and brown thrasher. Larger openings in jack pine-dominated ecosystems are inhabited by upland sandpiper, American kestrel, and ruffed grouse.

Beginning in the 1990s, the population began to increase in response to habitat management that occurred in the 1970s and 1980s through a multi-agency effort. By 2003, the total estimated population of singing male Kirtland's warblers was 1,202. The majority of birds are now found on land managed by the Michigan Department of Natural Resources and the United States Forest Service. In response to the need for more land dedicated to the restoration of this species, the Fish and Wildlife Service established the refuge in the early 1980s due, in part, to the recommendations of the Kirtland's Warbler Recovery Team. The original goal was to acquire 7,500 acres of land on which habitat would be managed for the benefit of Kirtland's warbler. At present, the refuge contains 119 separate tracts totaling 6,684 acres."

Many woodland creatures use the aspen forest for nesting and feeding. Species such as the least flycatcher, red-eyed Vireo, rose-breasted grosbeak, black-billed cuckoo and American redstart nest in the tree canopy. Ground nesting species such as the ruffed grouse, veery, snowshoe hare, and

white tailed deer use aspen forest types. A few species of wildlife that nest under ground or in debris include the eastern chipmunk, long-tailed weasel, marbled salamander, ringneck snake, milk snake and smooth green snake. Birds and mammals that nest in cavities of trees include black-capped chickadee, yellow-bellied sapsucker and northern flying squirrel.

Riparian forests adjacent to streams and lakes provide critical habitat for many species of wildlife and reptiles. The land and water interface is a long narrow, sometimes meandering, edge habitat. In South Branch Township and throughout Michigan, natural, undeveloped lakeshore habitat is one of the most endangered habitats. There is a continuing trend for lake lot owners to clear brush, aquatic weeds, dead trees and live trees that interfere with a wide-open view of the water. The native vegetation is replaced with well manicured and chemically treated lawns down to the waters edge. This practice not only degrades critical wildlife habitat but also impacts water quality by diminishing the riparian zone's capacity to filter nutrients and ability to stabilize shoreline erosion.

Birds that use floodplain habitat for feeding and nesting include the red shouldered hawk, barred owl, kingfisher, northern oriole, red-headed woodpecker, pileated woodpecker, hairy woodpecker, downy woodpecker, woodcock, wood duck and great blue heron. Deer, raccoon, northern flying squirrel, water vole, mink and river otter also frequent these areas. Gray tree frogs, spring peepers, wood frogs, wood turtles, eastern ribbon snakes, water snakes, salamanders and central newts can all be found in river/flood plain areas.

Lowland conifers (Northern white cedar, balsam fir and black spruce) provide important winter thermal cover for many wildlife species. There tends to be less snow on the ground, more protection from the cold winds and often a higher nighttime temperature than other cover types. The snowy owl, pine grosbeak, purple finch, boreal chickadee, and Nashville warbler frequent lowland conifer stands during the winter months. Many species of wildlife also use the lowland conifer forest for nesting and feeding. The northern saw-whet owl and black-backed woodpecker nest in hollowed out tree trunks. Ground nesting species such as the short-eared owl, common snipe, ring-necked duck, snowshoe hare, and white-tailed deer use this cover type. The northern parula and solitary vireo nest in the canopy, while the northern waterthrush, arctic shrew, meadow vole, and bobcat nest beneath the ground or debris. This cover type also offers opportunities for viewing migratory birds in the spring and fall. These species include the olive-sided flycatcher, golden-crowned kinglet, ruby-crowned kinglet, Swainson's thrush, Tennessee warbler, winter wren, palm warbler, Connecticut warbler, Lincoln's sparrow and white-tailed sparrow.

Ecological Corridors

Prior to logging and land clearing during the late 1800's, this area was covered with pine forests. The pre-settlement forests were rich ecosystems that stretched across the northern Lower Peninsula of Michigan. The backbones of these ecological corridors were the many rivers, creeks and intermittent drainages, along with their associated wetlands and riparian forests. The north, south and main branches of the Au Sable River and their many feeder creeks are key ecological corridors within the Au Sable River Watershed.

Associated wetlands and riparian forests are a link in a long green chain or ecological corridor that centers on the Au Sable River. These corridors are part of a larger network of ecological corridors consisting of the creeks, streams, wetlands and upland forests within the Au Sable River Watershed. This network, in turn, is connected to larger networks in the Lake Huron Watershed. Ecological corridors or "green infrastructure," can be likened to a highway system.

All segments of the highway must be connected and in working order for the highway system to properly function. If segments are degraded or missing than the highway will not function to its fullest potential. The same holds true for ecological corridors, when segments are degraded or fragmented, the system will not function properly. In other words, activities on a given piece of property can have implications that reach far beyond the ownership boundaries.

Sites of Environmental Contamination

Part 201 (Environmental Remediation) of the Natural Resources and Environmental Protection Act (1994 PA 451, as amended) regulates sites of environmental contamination in Michigan. The Michigan Department of Environmental Quality (MDEQ) maintains a database of sites of environmental contamination on their web page. Below is a listing of information obtained from the MDEQ database.

Site ID: 20000009
Site Name: South Branch Twp M-18 Residential Well
Site Address: 5453 M-18 Hwy
City: Roscommon
Zip Code: 48653
County: Crawford
Source: Gasoline Service Station
Pollutant(s): 1,2 DCA; Benzene; Ethylbenzene; Toluene; Xylenes
Score: 27 out of 48
Score Date: 1993-08-30
Township: 25N **Range:** 02W **Section:** 36
Quarter: SW **Quarter/Quarter:** SE
Status: See Leaking Underground Storage Tank Site Database

Site ID: 20000058
Site Name: Shepan Fuel Oil Spill
Site Address: 106 Jonassen
City: Roscommon
Zip Code: 48653
County: Crawford
Source: Private Households
Pollutant(s): Ethylbenzene; Xylenes; Heating oil
Score: 14 out of 48
Score Date: 2004-01-07
Township: 25N **Range:** 02W **Section:** 32
Quarter: SW **Quarter/Quarter:** SW
Status: Interim Response conducted - No further activities anticipated

Site ID: 20000068
Site Name: Wyandotte Lodge
Site Address: 1320 S. McMasters Bridge Road
City: Grayling
Zip Code: 49738
County: Crawford
Source: Hotels & Other Lodging Places
Pollutant(s): Heating oil
Score: 15 out of 48

Score Date: 1996-01-09

Township: 26N **Range:** 01W **Section:** 11

Quarter: NW **Quarter/Quarter:** SE

Status: Delisted - no longer meets criteria specified in rules