



FOREST STEWARDSHIP PLAN

Landowner: McGaw YMCA Camp Echo

Plan Writer: Jack W. Boss, ECOSYSTEMS MANAGEMENT, LLC
Graphics: Land Planning Solutions, LLC

Plan Start Date: 2015

Plan Duration: Ten Years

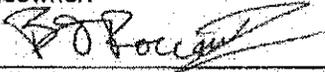
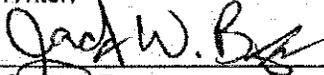
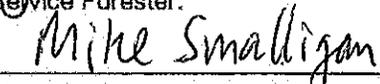


Department of Natural Resources - Forest Resources Division

www.michigan.gov/foreststewardship

Required by authority of Part 501 of Act 451, PA 1994 as amended to certify that this Forest Stewardship Plan has been reviewed and approved by the Landowner, Plan Writer, and the DNR Service Forester.

Renewal or Revision of Prior Forest Stewardship Plan? NO

Landowner Contact Information		Plan Writer Contact Information	
Name: McGaw YMCA Camp Echo		Name: Jack W. Boss, Ecosystems Management, LLC	
Address: 3782 South Triangle Trail, Fremont, MI 49412		Address: 3210 Bewell Ave. SE, Lowell, MI 49331	
Phone: 231-924-6660		Phone: 616-897-8575	
Email: BernardR@McGawYMCA.org		Email: ecosystemsmgt@att.net	
Property Information			
Total Acres: 481.82	Forested Acres: approximately 330	Acres in Plan: 481.82	Tax ID: See Below
Town: T13N	Range: R13W	Township: Sherman	County: Newaygo
Property Legal Description (Quarter Section, Section, Town, Range, Township, County): parts of Sections 27, 28, and 34; T13N, R13W (Sherman Township) further identified as parcel numbers 62-14-27-100-005/106; 62-14-28-200-009; and 62-14-34-200-002/009			
How to Find Property from Nearest Town: From the City of Newaygo, north 4.5 miles to 40 th Street, then 3.25 miles west to Ferris Avenue, then 1.0 mile north to 32 nd Street, then 0.6 miles west to the camp entrance.			
Landowner's Goals for this Forest Stewardship Plan			
<ol style="list-style-type: none"> 1) To properly manage forest resources thereby enhancing timber production, health, and sustainability. 2) To increase educational opportunities for teaching young people about natural resource management. 3) To improve the aesthetic qualities of the property. 4) To increase recreational opportunities on the property. 			
Michigan's Stewardship Ethic			
Stewardship is an ethic recognizing that the land and its natural inhabitants have an inherent worth and that we have a responsibility to consider the land as we protect, manage, utilize, and enjoy the forest. Stewardship guides us to conduct our activities to the utmost of our abilities, to insure the future health, productivity, diversity, and well-being of the land, its natural communities and species, and to provide opportunities to our successors that are at least equal to ours to use and enjoy the land and its resources.			
Signatures of Approval from Landowner, Plan Writer, and DNR Service Forester			
This plan describes my goals and objectives for my forest. Participation in the Forest Stewardship Program is voluntary and only indicates my intent to practice sustainable forest management. I understand that enrolling forest land into separate property tax programs like the Commercial Forest program or the Qualified Forest program requires my compliance with an approved forest management plan in exchange for the reduction in property taxes.			
Landowner: 		Date: 9/16/2014	
Plan Writer: 		Date: 9/16/2014	
DNR Service Forester: 		Date: 17 September 2014	

After review and approval by the Landowner, the Plan Writer will submit the entire Plan to the nearest DNR Service Forester for their review. Electronic submission of the Plan is encouraged by emailing a Word document or pdf file to the Service Forester. The DNR Service Forester will return a hard copy or pdf of the final signature page to the Plan Writer after approval.

INTRODUCTION

Non-industrial private forestlands make up a large portion of the Michigan landscape; currently covering 8.4 million acres, which is about 45% of the State's total forestland (19.4 million acres). Private forests and woodlots contribute important environmental qualities, recreational opportunities, and raw materials. With a growing interest in resource management on private lands, the Federal government, in cooperation with state agencies, has introduced several programs to assist landowners. In 1990, the Food, Agriculture, Conservation, and Trade Act authorized the Forest Stewardship Program (FSP) and the Stewardship Incentive Program (SIP) to stimulate management of non-industrial private forests through cost sharing of plan writing and approved practices. While SIP has been discontinued, other Federal programs under the 2014 Farm Bill now provide cost sharing or reimbursement for a broad range of resource management activities to protect or enhance forest ecosystems.

The United States Department of Agriculture (USDA) – Forest Service and state foresters have leadership responsibilities for FSP at the national and state level, respectively. Local offices of the Natural Resources Conservation Service (NRCS) now handle most of the cost-share programs available to private landowners. To qualify for cost-sharing assistance through most federal and/or state programs, a landowner must first have an approved Forest Stewardship Management Plan (or similar resource management plan) prepared by a certified resource consultant. Such a plan documents the landowner's goals and objectives, and recommends management practices that maintain or improve the land's productivity. A FSP plan is responsive to landowner objectives, is action and multiple-resources oriented, and is multi-disciplinary in scope.

Participation in the FSP is open to non-industrial private landowners who are committed to the active management and stewardship of their forested properties. In Michigan, private landowners who manage their land for forestry may qualify for property tax reduction through the Qualified Forest Property Program and the Commercial Forest Program. Participating landowners are required to have a forest management plan that is approved by the Michigan Department of Natural Resources (MDNR). A FSP plan qualifies as acceptable in applying for both of these tax reduction programs. A FSP plan may also be submitted to qualify for Qualified Deer Management Association (QDMA) land certification.

With authorization from the MDNR – Forest Resources Division, the following Forest Stewardship Plan was prepared for McGaw YMCA Camp Echo. Camp Echo qualified for a FSP Outreach and Education Project grant to cost-share the preparation of this plan. A copy of the grant application, Forest Stewardship Assessment, and MDNR authorization are included in Appendix A of this document. More information about the Forest Stewardship Program is available at www.michigan.gov/foreststewardship. This management plan covers the 10-year period 2015-25.

PROPERTY DESCRIPTION

Location

The subject property is a 481.82-acre site located in central Newaygo County, approximately five miles northwest of the City of Newaygo (Figure 1). It constitutes parts of Sections 27, 28, and 34 in Sherman Township, and is further identified as parcels 62-14-27-100-005/106; 62-14-28-200-009; and 62-14-34-200-002/009. The property can be accessed from Ferris Avenue

and 32nd Street, which form its eastern and northern boundaries respectively. At this time the subject site is mostly forested; it includes mixed upland hardwoods, red pine plantations, emergent/scrub-shrub wetlands, small non-wooded openings, and agricultural fields. As an established YMCA camp, the property houses numerous buildings and recreational facilities (see Figure 1A). Adjacent properties include similar forested and wetland acreage, large agricultural fields, lake-front homes/cottages, and farmsteads.



The main entrance to Camp Echo on 32nd Street is marked with a sign and drive-through arch.

Soils, Topography, and Climate

According to the 1995 Soil Survey of Newaygo County and the USDA Web Soil Survey, the major upland soil types on the property (see Figure 2) are Coloma sand (0-30% slopes), Marlette loam (1-18% slopes), and Metea/Marlette/Spinks complexes (1-40% slopes). The primary wetland soil type is Carlisle muck (0-1% slopes). The characteristics and uses for these and other prominent soil types on the property are included in Appendix C. The site's topography, as shown on Figure 2A, is rolling and steeply graded to nearly level with elevations ranging between 818 (Ryerson Lake) and 875 (northeast corner) feet above mean sea level.

Based on U. S. National Weather Service records kept at Hesperia, Michigan (1951-80), the growing season in central Newaygo County extends from late May to early October (approximately 145 days). The average high temperature during July (the area's warmest month) is 82.1 F°, and the average low temperature during February (the area's coldest month) is 12.5 F°. The average annual precipitation is 33.6 inches with adequate rainfall usually occurring during the entire growing season. The average annual snowfall in Newaygo County is approximately 75 inches.

Wetlands and Riparian Areas

As shown on Figure 3, the National Wetlands Inventory (NWI) map for the Newaygo, Michigan, U.S. Geological Survey Topographic Quadrangle, fourteen wetlands/complexes occur on the property with some extending off-site. These areas are identified as saturated and/or

seasonally/temporarily flooded forested, scrub-shrub, and emergent wetlands. Several small, open-water ponds are also identified on the NWI map. The map depicts Ryerson Lake as a permanently flooded lake, with an unconsolidated bottom. The sources of hydrology to ponds, wetlands, and the lake appear to be groundwater, runoff, and direct precipitation. Ryerson Lake ultimately discharges into the Muskegon River at the City of Newaygo.

The NWI map does not depict the locations of many small and/or seasonally flooded wetlands (springs, seeps, and vernal ponds), which occur on site. These wetlands are identified in later sections of this plan.

The Michigan Department of Environmental Quality (MDEQ) appears to regulate most of the wetlands on the subject property appear since these wetlands are larger than five acres in size or within 500 feet of a lake, stream, or pond (“contiguous”). A permit may be required to conduct filling, draining, bridging, dredging, and other maintained uses within the regulated wetlands.

Recreational and Aesthetic Features

Camp Echo is primarily a summer camp for youngsters, but during fall through spring, campers of all ages (families, school and community groups, etc.) come to enjoy the property and its facilities. The list of ongoing recreational activities includes hiking, swimming, boating, horseback riding, fishing, nature study, biking, archery, skiing and snowmobiling. A well-established network of vehicular and foot trails, originating at the driveway entrance on 32nd Street, provides access throughout most of the property (See Figure 5b).

Diverse habitats within the property support a large assortment of vegetation including flowering trees, wildflowers, and old growth timber which together yield a great deal of aesthetic pleasure. The large varieties of wildlife attracted by these habitats contribute a multitude of sights, sounds, and viewing opportunities. While the southern and eastern portions of the property are the most secluded, many locations offer an atmosphere of peace and solitude.



This hillside stream, draining a wetland to Ryerson Lake, is one of the special places on the property.

CURRENT STATUS OF FOREST AND WILDLIFE RESOURCES

Forest Stands/Health

Figures 4, 5a, and 5b illustrate the present forest cover, i.e. stands, and man-made or natural features. The health of forest stands on the property ranges from good to very good. Many high-quality red oaks, sugar maple and other valuable hardwoods occur throughout the property. Forest stands on the property, which have not been managed for many years, also include over-stocked areas, and multi-stemmed/poorly formed trees. Wind damage is minimal. Ash trees on site have been impacted by emerald ash borer (EAB); many have perished. Dead timber, mostly ash trees, comprises less than 5% of the forest on site.

Overall, insects and diseases do not appear to have greatly impacted tree growth and survival. During spring 2014 searches for egg masses and other insect evidence; tent caterpillar, gypsy moth, oakworms, and similar defoliators appeared to be absent—possibly at low points in their population cycles. Bark beetles, carpenter ants, borers, etc. can be expected in dead, stressed, and damaged timber. Such pests are typically controlled by woodpeckers and other insectivores. Based on overall timber health, stand diversity, and lack of substantial dead timber/slash on site; there appears to be no risk of pest infestation or wildfire on the entire property. Landowners can learn more about current insect and disease threats in their immediate area by visiting: www.michigan.gov/foresthealth.

Wildlife Populations

The forested habitats on and near the property already attract white-tailed deer, tree squirrels, cottontail rabbits, wild turkeys, ruffed grouse, woodcock, owls, hawks, woodpeckers, and numerous songbirds. Canada geese, sandhill cranes, mallards, wood ducks, diver ducks, raccoons, mink, muskrats, reptiles, and amphibians utilize the many wetlands on site and Ryerson Lake. Red fox, coyotes, woodchucks, chipmunks, mice, voles, and similar wildlife may be found most commonly in upland portions of the property. Black bear, cougar, beaver, and otter are uncommon transients in the area. Warm-water game fishes such as bluegill, crappie, large-mouth bass, and northern pike are abundant in Ryerson Lake.

Oaks and beech provide an abundance of mast. A large variety of fruit bearing trees/shrubs, vines, grasses and herbs also furnish wildlife food. The existing ponds and wetlands are important sources of water during summer months. Large numbers of den trees and nesting cavities occur throughout the property. At present, no wildlife habitat structures, such as nesting boxes, have been installed on site.

Endangered, Threatened, and Special Concern Species

For purposes of this report, the Michigan Natural Features Inventory (MNFI) database was checked for threatened, endangered and special concern (T&E/SC) animal and plant species that are historically known or presumed to exist on or near the property. The database search indicated that four of Michigan's T&E/SC species or special habitats are likely occur on the subject property. Refer to Appendix B for a copy of the MNFI report and detailed information about the above-referenced listings.

Invasive Plant and Animal Species

The MDNR Wildlife Division has established the control and eradication of invasive species to be a major priority in managing the state's resources. According to Michigan's Wildlife Action Plan, more than 200 invasive plants and animals have been accidentally or intentionally introduced into the Great Lakes Region. These species have caused major ecological damage and economic loss. Invasive species displace native flora and fauna by out-competing them for the available space and nutrients; in some cases forming dense monocultures, which disrupt natural processes. Invasive species are responsible for the decline of endangered plants and animals. Autumn olive, multi-flora rose, honeysuckle, Japanese barberry, garlic mustard, and spotted knapweed were the most obvious invasive species recognized during the field investigations in preparing this plan. See Appendix D for information about the recognition and control of these non-native species.

Archeological, Cultural, and Historic Sites

Federal and state laws protect archeological, cultural, and historic sites from disturbances, destruction, or removal. Landowners should become familiar with the special features on and near their properties, which represent a culture or society of historic value. Such features may include historical buildings, foundations, artifacts, burial grounds, dumpsites, and landmarks.

The Michigan Historic Preservation Office (MHPO) provides online maps and descriptions of historic sites in the state. According to the MHPO, no archeological sites, historical buildings, or other cultural resources are associated with the subject property. The nearest MHPO site is the Penoyer's Sawmill ruins near the M-37 bridge on the Muskegon River in Newaygo.

The Camp Echo property is known to have been a former lumber camp. According to historical accounts ("Logging in Muskegon-The Ryerson Family"), Ryerson, Hills & Company conducted a logging operation on site in the late 1870s, transporting timber products by rail to the Muskegon River. The foundation of the logging company's horse barn remains on the property; lumbering era artifacts are occasionally recovered near the barn site.



Left: This foundation of the former Ryerson, Hills & Co. horse barn remains on the Camp Echo property.
Right: One of many white pine stumps found on the property, remnants from the mid-1800's lumbering era.

MANAGEMENT OBJECTIVES—LANDOWNER GOALS

As determined by Camp Echo, the primary objectives of this management plan are to effectively increase/diversify wildlife use and production, expand recreational opportunities, improve or maintain aesthetic qualities, and properly manage and sustain timber resources. Reforestation may be utilized to re-stock denuded areas.

Secondary management objectives include: improving/maintaining water and soil quality, protecting rare and endangered species, protecting wetland and/or riparian areas, and supporting the fishery in Ryerson Lake.

The following paragraphs define and discuss these prioritized goals and furnish **general guidelines** for achieving them.

Wildlife Population Enhancement—Habitat Improvement

Wildlife **population enhancement** is achieved through a variety of means. Unwanted species can be reduced or eliminated with the use of repellents, scare devices, and enclosure fences. Desired animal species may be introduced through stocking or transplantation. Animal populations may also be increased through habitat manipulation, predator control, artificial feeding, and other methods. Hunting and trapping are very useful tools in managing animal numbers, sex/age ratios, and health. Wildlife populations often need to be regulated to prevent starvation, disease, and property damage.

For all wildlife species, habitat provides four basic needs: food (variety and sustained), water (to drink, to bath), shelter (escape cover, nesting/denning, winter protection) and space (to roam, to intermingle, to rear young). **Habitat improvement** means providing the types of plant communities that favor the wildlife species preferred. The types of forest stands, their ages, and how they are arranged determine which wildlife species will benefit. Different wildlife species utilize the different habitat conditions inherent in each stage of succession. Thus, to increase the variety of woodland animals, several different stages of succession should be furnished. It is important to remember that habitat adjustments on one property will likely affect the larger landscape, such as animal populations on the neighboring properties.

Many landowners prefer having a great variety of wildlife on their property to watch, photograph, hunt, etc. The term **biodiversity** refers to having many different animal and plant species together in one place/vicinity. Biodiversity is attained through vertical and horizontal diversity. Vertical diversity in layers is provided by maintaining different age classes of timber and types of vegetation, including trees, shrubs, vines, and herbs. Horizontal diversity is provided by interspersing habitat zones and by maintaining irregular shapes and sizes of these habitat zones.

In terms of habitat, **edge** is the place where plant communities meet, or where successional stages within communities merge. Often, this is the “richest” area in the forest for wildlife abundance and diversity. For this reason, having a variety of cover types and timber age classes will benefit many wildlife species because of the edges they create. When adjacent to fields and other open areas, a forest edge with vertical diversity will benefit the greatest number of wildlife species. Thus, a grassy meadow should transition to shrubs, then to small trees, and finally to tall timber.

To maintain native wildlife populations in fragmented, human-dominated landscapes, habitat **corridors** should connect small and large vegetation zones. These corridors, or travel lanes, provide a means for wildlife to safely move from one cover type to another, such as from feeding areas to resting sites. Corridors permit genetic flow between populations that would otherwise be isolated. It is important to remember that all properties are part of the larger landscape which extends offsite, and on which many wildlife species depend for various needs.

A forest “opening” is a grassy field or meadow within a wooded area. Openings are important because they provide edge; produce certain important food items; and supply bedding and nesting sites. A number of small, irregular shaped openings should be maintained in heavily wooded areas. Five to ten small (0.5 to 3.0 acres each) forest openings per 100 acres of woods is a desirable ratio.

Aspen should be a primary interest for landowners who wish to manage for ruffed grouse. Grouse need aspen in three age classes: 1) sapling stands from 4 to 15 years old for brood cover, 2) pole and small saw-log stands 16 to 25 years old for fall and spring cover, and 3) old growth aspen 25 to 60 years old for wintering and nesting cover. The buds and flowering catkins of male quaking aspen are extremely important as food. All of these age classes should be available within each 6- to 25-acre grouse territory. Each even-aged aspen stand should range from 0.5 to 3.0 acres in size.

Because aspen is shade intolerant, it often grows in even-aged stands where no other tree species dominates. When aspen reaches maturity at 50 to 60 years of age, it usually gives way to more shade-tolerant species such as oak, maple, and beech. When maintaining aspen stands, clear-cut harvesting is recommended to ensure optimum root sucker regeneration and to remove shade tolerant competitors. On good sites, aspen is ready for harvest as pulpwood in 30 to 35 years. Thus, a 40-year cutting rotation will provide the three age classes of aspen needed by grouse and will produce marketable forest products (saw-logs and pulpwood). White-tailed deer will simultaneously benefit from aspen harvest practices for grouse.

Forests managed for optimum biodiversity should contain the **old growth** succession stage. Among the wildlife species that benefit from old-growth stands are pileated woodpecker, yellow-billed cuckoo, scarlet tanager, wood thrush, barred owl, water shrew, fisher, and gray tree frog. Most forest stands in North America reach the old growth stage after 100 years. The element that makes these areas unique and valuable to wildlife is decay. Old-growth forests contain an abundance of rotting fallen logs and large dead snags. The multi-layered canopy and diverse vegetation provide special cover and food requirements to some animals. Wood warblers and woodpeckers utilize the abundant supply of insect pests that infest dead timber. Moist soil areas and water in old-growth stands furnish breeding habitat for reptiles and amphibians.

Recreational Opportunities

Since the forest is a place of beauty, it furnishes an ideal environment for recreation. Fishing, hunting, camping, berry picking, nature study, hiking, skiing, and snowmobiling are some of the activities associated with forests. In addition to the obvious enjoyment that forests provide, such as scenery and wildlife, shade, wind protection, fragrant aromas, and noise reduction are other important and beneficial functions that enhance recreation. The recommended land practices discussed in this plan are expected to increase recreational enjoyment of the property by improving access, increasing species diversity, and expanding wildlife populations. A particular recreational goal of this plan is to increase environmental education opportunities on the property through improved access to unique habitats and demonstration areas.

Aesthetic Management

The MDNR Forest Division Bulletin entitled “Woodland and Aesthetic Management” describes what most landowners prefer relative to forest aesthetic features. These include: natural appearing forest landscapes, views and vistas of natural scenes, vegetative variety, large trees, open under-story, visually interesting bark characteristics, and fall color. Managing for “aesthetics” does not necessarily suggest a hands-off, preservation approach. The appearance of a forested landscape can be improved by manipulating the vegetation. This includes timber harvest activities. The following guidelines should be used when a primary objective in forest management is to increase aesthetic enjoyment:

- Determine the visual concerns for each area of the property. For example, what is visible from the road or residence, and what areas do not make a major contribution to aesthetic enjoyment?
- Be aware of the visual consequences of various timber management practices, and be familiar with visual mitigation concepts.
- Make sure that visual criteria are included in the timber sale contract when logging professionals are employed.

Forest aesthetics, as applied to the woodlot, have been described as “the beauty, the attractiveness, and the charm of our woodlands.” People like to see things that have a sense of order. Parallel lines (an even-aged conifer plantation), gentle curves (a winding forest trail), and nice symmetry (the shape of a well-developed tree) all have appeal. An unmanaged woodlot can lose these qualities much like one that is improperly managed. This occurs when “weed” tree species, diseased or damaged trees, and dead timber become increasingly manifest.

Harvesting timber is a disruptive affair even under the best circumstances. To many people, logging operations are noisy and unsightly. An untrained eye cannot see the immediate and long-term benefits to wildlife, water, and recreational opportunities that will evolve from proper forest management. For this reason, landowners should preview operations (including site restoration and cleanup) on properties similar to their own, by loggers and foresters they intend to employ. In some cases, small demonstration areas can be established on-site to acquaint landowners with the process and outcome before work is done on a grand scale.

Where aesthetic values are important, a portion of the timber sale proceeds can be earmarked for restocking the harvested trees. In many cases, the re-placement trees will ultimately increase the value of the timber stand, and likewise the property itself. Fast growing deciduous species and/or conifers may be stocked to rapidly re-gain vegetative cover. A variety of replacement trees and flowering shrubs may also be selected to diversify the forest and its wildlife inhabitants. The access roads created during logging operations may be converted into hiking paths or cross-country skiing trails. Thus, there are many immediate and long-term benefits of timber management which can be gained without fully compromising aesthetic values.

Aesthetic management also involves natural features other than vegetation. Improved access to special areas on the property such as bogs, springs, rock piles, waterfalls, or geological formations often improves the enjoyment of these features. Such access may include foot trails, viewing platforms, sitting benches, and boardwalks.

Timber Production and Management

Proper forest management is required to maximize the quality and production of desired timber species based on site conditions including soil fertility, hydrology, and other factors. In managing timber, certain measures are taken to eliminate inferior species, promote forest health, regulate stand density, increase tree growth, provide for natural regeneration, and control length of rotation. The management techniques employed may include thinning, release cuttings, weeding, pruning, and more aggressive harvesting methods.

Timber stand improvement (TSI) is a conscious effort made in a forest stand to improve future growth and quality. Three specific objectives of TSI are: 1) to develop a quality stand by removing defective, damaged, or otherwise undesirable trees, thus concentrating growth on fewer high quality trees; 2) to promote the growth of high value trees by removing species of low economic value; and 3) to encourage optimum growth of the residual stand by regulating the number and distribution of trees. Careful planning of a TSI operation will maximize the commercial value of timber stands and greatly reduce wasted forest resources.

Timber harvesting is an essential part of forest management which, when carefully planned, results in the production of usable economic products. It also provides the opportunity to regenerate the forest through reforestation or improve its quality by removing undesirable trees. The objectives of timber harvesting include: removal of mature trees when they have reached prime economic value; removal of low value species and defective trees; regulating the growing space between desirable trees; and providing space for the establishment and development of new seedlings.

The characteristics of an individual forest stand will normally determine the method of harvesting to be used. Selection of the appropriate method depends on the biological requirements of the species present, the amount of regeneration naturally taking place, the amount of competition from undesirable species, soil type, and other site characteristics. Four major recognized methods of harvesting have been determined for each natural forest type present in Michigan. These are clear-cutting, seed tree method, shelter-wood method, and selection method. Where prescribed in this plan, the major objectives in timber harvesting will be to improve the quality of the upland hardwood stands on the property, sustain habitat requirements for deer and turkeys, and utilize merchantable forest products.

Agroforestry should be a consideration among landowners who wish to integrate agriculture, forestry, and wildlife management. The five basic types of agroforestry in the U.S. are alley cropping, forest farming, riparian forest buffers, silvopasture, and windbreaks. These multipurpose systems support food, fiber, and energy production as well as increase wildlife habitat. while reducing negative environmental impacts such as erosion and water pollution. More information about agroforestry is included in Appendix D.

Since forest plants and soils “store” carbon, timber production and management affect the natural cycles of that storage in living and dead plant material. The removal of carbon from the atmosphere is a process referred to as **carbon sequestration**. In this manner atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils. The sink of carbon sequestration in forests and wood products helps to offset sources of carbon dioxide to the atmosphere, such as deforestation, forest fires, and fossil fuel emissions. Heightened atmospheric carbon dioxide is widely believed to be responsible for global warming. Sustainable forestry practices can increase the ability of forests to sequester atmospheric

carbon while enhancing other ecosystem services, such as improved soil and water quality. Planting new trees and improving forest health through thinning and prescribed burning are some of the ways to increase forest carbon in the long run. Harvesting and regenerating forests can also result in net carbon sequestration in wood products and new forest growth.

Tree Planting-Reforestation

While carbon sequestration is one goal in planting trees and shrubs; the many other reasons include timber production, wildlife habitat improvement, windbreaks, erosion control, and aesthetics. Where prescribed in this plan, the main objectives are wildlife habitat improvement, forest diversity, and aesthetic management. Appendix D contains a tree/shrub planting guide for reference.

Water and Soil Quality

Controlling erosion is a major objective in improving and maintaining high water and soil quality. Sound conservation practices that will protect soil and water include the use of windbreaks, crop rotation, buffer strips near wetlands, no-till planting methods, and contour farming. In addition to those listed above, management practices that improve the quality of soil include using cover and green manure crops, legumes in rotation, nutrient management, integrated pest management, and irrigation water management. A professional soil conservationist or farm services agent should be consulted for assistance with these endeavors.

The 2014 Farm Bill has reenacted the Conservation Reserve Program (CRP), the Wetlands Reserve Program (now part of the ACEP), and other conservation programs designed to control erosion and protect wetlands. Through these programs, funds are available for technical assistance and cost-sharing on conservation practices.

Rare and Endangered Species

The Endangered Species Act of 1974 authorized the MDNR to prepare a list of threatened and endangered species, and to develop plans for their protection. More than 200 species were listed as threatened or endangered by the Michigan Technical Advisory Committee; about 90 species were named as being rare; and 25 were stated to be extinct. Before any state threatened or endangered species is harmed, including transplanting, a T&E permit must be obtained from the MDNR-MNFI office.

Many factors may reduce a species population size to the point where its survival is jeopardized. These factors include habitat destruction, exploitation, habitat restriction, and disease or pest introduction. One major concern of conservation biologists today is the fragmentation of large segments of natural habitat into small isolated patches. Many species, such as flying squirrels, tanagers, flycatchers, and thrushes, depend on large tracts of unbroken, uniform habitat. When fragmenting once continuous habitat, it is very important to furnish travel corridors between the resulting segments. This will minimize isolation and the loss of genetic variety.

Wetland and Riparian Area Protection

Wetlands are unique ecosystems that serve as the transitional zone between upland and aquatic habitats. Wetland areas are typically identified by the presence of 1) water at or near the surface of the ground for at least part of the year, 2) distinctive soil types which develop

under water-saturated conditions, and 3) plants adapted for living in these soils. Since wetlands are very productive, they play a significant role in maintaining a high level of biological diversity. Not surprising, wetland habitats are critical to the survival of many threatened or endangered species. Approximately 30 percent of Michigan's threatened and endangered plants and 60 percent of the threatened and endangered animals are wetland species. Of course, wetlands are also valuable for preserving water quality, providing flood control, and producing fish and game species.

In order to protect these valuable natural resources, the State legislature passed Public Act 203 of 1979, the Goemaere-Anderson Wetland Protection Act (now part 303 of Act 451, 1994). This act and other wetland statutes regulate construction activities in certain wetlands by requiring a permit from the Michigan Department of Environmental Quality (MDEQ) for dredging, draining, or filling projects. By definition, all of the wetlands present on the subject property appear to be protected. As a result, any work within these wetlands, involving the above listed activities, should be conducted under the appropriate permit.

Riparian zones are those areas adjacent to rivers, streams, lakes, and other wetlands. Lakeshore and streamside forests are very important in maintaining water quality by removing nutrients and sediment from surface runoff and shallow groundwater. Riparian forest buffer zones also shade streams to optimize light and temperature conditions for fish and other aquatic organisms.

The riparian forest not only improves water quality but also supports a large variety of wildlife. The many kinds of plants, including grasses, sedges, vines, shrubs, and trees, that thrive in these wet-soil areas provide food and nesting sites for wildlife. The streamside forest maintains high biological productivity and diversity in the adjoining water system.

Forested buffer zones at least 100 feet wide should be left around wetlands larger than one acre in size and along all rivers and streams. A buffer zone between 50- and 100-foot wide is acceptable for small wetlands and vernal ponds less than an acre. These criteria are generally adhered to in this plan. Selected trees can be carefully harvested from wetlands and riparian areas during periods of summer drought and winter when the ground is frozen. Do not disrupt the soil or remove stumps in buffer zones.

Fisheries Management

Maintaining a viable fishery is a common goal among landowners who enjoy fishing and have lakes, ponds or streams on their property. Based on the existing limnological conditions (water temperature, oxygen levels, etc.), the appropriate fish species can be stocked and managed.

Fisheries management programs can be fairly complex. For example a management program could include extensive habitat modifications, artificial feeding, aeration, harvest/size limits, and aquatic weed control. Poorly managed or unmanaged systems may result in fish die-offs, stunted populations, or improper growth patterns. The Michigan State University (MSU) publication entitled "Managing Michigan Ponds for Sport Fishing" is a useful guide to landowners who wish to manage ponds and lakes for fishing. The primary goal at this time with respect to fisheries management will be to cooperate with the established Ryerson Lake Association in protecting water quality and stocking fish. Since Ryerson Lake is private, the MDNR does not participate in lake management projects. A private-sector fisheries consultant may be retained to monitor fish populations and recommend management strategies.

PRESCRIBED MANAGEMENT PRACTICES

Figure 5a designates seven management units (A through G) for the property based on the present forest or herbaceous cover. The following pages provide a detailed description of each management unit and the specific prescribed management activities for each unit for the ten-year period 2015 to 2025. The prescribed activities for the entire property are illustrated on Figures 6a and 6b.

Upon acceptance of this FSP plan, the landowner is not obligated to implement any prescribed practice or adhere to the timing schedule of planned management activities (see Pages 13-30). Likewise, the landowner is free to alter the location or extent of planned activities.

MANAGEMENT UNIT INFORMATION

MANAGEMENT UNIT: A NUMBER OF ACRES: 25.45

=====MAJOR OBJECTIVES FOR THE UNIT=====

Recreation and Education
Soil and Water Quality, Aesthetics

=====EXISTING CONDITIONS=====

COVER TYPE AND MAJOR SPECIES: Unit A includes the main campus of Camp Echo, staff residences, and well developed program areas. The timber component of this unit consists of mature red oak, sugar maple, and red maple. Smaller numbers of white pine, black oak, white oak, silver maple, black cherry, American beech, and black walnut are intermixed or localized. The sparse understory contains apple/fruit trees, landscape shrubs and arborvitae. Lawn grasses, clover, dandelion, and violets are common herbaceous species.

SIZE CLASS: saw-logs

SOIL TYPES: Coloma sand, Metea loamy sand

SITE QUALITY: Good

STAND QUALITY: Good

STAND DENSITY: <30 ave.

MANAGEMENT UNIT DESCRIPTION: Largely situated on a peninsula, Unit A is ideally located for camping—yielding pleasant views and access to Ryerson Lake on three sides. A map of central campus within Unit A, identifying buildings and recreational facilities, is presented in Appendix A. One portion of the unit contains the ruins of the former Ryerson, Hills & Co. lumber camp horse barn (photo Page 5); thereby it offers historical significance. Manicured lawns, giant trees, landscape plantings, well-maintained buildings, and the beach frontage are some of the aesthetically pleasing attributes. The varied habitats and extensive edge attract a diverse population of songbirds, waterfowl, deer, and small mammals to parts of the unit.

=====PLANNED MANAGEMENT ACTIVITIES (PRESCRIPTIONS)=====

for the next ten years: 2015 to 2025

In accordance with the expressed mission of Camp Echo; recreation and education will be utilized to promote healthy living, support youth development, advance social skills, and instill environmental ethics/responsibility. While diverse facilities are already in place to achieve many of these goals, more options may be considered. The newly constructed nature center in Unit A is in close proximity to wetlands and beech maple forest—two habitat types that are very important in the greater ecosystem, and often needing protection. The well-developed network of trails (see trail map in Appendix A), originating from main campus, accesses a diverse set of other natural habitats. Signage could be installed to identify these areas and their special attributes. A particular goal of this plan is to teach sound forest and wildlife management practices to camp visitors. More opportunities to meet this goal are illustrated as “demonstration areas” on Figures 6a/6b and presented in the planned activities discussions for other units.

Water and soil quality will be maintained in Unit A by avoiding erosion and siltation caused by soil disturbance near wetlands and the lake; a 50- to 100-foot wide vegetative buffer zone is recommended. Silt fencing can be installed where temporary soil disturbance occurs in highly erodible areas. Lawn maintenance should exclude the use of fertilizers and herbicides where runoff is possible. Storm-water should be initially directed to a wetland so that ample filtration will occur before it reaches the lake. Similar to other lake residents, Camp Echo discharges all sanitary waste to the township sewer system.

While timber cutting is not desired in the main campus area, limited TSI may be employed in some outlying portions of Unit A. The main TSI objectives will be to salvage or eliminate dead timber (EAB affected ash) and unsightly, defective trees. Pruning may be utilized to enhance the appearance and future value of certain trees (especially black walnut) in the unit (see pruning directives in Appendix D).

Songbird use and diversity may be increased in outlying portions of Unit A with the placement of nest boxes--install three to five nest structures (with predator guards) for bluebirds, tree swallows, and wrens. Remove old nesting material from these structures during late winter each year.

It appears that the duration and/or level of surface water in the wetland adjacent to the nature center may be increased with installation of a small earthen dam and drop-pipe control structure. Thereafter, encircle the wetland with a walking trail. See Figure 6b for project location and Appendix B for guidelines.

Finally, in conjunction with the other educational demonstrations being planned, consideration may be given to engaging an archeological dig at the Ryerson, Hills & Company barn foundation. Uncovered relics and information about the mid-1800's logging operation could be displayed in a kiosk at the barn site. Or, simply register the barn site with the MHPO.



The aesthetic qualities of Unit A include open vistas and well-maintained buildings.



The beach area on Ryerson Lake is a significant recreational asset at Camp Echo.

MANAGEMENT UNIT INFORMATION

MANAGEMENT UNIT: B NUMBER OF ACRES: 207.59

=====MAJOR OBJECTIVES FOR THE UNIT=====

Timber Production/Forest Management
Recreation, Environmental Education

=====EXISTING CONDITIONS=====

COVER TYPE AND MAJOR SPECIES: Unit B is a mixed-aged, upland hardwoods forest. The DBH (diameter at breast height) for trees in this unit ranges from 8-30 inches. Although timber species in the unit are generally intermixed, two areas are more distinct in composition; a stand including mature American beech and sugar maple (Michigan's climax forest), and a stand including mature red oak. In addition to these three tree species, Unit B commonly supports black oak, white oak, red maple, large-tooth aspen, and black cherry. White ash, black locust, white pine, black walnut, and red pine are minor components in the unit. The under-story (varying densities) contains maple and beech saplings, ironwood, hawthorn, witch-hazel, autumn olive, and multi-flora rose. The sparse to medium ground cover includes various seedlings, upland grasses, sedges, mosses, mandrake, violets, lily-of-the-valley, and garlic mustard.



A hiking trail courses through this beech-maple stand in Unit B, just north of main campus.

SIZE CLASS: Small sawlogs/sawlogs

SOIL TYPES: Marlette loam, Metea loamy sand
Metea/Marlette/Spinks complex

SITE QUALITY: Good

STAND QUALITY: Good

STAND DENSITY: BA = 110 (70-130)

MANAGEMENT UNIT DESCRIPTION: Remnant stumps throughout Unit B are a testament to the many giant white pines, which dominated the landscape before the mid-1800's lumbering era. Perhaps due to site conditions, white pine did not re-establish itself as a major upland forest component on the property. Current variations in stand density, species composition, and growth rates are probably related to the many different soil types, slopes, and other factors. Having developed without harvest or management for so many years, the unit now supports large numbers of multi-stemmed and poor-formed trees. However, it also contains quality red oaks, black cherry, and sugar maples. The diversity of available wildlife habitats includes dense stands of young maples, mature open woods, stream bottomland, hillside seeps/springs, and vernal ponds. Mature oaks, beech, and black cherry are the primary sources for mast (nuts, seeds), roosting sites, nest cavities, and dens. Numerous trails and two-tracks within the unit provide recreational access (Figure 5b).

=====PLANNED MANAGEMENT ACTIVITIES (PRESCRIPTIONS)=====
for the next ten years: 2015 to 2025

Timber Production/Forest Management

Figure 6 illustrates the general locations in Unit B where selective harvest, TSI operations and an aspen clear-cut may be considered at this time. The selective harvest will focus primarily on mature sugar maple and red oak in the northeast and southern portions of the unit, respectively. Mark trees for harvest that are at least 18" in diameter at breast height and healthy. The typical harvest tree will possess at least one clear saw-log (16-feet). Smaller diameter trees of high value can be harvested when they are too close to each other and are competing for space.



A selective harvest in this red oak stand will produce valuable forest products and reduce crowding.

Concurrently, TSI work is also needed to release future crop trees and exclude low value timber. This is especially true for the north-central portion of Unit B where much of the poorly formed timber occurs. TSI activities will focus on the removal of multi-stemmed trees,

damaged/defective trees, and tree species that have little future market value. Thereby, the remaining high-value, well-formed trees will grow faster. Most of the timber that is removed during the TSI operation can be marketed as small saw-logs, pallet material, or chipped for pulp.

During select harvest and/or TSI operations, always take precautions to avoid damaging residual trees, especially good-form, pole-sized hardwoods where they occur in the under-story. Avoid using heavy machinery on steep slopes; in some cases trees can be safely cabled. Timber operations during winter when the ground is frozen or mid-summer after drought will minimize rutting, compaction, and other soil impacts. During harvest and TSI operations, do not reduce the basal area below 80 and do not remove more than one-third of the basal area at any one time (e.g. BA 120 can be reduced to BA 80). Before timber operations commence, layout logging access roads within the property that will ultimately serve as recreational access trails. One such trail will better access the eastern extent of the property (see Figure 6a).

Following the TSI operation, pruning and thinning may be needed in some locations to produce future crop trees including oaks, sugar maples, and black cherry. Thinning is employed to properly space future crop trees in the stand—allowing each selected tree ample growing space for rapid development. Prior to commencing a thinning process, the trees which have the highest potential to become valuable timber can be marked with paint or flagging. Selected trees (saplings and poles) will include those trees that are already straight-formed and have no visible defects such as cankers or deer damage. Also, choose trees that are already sufficiently spaced, for example 6-inch poles that are at least 10 feet apart. The thinning process then involves the removal of the surrounding trees of all species in the same or similar age class. Thinning can be accomplished by cutting and removing or simply girdling the unwanted trees. To determine the proper spacing between trees at any point in time, multiply the DBH of the selected crop tree by 1.67. This calculation produces the distance in feet that trees should be apart from each other, e.g. 6 inches X 1.67 = 10 feet.

Continued pruning will be required for those trees (saplings and poles) that have been selected as potential crop trees. The primary objective in pruning is to produce a clear single straight stem up to a height of 18 feet or higher if possible. The traditional hardwood log is 16 feet in length. As the selected crop trees grow, repeat pruning treatments will normally be required to attain a clear 16-foot+ log. In general, pruning activities should be accomplished during winter months from October through March, before buds break and leafage begins to develop. During pruning efforts, kill grape vines that extend into the crowns of future crop trees. Simply cut the vines at their base; removal is not necessary. To prevent oak wilt, a fungal disease resulting in mortality; do not prune, cut, or otherwise injure oak trees between April 15 and July 15.

Also following TSI and harvest operations, open areas may be restocked with sugar maple, American basswood, Eastern hemlock, white pine, and other shade-tolerant tree species. Larger forest openings can be stocked with red oak, which requires abundant sunlight. Protect stocked trees (and naturally regenerated seedlings, if preferred) with fencing or repellants to deter rabbits and deer. Protection should remain in place until tree plantings are pole-sized.

The proposed aspen clear-cut will re-generate a “pure” aspen woodlot on the property. The values of aspen management, primarily to benefit wildlife, were discussed on Page 7. For education purposes, the aspen clear-cut will serve as a forest management demonstration area.

To maximize biodiversity on the property and provide aesthetic beauty, retain several areas depicted on Figure 6b as old growth forest. Specifically, these areas are difficult to access or have important riparian area values. The beech-maple stand directly north of main campus

should be retained (old growth forest) as a unique forest community on site.

To benefit deer and turkeys in Unit B, retain several mature, acorn-producing white oaks in the unit. Identify and protect other trees in the stand that appear to have wildlife value. Such trees may possess hollow trunks for dens, cavities for nesting, or lateral limbs for perching.

For the benefit of rare and endangered animals, several hillside springs, seeps, and vernal pond areas in Unit B should remain undisturbed and otherwise protected. These areas expand animal diversity; furnishing special food requirements and breeding habitats for certain amphibians, reptiles, and insects. Springs are an important source of drinking water and food plants in winter. Maintain a buffer zone of at least 50 feet around these wetlands; avoid introducing runoff, felled trees, etc.



Vernal ponds and other temporary surface water areas should be protected in Unit B.

Recreation and Education

New recreational access can be considered an attractive by-product of timber management operations. Predetermine the desired course of logging roads and skid trails, which will ultimately become hiking access on the property. Additionally, utilize timber activities to serve as demonstration areas, exemplifying selective harvest, TSI, and other forest or wildlife management techniques. Additional forestry displays along trails may include examples of “wolf” trees, wildlife den trees, remnant timber era stumps, and tree harvest stumps to “count the rings”. Signage can be installed for these educational purposes. Occasional brush removal and similar grooming will be needed to maintain recreational access.

As identified on Figure 6b and pictured on Page 3, an improved trail is needed to better access the stream and “waterfall” area in Unit B. The addition of a concrete dam and rip-rap (i.e., large rocks) at the mouth of the stream would heighten aesthetic values, maintain surface water in the up-gradient wetland, and reduce erosion potential within the stream channel. A viewing deck or benches at the waterfall may also be considered. MDEQ and Newaygo County earth-change permits will be needed for these projects.

MANAGEMENT UNIT INFORMATION

MANAGEMENT UNIT: C NUMBER OF ACRES: 49.70

=====MAJOR OBJECTIVES FOR THE UNIT=====

Soil and Water Quality, Environmental Education

=====EXISTING CONDITIONS=====

COVER TYPE AND MAJOR SPECIES: Unit C consists of several designated agricultural fields, which are share-cropped by local farmers. Common agricultural crops in these areas include alfalfa/clover (i.e., hay), rye, corn, and soybeans. A variety of grasses and forbs have volunteered from native seed sources in nearby fields.

SIZE CLASS: NA

SOIL TYPES: Coloma sand, Metea/Spinks loamy sands

SITE QUALITY: Good

STAND QUALITY: NA

STAND DENSITY: NA

MANAGEMENT UNIT DESCRIPTION: While share-cropping generates a small annual income for Camp Echo, it also provides vegetative diversity on the property and bolsters the local economy through cash crop production. Many bird and mammal species find desirable cover and specialty food items in the Unit C crop fields. Hayfields are especially useful to songbirds and turkeys for nesting and insect gathering; while the waste grain in corn and bean fields attract deer and waterfowl after harvest. The open hayfield directly north of main campus, which is by-passed on all sides by trails, provides ideal wildlife view opportunities.

=====PLANNED MANAGEMENT ACTIVITIES (PRESCRIPTIONS)=====

for the next ten years: 2015 to 2025

The open field areas, which comprise Unit C, are expected to remain actively used for agricultural crop production during the ten-year period of this plan (2015-25). As such, these areas will also serve important wildlife functions and help maintain soil/water quality on the subject property. Within the environmental education program, Unit C can be utilized in teaching soil and water conservation as an integral part of land stewardship. Wise farming practices/methods such as conservation tillage, green manure, winter cover crops, vegetative buffers, and wind breaks can be exemplified.

preceding photo, much of the timber in Unit D is small diameter and poor quality. The forest floor remains wet or saturated during the growing season. Small numbers of trees in the unit have been lost to wind-throw, and most of the ash has been impacted by EAB. Since excessively wet soils hamper mobility, hiking trails on the property largely bypass the unit. Linear in shape, the edges of Unit D form important travel corridors for wildlife.

=====PLANNED MANAGEMENT ACTIVITIES (PRESCRIPTIONS)=====
for the next ten years: 2015 to 2025

The primary recommendation for Unit D is to protect it from degradation and perpetuate its functions and values. Maintain a buffer area of 50-100 feet wide around its perimeter; restricting vehicular traffic, stump removal, fertilizers, herbicides, etc.

Based on soil type and wetness, brush and lowland tree species will continue to dominate the unit. Quality timber production and management are not feasible, although some merchantable trees may be periodically extracted from the upland edge. Firewood can be gleaned from the area during winter months with the use of snowmobiles.

To enhance waterfowl production on the property, two or three wood duck nest boxes can be installed along the forested edge of Ryerson Lake. Place these boxes 4-5 feet above the water affixed to smooth, steel pipe or 10-15 feet above ground on lakeshore-trees with predator guards. Replace wood chip bedding in the box every year in February. Install and tend these boxes during February while the lake is ice-covered.

MANAGEMENT UNIT INFORMATION

MANAGEMENT UNIT: E NUMBER OF ACRES: 25.95

=====MAJOR OBJECTIVES FOR THE UNIT=====

Wetland and Riparian Zone Protection
Wildlife Habitat, Threatened and Endangered Species

=====EXISTING CONDITIONS=====

COVER TYPE AND MAJOR SPECIES: Unit E includes all of the emergent/scrub-shrub wetlands and their riparian areas on the property. Timber species within this unit, primarily along edges, include red maple and quaking aspen. Willow, buttonbush, winterberry, speckled alder, and leather-leaf are the most common shrubs. The emergent communities are dominated by sedges, bulrush, blue-joint grass, reed canary grass, cattails, and goldenrods. Open water areas support sub-emergent plants, such as pondweeds, coon-tail, and water-weed.

SIZE CLASS: N/A

SOIL TYPES: Carlisle muck, Parkhill loam

SITE QUALITY: NA

STAND QUALITY: NA

STAND DENSITY: N/A

MANAGEMENT UNIT DESCRIPTION: The wetland habitats in Unit E greatly diversify plant and animal populations on the property by providing shallow water conditions, expanded food items, and emergent cover. The unit attracts/produces aquatic insects, amphibians, reptiles, furbearers, waterfowl, and many other species that otherwise would not be present. The edges of these areas are traveled by deer and furbearers. One of the wetlands in the unit may be considered a sedge meadow or fen, a unique area on the property. Another wetland in this unit is a man-made impoundment, possibly a former NRCS project.



The diverse emergent/scrub-shrub wetland habitats in Unit E include a fen (left) and an impoundment-marsh (right).

=====PLANNED MANAGEMENT ACTIVITIES (PRESCRIPTIONS)=====
for the next ten years: 2015 to 2025

The primary recommendation for Unit E is to protect it from degradation and perpetuate its functions and values. Maintain a buffer area of 50-100 feet wide around its perimeter and avoid using fertilizers, herbicides and pesticides in the shoreline areas. Do not fell trees into these areas or remove dead snags, which serve as perches and nest sites.

The unit's diverse wetland habitats provide an excellent educational opportunity. Consider further exposing these special areas with new trail additions, including boardwalks and raised observation decks (see Figures 6a/6b). Some of these project types may require a MDEQ permit.

The southern portion of Unit E, a man-made impoundment, can be utilized for wetland wildlife production. As shown on Figure 6a, enhance this wetland complex for waterfowl, songbirds, and reptiles by installing a variety of habitat structures. Several wood duck nest boxes, loafing platforms, and songbird nest structures can be provided. Place nest boxes 4-5 feet above the water affixed to smooth, steel pipe or 10-15 feet above ground on a nearby tree with predator guards. Remove old nesting material from songbird boxes, and replace wood chip bedding in the wood duck boxes every year in February. Installing and tending the boxes can be easily accomplished above ice during the winter.

MANAGEMENT UNIT INFORMATION

MANAGEMENT UNIT: F NUMBER OF ACRES: 16.05

=====MAJOR OBJECTIVES FOR THE UNIT=====

Timber Production/Forest Management
Wildlife Management

=====EXISTING CONDITIONS=====

COVER TYPE AND MAJOR SPECIES: Unit F is a series of conifer plantations, which range from 30 to 80 years in age. Red pine and Scotch pine are the dominant tree species in this unit; scattered black oak and black cherry, which seeded in from adjacent forest, occur as sub-dominants. The fairly open understory includes autumn olive, blackberry, and various hardwood seedlings/saplings. Shed needles, grasses, and mosses cover the ground.

SIZE CLASS: Small saw-logs

SOIL TYPE: Allendale and losco loamy sands,
Eastport-Grattan sands

SITE QUALITY: Fair

STAND QUALITY: Fair

STAND DENSITY: BA = 150+/-

MANAGEMENT UNIT DESCRIPTION: Lacking proper management in the past, the conifer plantations in Unit F are now over-crowded and, in some cases, stunted. The heavily-shaded lower branches of many trees have died. But, as yet, crowding has not resulted in a significant die-off of sub-dominants. With frontage on 32nd Street and the driveway to main campus, large parts of the unit are highly visible to passersby. As a wildlife habitat; the unit offers dense overhead cover, roosting/nesting sites, and a few grassy openings for basking or insect gathering.



Some of the conifer stands in Unit F are now very over-crowded; growth is stunted.

=====PLANNED MANAGEMENT ACTIVITIES (PRESCRIPTIONS)=====
for the next ten years: 2015 to 2025

To facilitate the production of more valuable red pines in Unit F and assure future health and vigor, a thinning removal of at least one-third of the trees in some stands is needed. Exclude every third row of pines, thereby lowering the basal area within these plantations to approximately 90. Where possible, remove poorly formed, crooked, and twin-stemmed trees during thinning operations. Additionally, a selective cut of a few mature red pines can be accomplished in the western portion of the unit. During thinning/harvest operations, non-marketable coniferous timber and slash should be chipped or burned to avoid future insect pest infestations.

As a general rule, when managing pine plantations for optimum growth and saw-log production, two pre-harvest thinnings are usually recommended. These thinnings are usually accomplished when the stand is 25-30 and 40-45 years old. In the initial thinning, every other or every third row is completely removed; leaving no more than 700 trees per acre. During the second thinning all remaining trees showing poor form or damage are selectively removed; leaving 100 to 150 crop trees per acre. The final harvest of mature, high quality timber occurs when the stand reaches 80 to 120 years of age. These trees can be marketed for telephone poles or as log home material. Some red/white pine stands reach 200 years of age, and some individual trees survive to age 400. A select number of giant, old-aged conifers can be retained on the property for aesthetic values.

In conjunction with TSI or clear-cutting operations planned for other units on the property, all Scotch pine should be removed through a clear-cutting process. Scotch pine, once valued for Christmas trees, is a non-native variety that has little potential in saw-log markets. Furthermore, Scotch pine harbors diseases and pests, which can affect the more desirable native species. Following the clearance of Scotch pine, replant the area with white pine, red pine, or a hardwoods mixture. For aesthetic purposes, do not clear-cut along the edge of the driveways—maintain a timbered buffer zone. Remove the buffer strip gradually as planted trees in the background mature.



Non-native Scotch pines, such as these, have little future timber value and should be replaced.

MANAGEMENT UNIT INFORMATION

MANAGEMENT UNIT: G NUMBER OF ACRES: 47.78

=====MAJOR OBJECTIVES FOR THE UNIT=====

Wildlife Habitat Management, Environmental Education
Invasive Plant Control

=====EXISTING CONDITIONS=====

COVER TYPE AND MAJOR SPECIES: Unit G is generally categorized as idle fields. These areas now sustain upland grasses, goldenrod, common milkweed, Queen Anne's lace, black mustard, fleabane, clover, asters, dandelion, and many other forbs. Dewberry, blackberry, sweet fern, autumn olive, honeysuckle, multi-flora rose, and various saplings are common shrub species. The northern portion of the unit supports a fenced orchard and scattered young black cherry, sassafras, oaks, red juniper, and pines. The southern portion of Unit G was used, in part, for corn and clover production; the corn plantings failed and were abandoned in 2013. These areas are now fallow, having been replaced with grasses and forbs.



This abandoned corn planting in southern Unit G is now invaded with grasses and forbs ("weeds").

SIZE CLASS: NA

SOIL TYPES: Coloma sand, Marlette loam, Metea loamy sand

SITE QUALITY: Good

STAND QUALITY: N/A

STAND DENSITY: N/A

MANAGEMENT UNIT DESCRIPTION: Unit G is a grass-dominated habitat that is ideal for ground nesting wildlife and small rodents. The old-aged field conditions may be especially valuable to meadowlarks, sparrows, turkey broods, mice, voles, cottontail rabbits, groundhogs, and foxes. The grassy cover provides fodder, insects, and seeds. Brushy thickets and fruit bearing shrubs attract an assortment on songbirds such as thrashers, catbirds, cardinals, yellow

warblers, and goldfinches. Goldenrod and other flowering plants in this unit furnish sources of nectar to bees, butterflies, and other pollinators.

=====PLANNED MANAGEMENT ACTIVITIES (PRESCRIPTIONS)=====
for the next ten years: 2015 to 2025

If properly developed, the northern portion of Unit G appears to have potential as a Karner blue butterfly (Kbb) habitat. This butterfly species, which is listed as threatened by the Michigan Natural Features Inventory (MNFI), occurs in Newaygo and only a few other Michigan counties. To enhance this section of Unit G for Kbb, the means will include knapweed control, lupine (host plant) planting, and nectar plant development. The U.S. Forest Service at Baldwin can be contacted assistance. This project, if successful, could furnish a worthwhile educational opportunity and be a great public relations tool. The project area will be viewable by the public from 32nd Street.

The primary recommendation for the western portion of Unit G is invasive plant control. While this area appears to have been used for grazing in the past, it now supports a fair amount of brush. In particular, multi-flora rose is becoming well established. Appendix D includes information about eradicating this and other invasive plants. Periodic grazing or mowing can be employed to maintain grassy cover.



Multi-flora rose, which is well established in eastern Unit G, should be eradicated.

With its fertile soil and sunny exposure, the southern portion of Unit G provides the best location on the property for establishing a native grass prairie habitat (see Figure 6a). Native grasses, which furnish ideal nesting cover for birds, can be mixed with wildflowers to attract butterflies and other pollinators. The NRCS and the U.S. Fish & Wildlife Service both provide cost-share and guidance to landowners who wish to establish native grasses and pollinator habitat. Directives for establishing native grass plantings are included in Appendix B. In maintaining native grass areas, an experienced professional may be required to conduct prescribed burns.

Additional wildlife management considerations for the southern portion of Unit G may include the development food plots and pollinator habitat; periodic mowing to control brush; producing a brushy fence-row travel lane; installing nest boxes; and planting grouped conifers for cover. In conjunction with the wetland wildlife habitat planned for southern Unit E, the referenced upland practices in southern Unit G will effectively establish a wildlife habitat demonstration area for educational purposes. This wildlife habitat demonstration area project could qualify for enrollment in a grant program offered by the MDNR Wildlife Division.

To benefit game species and other wildlife in southern Unit G, diversify food plot crop species. Supplementary crop plantings may include corn, sorghum, sunflowers, buckwheat, wheat, millet, chicory, rape, oats, clover, and alfalfa. The crops in wildlife food plots should be planted in alternate years and rotated to maintain soil nutrients. Free or low-cost seed may be available from Pheasants Forever, Inc. or similar conservation organizations.

When creating or managing food plots and grassy nesting cover, the following practices will further benefit wildlife and protect soil and water quality:

- 1) Retain stubble and waste grain on the surface of the ground through winter months and avoid winter plowing.
- 2) Reserve several rows of standing crop near brushy cover and woodlots through winter.
- 3) Postpone the first cutting of grasses and/or hay until after July 1st to protect ground nesting birds. Complete controlled burns in grass areas before May 1st.
- 4) Minimize the use of herbicides in crop fields by using the no-till method. Avoid using herbicides and phosphorus fertilizers near water.
- 5) In late summer, mow alternate sections of idle field areas to control brush and expose insects. Do not mow host plants (e.g. milkweed) or nectar plants while in use by butterflies.
- 6) Time plantings of oats, rye, barley, and turnips in food plots so that crops mature in early fall and green browse is available in early spring.
- 7) Retain narrow, idle strips such as brushy fencerows between food plot compartments.

Idle, old-field areas should be maintained in portions of Unit G for specific wildlife needs and species diversity. Periodic mowing every three to four years is usually required to control brush and maintain grassy cover.

SUMMARY OF PLANNED MANAGEMENT ACTIVITIES

Management activities to be accomplished within the next 10 years (2015-2025)

<u>Unit</u>	<u>Acres or Approx.#/Unit</u>	<u>Prescription</u>	<u>Year</u> <u>Planned</u>	<u>Year</u> <u>Completed</u>
A, D, G	5, 3, 9	Install / maintain artificial wildlife structures	2015-25	
A, E	1, 1	Develop surface water impoundments	2016-20	
B	100A	TSI to improve timber stand & growth* Concurrent selective harvest	2015-21	
B	1.5A	Clear-cut aspen - wildlife cover and regen.**	2015-21	
B	0.5 mi total	Create/maintain logging trails for access; grass/mulch (new trail soil stabilization)	2015-21	
B, F	300, 500	Plant hardwoods for aesthetics and restock	2015-22	
B, F, G	150, 1500, 75	Plant conifers for aesthetics/wildlife/restock	2015-22	
E	300 ft	Construct boardwalk trail through wetland	2016-20	
F	15A	Thin conifers for health and growth Concurrent selective harvest	2015-21 as needed	
F	6A	Clear-cut to remove Scotch pine	2015-21	
G	75	Plant shrubs in brushy fence-row	2015-22	
G	5.5A	Develop/maintain wildlife food plots	2015-24	
G	2.5A / year	Mow to maintain grassy nesting cover	2015-25 odd years	
G	3.5A	Develop native grass prairie	2015-22	
G	0.10 mi	Utilize hinge-cutting for wildlife corridor	2015	

*Scheduling dependent on market demand and timber buyer availability.

**Schedule cutting during dormant months.

Notes:

CONCLUSION

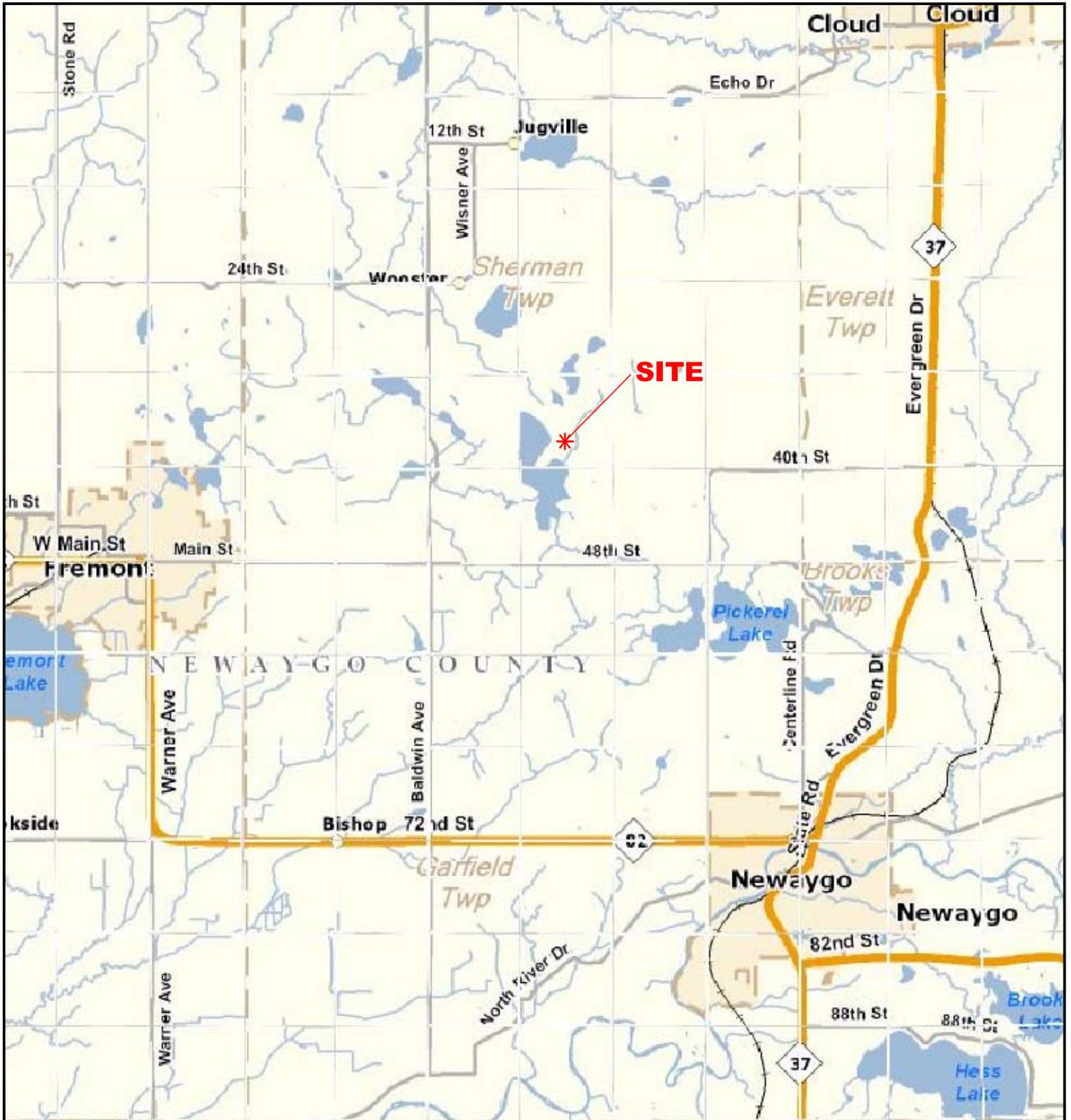
Proper forest management will maximize growth rates, reduce waste, and promote trees of good form and high quality, which ultimately produce higher income as products. Management is also concerned with replanting trees to replace harvested timber. In woodlands, timber management will enhance habitat suitability for many forms of wildlife. Activities such as thinning, weeding, and clear-cutting allow the woodlot to regenerate and produce plants that animals need for food and cover. A diversity of vegetation types and age classes will support the greatest variety of wildlife as well as increase aesthetic benefits.

Funded through the USDA Forest Service, and administered by the MDNR Forest Management Division, the Forest Stewardship Program (FSP) encourages private landowners to actively manage their forest and related natural resources. The Forest Stewardship Management Plan is a detailed plan that addresses several aspects of the environment, including forestry, wetlands, soil erosion, wildlife, and fisheries. Once a landowner obtains a FSP plan, he/she may be eligible to apply for financial assistance to implement the plan. A variety of federal cost-share incentive programs such as EQIP, CRP and ACEP are available through the 2014 Farm Bill. Contact your county Soil Conservation District office or the MDNR to decide which programs best meet the goals set forth in your plan.

The management suggestions and ideas in this plan should be helpful in achieving many of the landowner's expressed goals. In carrying out the recommended practices, assistance from professional consultants may be required occasionally. Technical assistance, financial aid, on-site evaluation, reference material, etc. can be obtained from the MDNR, U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), Michigan State University Cooperative Extension Service, and other agencies. Various organizations including the Michigan Wildlife Conservancy, Pheasants Forever, Wild Turkey Federation, and local sportsman's groups may also be contacted for support. For further reference, the NRCS provides resource management guidelines and practice standards online at: <http://www.nrcs.usda.gov/technical/efotg/>.

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- Other Information Sources:** Newaygo County Equalization, Michigan Natural Features Inventory (MNFI), Muskegon Hackley Library, USDA Forest Service—Carbon Sequestration, QDMA, NRCS eFOTG, and the National Planning Procedures Handbook.



Source: MDEQ, 2014

Site Location Map For:

McGaw YMCA Camp Echo

Sections 27,28,34,35; Sherman Township, Newaygo Co., MI



Scale = Not to Scale

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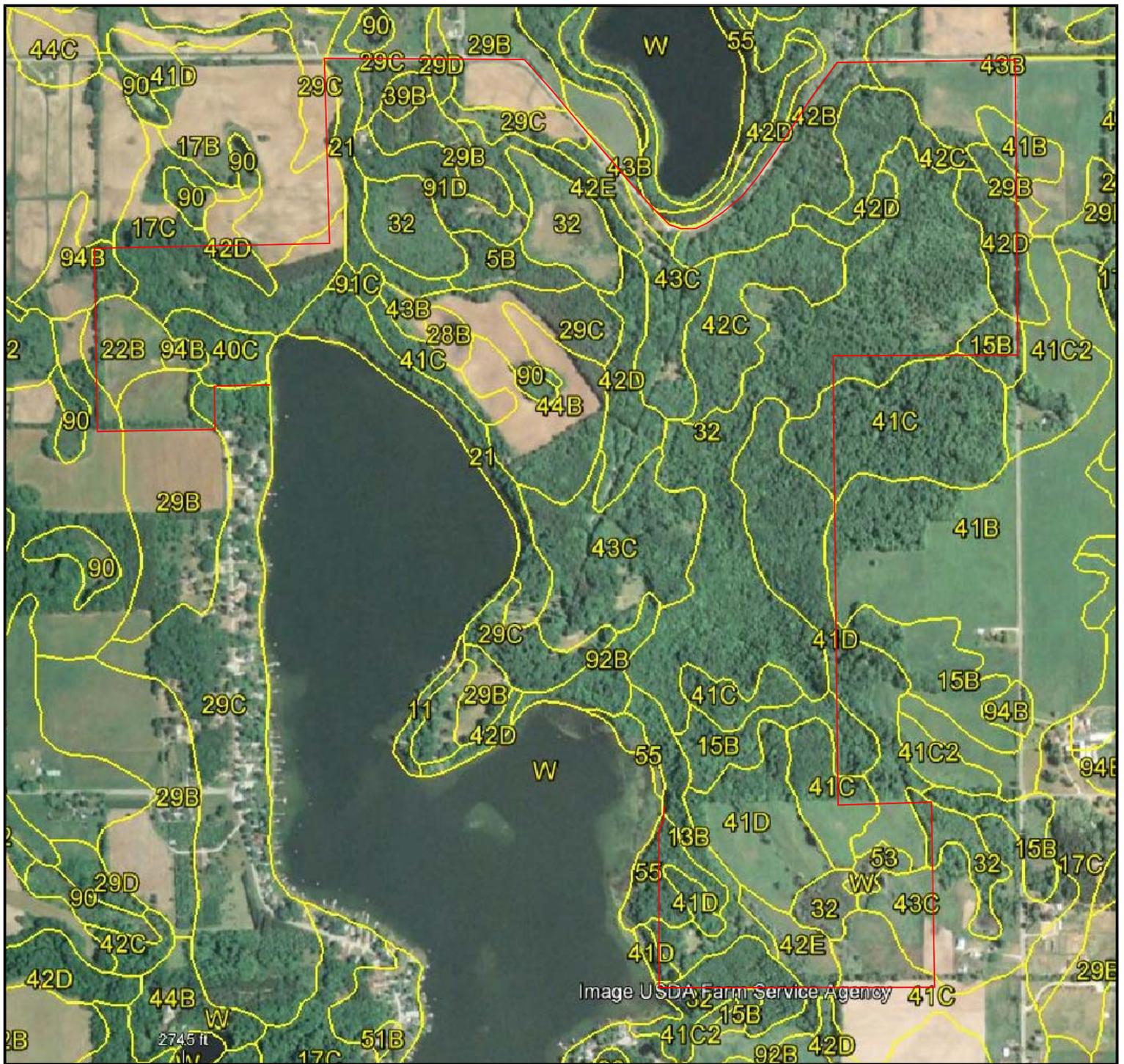


3210 Bewell Ave., S.E.
 Lowell, MI 49331
 Phone: 616-897-8575

DATE
 09/10/2014

PROJECT NUMBER
 146303

SHEET NUMBER
 Fig. 1



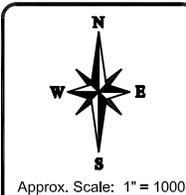
Symbol	Unit Name	Description	Symbol	Unit Name	Description
5B	Pipestone sand	0-4% slopes, Somewhat poorly drained	41B,C,D	Marlette loam	1-6, 6-12, 12-18% slopes, Well drained
11	Martisco muck	Very poorly drained	42B,C,D,E	Metea-Marlette-Spinks complex	1-6, 6-12, 12-25, 25-40% slopes, Well drained
13B	Selfridge-Capac complex	0-5% slopes, Somewhat poorly drained	43B,C	Metea loamy sand	1-6, 6-12% slopes, Well drained
15B	Capac loam	0-5% slopes, Somewhat poorly drained	44B	Spinks loamy sand	0-6% slopes, Well drained
17C	Spinks-Metea-Coloma complex	6-12% slopes, Well drained	53	Parkhill loam	Poorly drained
21	Kingsville mucky sand	Poorly drained	55	Sickles loamy fine sand	Poorly drained
22B	Scalley loam	1-6% slopes, Well drained	90	Histosols and Aquepts, ponded	Very poorly drained
28B	Watseka loamy sand	0-4% slopes, Somewhat poorly drained	91C,D	Plainfield sand	6-18, 18-35% slopes, Excessively drained
29B,C	Coloma sand	0-6, 6-12% slopes, Excessively drained	92B	Selfridge loamy sand	0-4% slopes, Somewhat poorly drained
32	Carlisle muck	Very poorly drained	94B	Brems sand	0-4% slopes, Moderately well drained
39B	Boyer loamy sand	0-6% slopes, Well drained	W	Water	
40C	Tustin loamy sand	6-12% slopes, Well drained			

Source: NRCS, 2014

NRCS Soil Mapping For:
McGaw YMCA Camp Echo

Sections 27,28,34,35; Sherman Township, Newaygo Co., MI

0 500 1000

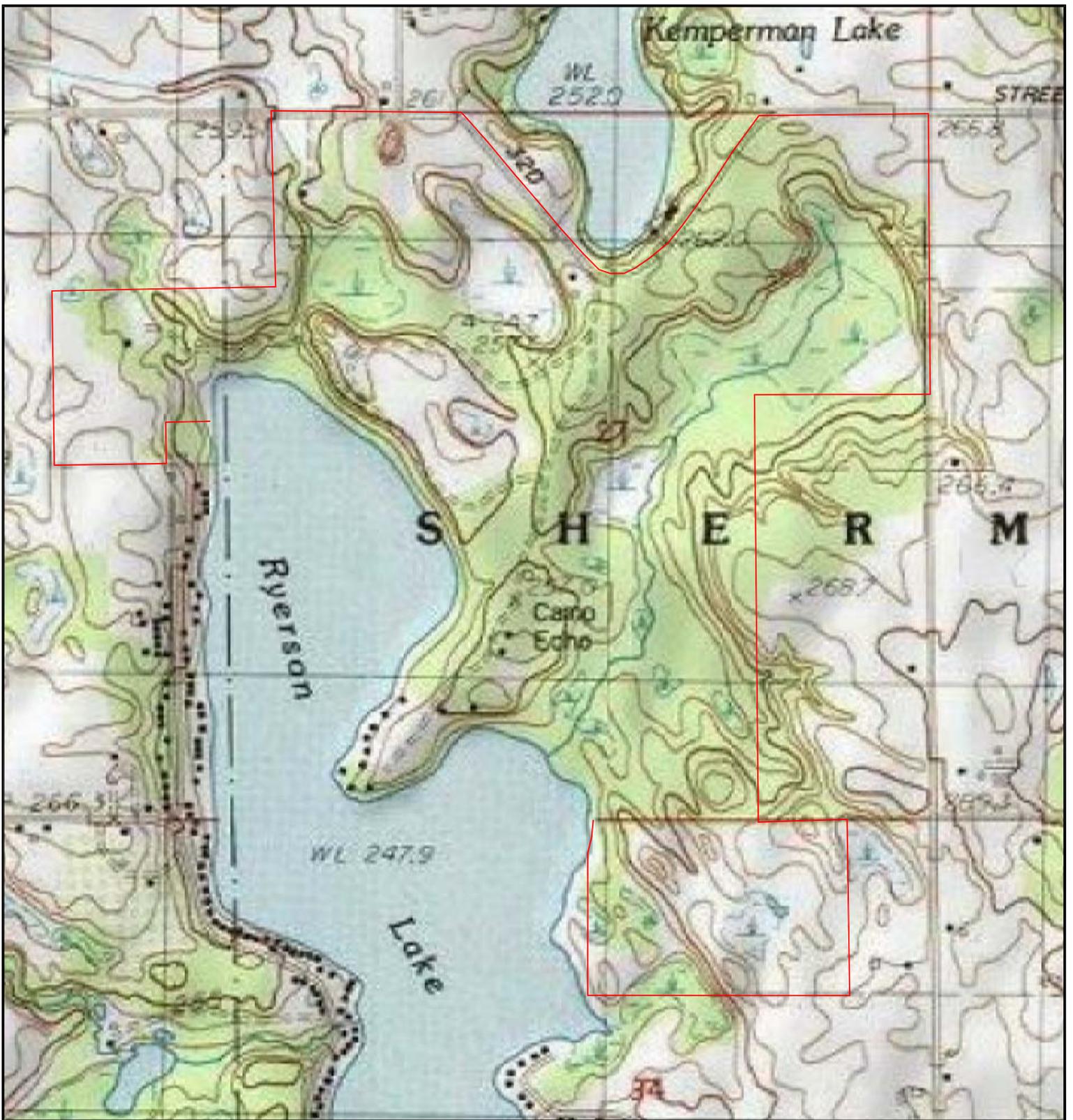


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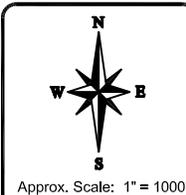
DATE	09/10/2014
PROJECT NUMBER	146303
SHEET NUMBER	Fig. 2



Source: USGS, 2014

USGS Topographic Mapping For:
 McGaw YMCA Camp Echo

Sections 27,28,34,35; Sherman Township, Newaygo Co., MI



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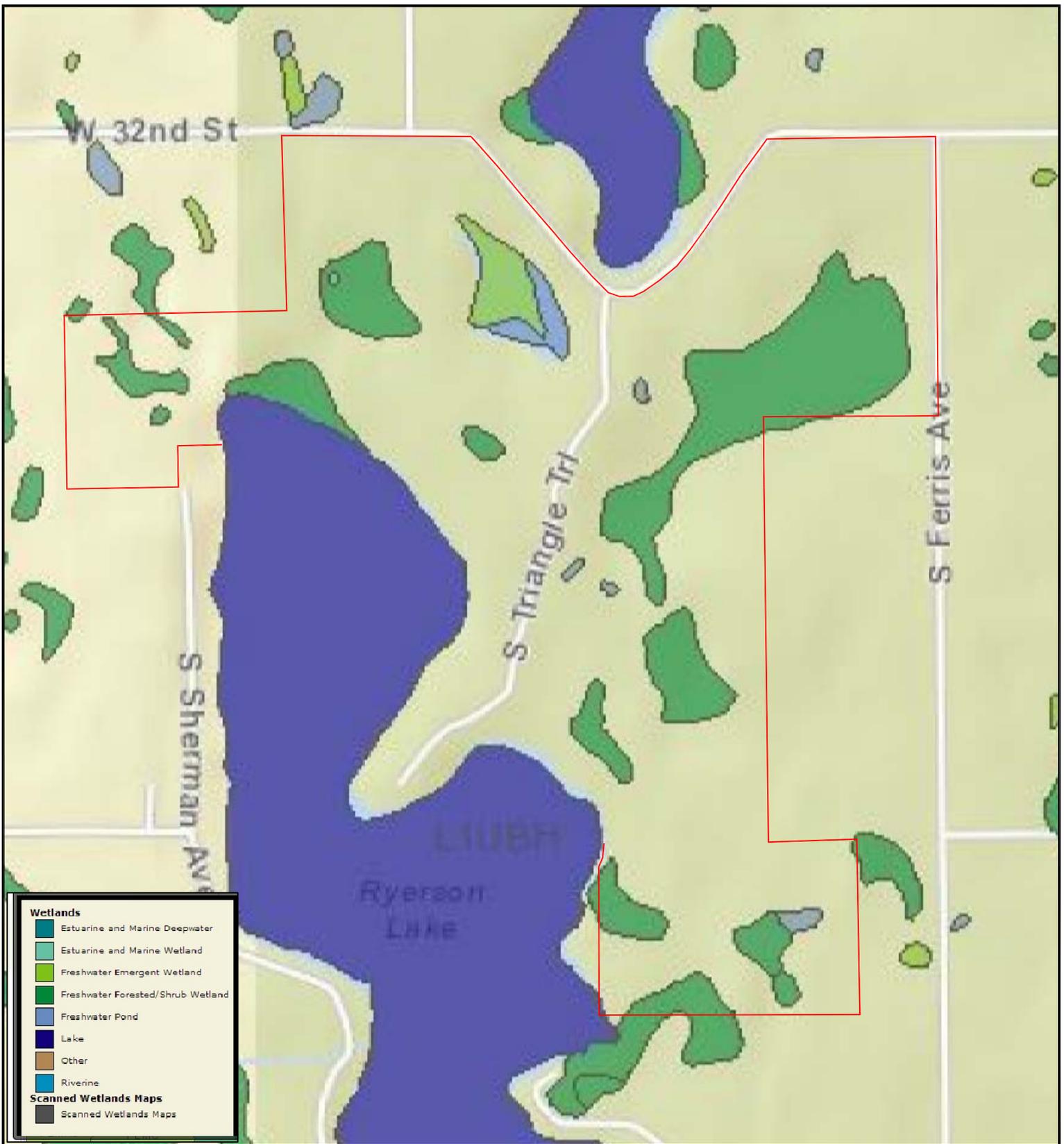


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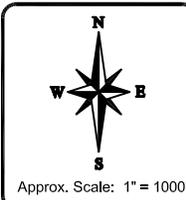
SHEET NUMBER
 Fig. 2a



Source: USFWS, 2014

NWI Mapping For:
 McGaw YMCA Camp Echo

Sections 27,28,34,35; Sherman Township, Newaygo Co., MI



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SHEET NUMBER	Fig. 3



Image USDA Farm Service Agency

Source: Google Earth, 2006

PROJECT NUMBER	146303
SHEET NAME	Aerial Map
SHEET NUMBER	Fig. 4

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 Lovell, MI 49531
 Phone: 616-587-2878

Site Map For:
McGaw YMCA Camp Echo
 Sections 27, 28, 34, 35; Sherman Township, Newaygo Co., MI

DATE	DESCRIPTION
08/02/11	Map

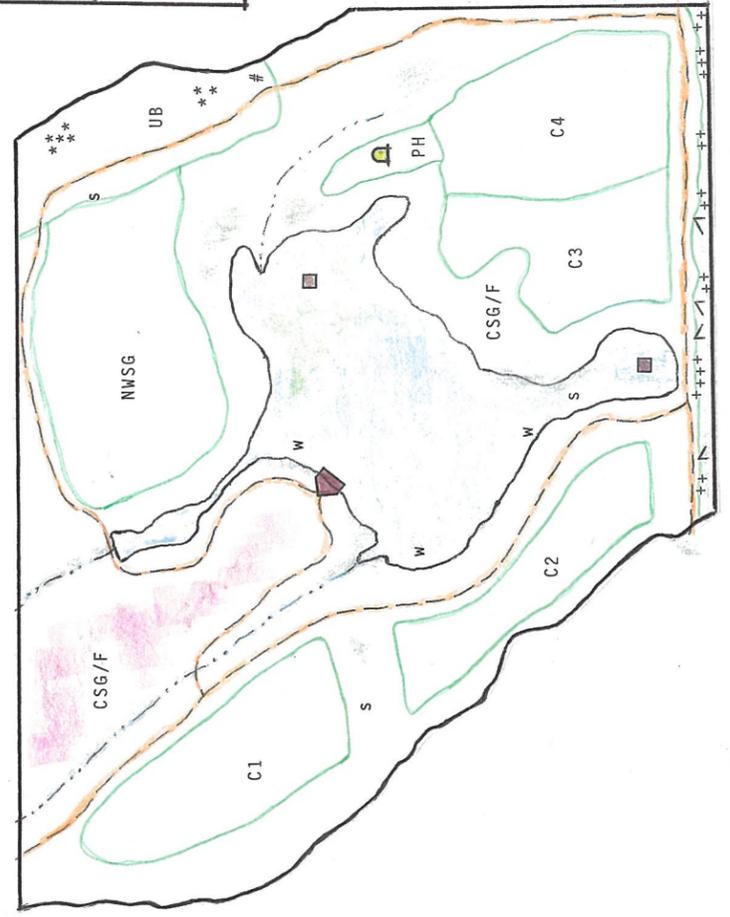
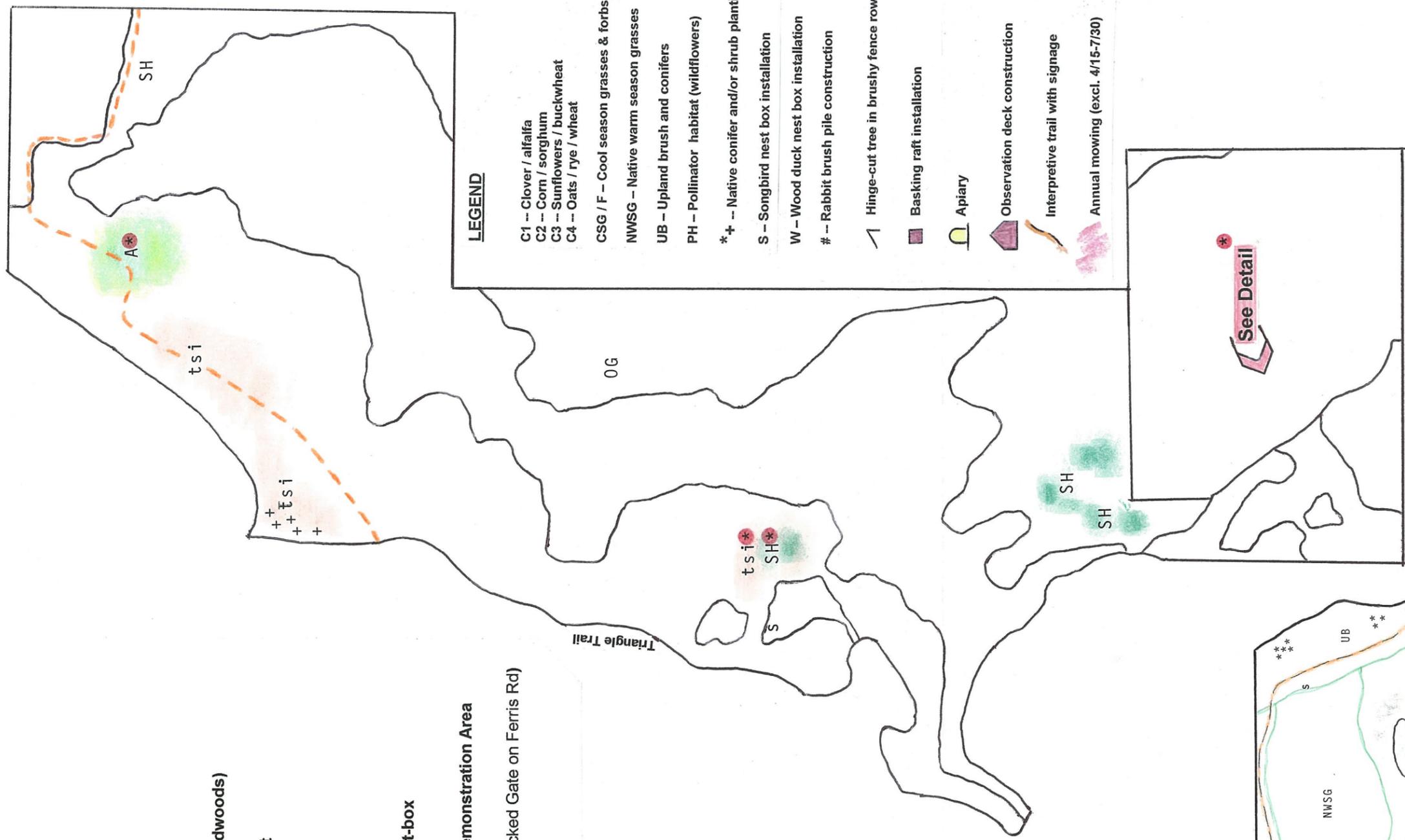
Approx. Scale 1" = 500'

LEGEND

- tsi - Timber Stand Improvement
- SH - Selective Harvest (mature hardwoods)
- OG - Designated Old Growth Forest
- A - Clear-cut to Regenerate Aspen
- + - Re-stock Red/white Pine
- S - Install/maintain Songbird Nest-box
- * - Forest/wildlife Management Demonstration Area
- - Develop/maintain Trail (Locked Gate on Ferris Rd)

LEGEND

- C1 -- Clover / alfalfa
- C2 -- Corn / sorghum
- C3 -- Sunflowers / buckwheat
- C4 -- Oats / rye / wheat
- CSG / F -- Cool season grasses & forbs
- NWSG -- Native warm season grasses
- UB -- Upland brush and conifers
- PH -- Pollinator habitat (wildflowers)
- *+ -- Native conifer and/or shrub planting
- S -- Songbird nest box installation
- W -- Wood duck nest box installation
- # -- Rabbit brush pile construction
- ∟ -- Hinge-cut tree in brushy fence row
- -- Basking raft installation
- 🐝 -- Apiary
- 🏠 -- Observation deck construction
- 👤 -- Interpretive trail with signage
- 🌿 -- Annual mowing (excl. 4/15-7/30)



See Detail

Source: Newaygo County, 2010

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PROJECT NUMBER	146303
SHEET NAME	Planned Activities Map
SHEET NUMBER	Fig. 6 a

Site Map For:
McGaw YMCA Camp Echo
 Sections 27,28,34,35; Sherman Township, Newaygo Co., MI

DATE:	ISSUED FOR:
09/10/2014	Review
P.M.	JB
DESIGN	MC
CHECKED	JB

EAST HALF OF PROPERTY

Scale = Not to Scale



LEGEND

- tsi** - Timber Stand Improvement
- SH** - Selective Harvest (mature hardwoods and pines)
- OG** - Designated Old Growth Forest
- th** - Thin Conifers
- Kbb** - Develop Karner Blue Butterfly Habitat
- H** - Identify/protect Historic Site
- S** - Install/maintain Songbird Nest-box
- W** - Install/maintain Wood Duck Nest-box
- *** - Forestry/wildlife/history Demonstration Area
- Clear-cut/remove Scotch Pine and Re-stock
- Protect Emergent Wetland
- Protect Special Wetlands (Springs and Seeps)
- Construct Boardwalk Through Fen Wetland
- Develop/improve Access Trail
- Develop Waterfall and Sitting Area
- Create Surface Water Impoundment

Source: Newaygo County, 2010

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PROJECT NUMBER

146303

SHEET NAME

Planned Activities Map

SHEET NUMBER

Fig. 6b

Site Map For:

McGaw YMCA Camp Echo

Sections 27,28,34,35; Sherman Township, Newaygo Co., MI

WEST HALF OF PROPERTY

DATE	ISSUED FOR
09/10/2014	Review
P.M.	JB
DESIGN	MC
CHECKED	JB

