JACK AND TUCKER HARRIS WORKING FOREST RESERVE

STEWARDSHIP MANAGEMENT PLAN

Photo by: Todd Parker

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Modified date: 3/6/2019

I. INTRODUCTION

Size: 640 acres

Location: Cheboygan County, Ellis and Walker Township, TXN- RXW, Sections X and X. Approximately 8 miles southeast of Indian River, across the Pigeon River from the Helmer's Dam Nature Preserve.

Acquisition Date: 10-27-16

Project type: Purchase. Long-time LTC supporters Jack & Tucker Harris pledged $809,000 towards the purchase of the Varity (former owners) property. The Harris' were granted naming rights for this wonderful working forest reserve. The Harris' wanted to engage other donors and project supporters for the Varity purchase, so they requested that $600,000 be applied towards the land acquisition and $209,000 be placed in a "Pigeon River land protection fund." LTC then did a short Fall 2016 fundraising campaign to raise $209,000 towards the Varity land purchase: 27 people donated $85,000 towards this land purchase/preservation effort.

Directions: Take M-68 east from Indian River for about 7.5 miles to Montgomery Road. Reserve is 1.5 miles south on the west side of Montgomery Road.

Tax ID's: 220-007-100-003-00; 210-012-200-001-00; 210-001-400-003-00; 210-001-300-002-00

Road Frontage: 2680 ft. on Montgomery Road.

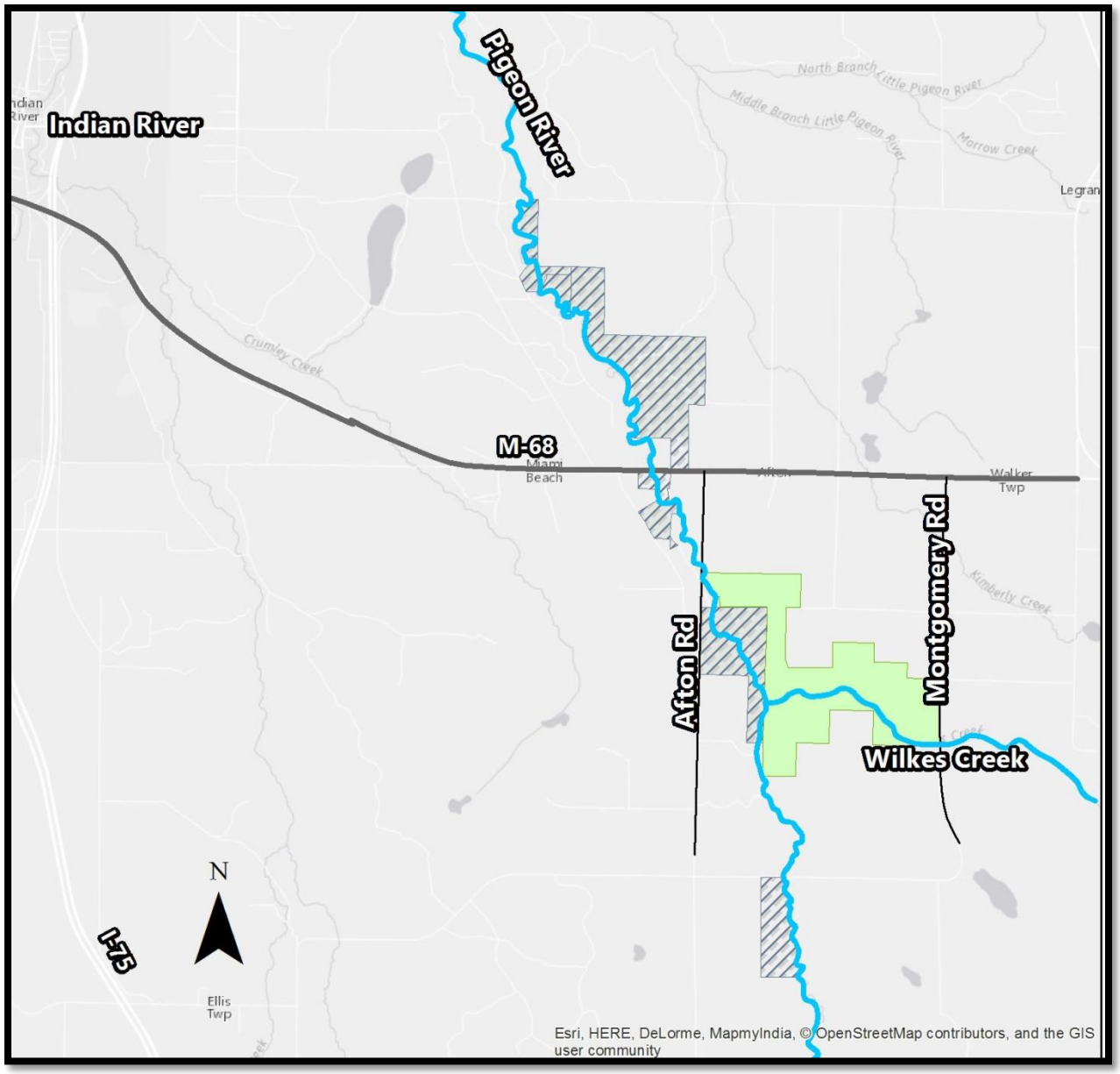
Water Frontage: 6,800 feet on Wilkes Creek; 1,700 feet on Pigeon River (State Designated Natural River)

Land Use History: The land was used for timber production and agriculture by the previous owners Velma and Bernie Varity. It appears that the timber was harvested with commercial intent, but many of the most recent log landing piles were left in place and never sold. Cattle were grazed throughout much of the property. Some of the open fields may have been used as hay fields, but for all of the known recent history the fields were used for grazing only. The land bears significant impact from the grazing history.

Current Land Uses: The land is now part of the Little Traverse Conservancy Working Forest Reserve system and is used for timber production, wildlife management, and a natural area. See Property Goals in next section.

Legal agreements: Commercial Forest Program- some or all of the property will be enrolled in the commercial forest program in 2017 or 2018. Driveway on south border is not a public road but a non-exclusive easement for LTC reserve management use and the abutting landowner's use (consultation is needed with the neighbor). Natural River

encumbrances mean that any development projects within 400’ of river require a permit.



Location Map: This map shows the location of the Harris Working Forest Reserve in light green and in relation to the series of Little Traverse Conservancy Nature Preserves (diagonal lines) along the Pigeon River. The property protects an additional 1,700 feet of the Pigeon River and act as an important wildlife corridor.

II. GOALS AND CONSERVATION VALUES

A. Conservation Values and Resource Protection:

- Scenic landscape as viewed from Montgomery Road and the Pigeon River.
- Scenic views as viewed from within the property.
- Wildlife habitat
    - A diversity of intact habitats, including northern forests, hardwood-conifer swamps, riparian forests, and grasslands
    - Buffer to the 200 acre Helmer's Dam Nature Preserve and in close proximity to hundreds of acres of additional nature preserve land along the Pigeon River
    - In close proximity to thousands of acres of intact natural areas owned and managed by the state, serving as a buffer and as a corridor between the Gaylord State Forest and the Pigeon River Country State Forest.
    - Habitat for interior forest obligate bird species, open grassland birds, and upland game birds dependent on early successional forests
    - Habitat for nesting waterfowl
    - Habitat for large mammals dependent on large continuous habitats
    - Part of an important wildlife corridor of LTC, State, and private natural lands in the Pigeon River riparian corridor.
    - Potential presence of rare, sensitive or high conservation value flora
- Water quality
    - Many small seasonal streams and wetland areas
    - Natural zones along Wilkes Creek and Pigeon River
    - Infiltration (storage, recharge, and filtration) for the Pigeon River and ultimately, for the Lake Huron watershed.
- Working Landscape - Timber production, habitat management, hayfields
- Outdoor recreation opportunities
    - Upland game bird hunting
    - Big game hunting
    - Hiking, biking, skiing, snowshoeing, nature observation, yoga, other non-motorized activities

B. Management Goals:

1. Protect natural resources, biological diversity, and scenic beauty (Conservation Values)
2. Ensure public access
3. Create non-motorized public recreation opportunities
4. Manage the forest for wildlife and ecosystem health through timber and grassland management

III. PROPERTY CONDITION AND FEATURES INVENTORY

A. Soils/Landforms/Topography: This reserve has a rolling topography with some steep grades near the river and stream channels. Elevation at the Pigeon River goes from 224m at the south end of the reserve to 217m at the north end. Wilkes Creek flows from 248m at the east end of the reserve to 222m when it enters the Pigeon River. From the lowest elevation of 217m the property rises to 259m on the highest hill on the property located near the middle of the southern boundary (see topo map in Appendix). The soils of the property are listed below, see Appendix for Soil Map with unit locations and detailed descriptions for each unit. The Afton Stone geologic layer is located near the ground surface.

7 Grousehaven Variant muck
8 Tawas peat
22B Leelanau loamy sand, 0-6% slopes
24B Ocqueoc fine sand, 0-6% slopes
27B Cheboygan loamy sand, 0-6% slopes
27C Cheboygan loamy sand, 6-12% slopes
27D Cheboygan loamy sand, 12-30% slopes
29B Fairport fine sandy loam, 1-8% slopes
33B Ontonagon silty clay loam, 2-6% slopes
37B Emmet sandy loam, 1-6% slopes
37C Emmet sandy loam, 6-12% slopes
37D Emmet sandy loam, 12-18% slopes
38B Onaway loam, 1-6% slopes
38C Onaway loam, 6-12% slopes
38E Onaway loam, 19 - 25% slopes
48A Allendale sand, 0-3% slopes
55A Solona Sandy Loam, 0-3% slopes
56A Riggsville Loamy Sand, 0-3% slopes
58A Alstad loam, 0-3% slopes
60A Rudyard loam, 0-3% slopes
62 Wheatley loamy sand
63 Brevort mucky loamy sand
64 Burleigh mucky sand
71 Bowstring muck, frequently flooded
78 Angelica mucky sandy loam
79 Charity fine sandy loam
CSwaaA Croswell sand

B. Hydrology: The reserve has a rich diversity of aquatic habitats. The Pigeon River is a State of Michigan DNR designated Natural River, and therefore has special development restrictions and ecological attributes that make it of high conservation value. It has also

been designated as a blue ribbon trout stream, which means is among the best trout streams in the state and possesses excellent overall water quality (www.mymlsa.org). The floodplain is part of a continuous natural area spanning onto the Helmer's Dam Nature Preserve and adjoining private land; contributing to a stretch of 2.5 miles of unbroken floodplain forest with no development on the east side of the river between Afton Rd (north) and Pigeon River Rd (south). The floodplain is part of a larger wetland complex on the reserve that is connected to the riparian area along Wilkes Creek. With over 6,800 feet of Wilkes Creek located within the reserve, this is an important resource to conserve. Wilkes Creek averages about 5-6 feet across and up to a couple feet deep in the pools. As the elevation drops and the creek valley widens towards the mouth, the creek forms more than one channel. Currently, there is a beaver dam on the creek at the railroad grade (and near the mouth) that has created a large pond. Several other forested wetlands and wet swales exist on the property. There is an open water pond on the northwest 40 of the property. The property should also be examined for vernal pools. The reserve is ultimately part of the Cheboygan River and Lake Huron watersheds.

C. Biological Resources:

Natural Communities/Habitats: There are multiple natural community types on the reserve. The Pigeon River floodplain is a northern floodplain forest community with green ash as the dominant overstory species (however, dying due to Emerald Ash Borer) and there are pockets of black ash swamps (where the ash has mostly died). In the black ash pocket *Bidens cernua* (a forb) and grasses were the dominant ground flora observed in August 2016. On the northwestern side of the reserve as the elevation rises out of the floodplain the community there is a Mesic Northern Forest (MNF) with sugar maples as the dominant canopy species. The bulk of the MNF is on the Helmer's Dam Nature Preserve. The MNF grades into a Hardwood-conifer swamp community as the elevation drops into a lowland. Here the dominant canopy species includes northern white cedar, white pine, yellow birch, red maple, and balsam fir. Much of the forest cover in the rest of the reserve (eastward) is comprised of a Dry-Mesic Northern Forest community with big-tooth/quaking aspen, white pine, hop-hornbeam, yellow birch, balsam fir, maple species and American beech all common. White, red, and black oak were also observed and a more thorough inventory is warranted.

Other wetland communities included shrub-scrub thickets, alder swamps, wet meadows/wet swales, and bands of an emergent wetland community. The remaining areas are dry open fields and meadows dominated by exotics, or in some cases little bluestem or bracken fern. A broad sketch of the natural communities can be found in the Appendix, but a more thorough examination and refinement of these communities is needed.

Animals: To be inventoried and tracked (see IV.A.). Ruffed grouse, Sandhill cranes, Barred Owl, Wood Duck, Mallard, European Starling, Nortehrn Shrike, Eastern Meadowlark, Red-winged blackbird, Blue Jay, Northern Flicker, Black-capped Chickadee, Common Raven, American Crow, Red-breasted Nuthatch, American Robin, Bobolink, Yellow-rumped Warbler, Turkey Vulture, Bald Eagle, Tree Swallow, Palm Warbler, American Woodcock, American Kestrel have been observed (by Glen Matthews and Derek Shiels).

Plants: An initial snapshot inventory of some of the plant communities was completed at the end of the summer (2016) and analyzed with a Floristic Quality Assessment (FQA). The total species observed stands at 130 and the total FQI score is 44.5 (see plant list and FQA results in the Appendix). A FQI score is derived by averaging each plant's assigned coefficient of conservation (C-value) to help assess the natural quality of a given site. A C-value was assigned to every plant in the state by a team of botanists and it represents how restricted the plant is to a particular habitat. The C-values are plugged into a formula to produce an FQI score. Higher FQI scores are meant to indicate sites that are more representative of the landscape in pre-settlement times. Commonly, it's interpreted that FQI's less than 20 have minimal significance, while FQI's greater than 35 represent areas of conservation importance (Herman *et al.,* 2001). An exhaustive survey covering more acreage and other seasons will reveal an even greater diversity and additional rare species. Still, the snapshot collected provides good evidence for the potentially high level of biodiversity of this reserve. Further surveys are needed to establish a comprehensive baseline and it would be good to evaluate the FQI score by community type within the reserve (see IV.A.).

New County records, if confirmed (voucher needs to be sent to U.M. Herbarium) include: *Hypericum ascyron* (Giant St. John's-wort, C-value=8), *Lobelia inflata* (Indian-tobacco, C-value=0), *Mycelis muralis* (wall-lettuce, non-native), *Symphyotrichum ontarionis* (Lake Ontario aster, C-value=6).

Species of Special Concern (SOC)/Targets: Only Bald Eagle currently documented. See the MNFI abstracts on the LTC server for potential SOC, including: Northern Goshawk, Red-Shouldered Hawk, Cerulean Warbler, Grasshopper Sparrow, Prairie Warbler, Dusted Skipper (a butterfly), Grizzled skipper (a butterfly), Henry's elfin (a butterfly), Red-legged spittlebug (an insect), Gray Wolf, Woodland Vole, Blanding's Turtle, Wood Turtle, *Botrychium mormo* (a fern)*, Triphora trianthophora* (a forb)*. Dalibarda repens* (a forb)*, Pterospora andromedea* (a forb), *Cirsium hillii* (a forb), and *Prunus umbellate* (a forb)

IV. MANAGEMENT OBJECTIVES

A. Ecological Monitoring Recommendations:

Ecological/Biological Features:

- **Natural Communities** – There is a diversity of community types ranging from forested to open and dry to wet. This diversity should be inventoried further to identify unique assemblages that should be managed to protect or restore. A finer detailed inspection of community type and boundaries could inform management. Surveys for the Forest Management Plan will help with this objective, but a more thorough and time intensive mapping effort may be needed.

- **Plant and Animal Observations –**Plant and animal observations will help define sensitive areas and areas to limit or modify logging operations, inform recreation planning, and are useful in environmental education, awareness, and public engagement. The initial Floristic Quality Assessment will be expanded on

and completed for community types as time allows (see Appendix for FQA). Additional plant and animal observations will largely be gathered through causal staff and visitor observations. EcoStewards volunteers can be directed to the Reserve and iNaturalist observations should be encouraged to populate species observations. Hunter feedback will be helpful in evaluating game species occurrences and specific requests for feedback from this reserve will be sought.

- **Forestry** – The forest inventories will evaluate canopy tree diversity and sticking but should also evaluate understory trees and regeneration success. These inventories should also measure coarse woody debris and cavity/den trees. Other biological/ecological evaluation metrics could be developed to track the impact/success of forestry activities.

- **Other, Geology/Aquatic/Cultural –**No formal plans or recommendations, but data can be collected and stored in Fee-Lands database as data arises.

Invasive Species: Invasive species here would threaten to limit species diversity in the herbaceous ground layer, impact tree recruitment, alter hydrologic regimes in wetlands. The impact of invasive species is expected to be more severe as the climate warms. Emerald Ash Borer has already decimated much of the black ash and, likely, a majority of the green ash on the property. Exotic plant species do not generate the abundance of insects that birds and bats depend on for survival. Active forest management creates new openings that often serve as a catalyst for invasive plants to spread aggressively if not taken into account when conducting forestry operations. It is therefore critical that at least a basic survey of the entire property be made for invasive plant infestations to know the species, locations, area sizes and densities. EcoStewards can help gather invasive species data, if available, by marking infestations following Early Detection mapping protocol. The species that would be of highest concern for the forested areas include buckthorns, garlic mustard, Japanese barberry, knotweed species, and oriental bittersweet (a vine). Due the past grazing history that has left the land degraded, bull thistle, burdock, reed canarygrass, and fields of non-native grasses and forbs are also prevalent and will need to be taken into consideration when managing for the various habitat's health and integrity.

Forestry: See Forest Management Plan that will be initially drafted in 2017/18.

Climate Change and additional impacts: Establishing a comprehensive baseline of ecological data is the best tool for tracking changes resulting from climate change or surrounding development pressures. Climate change may present unforeseen challenges and stresses to the ecosystems within the Reserve, and in some cases management decisions to pursue climate adaptation may be different than "business as usual" conservation actions. While knowledge continues to progress steadily, there are many potential impacts from climate change already predicted from climate change models. A couple leading negative impacts that could impact this reserve include extreme heat events that impact boreal plant species, the loss of aspen species (lack of regeneration) due to the northward migration brought on by heat stress, shorter winters that certain animals species have trouble adjusting to, reduced soil moisture in the summer, and an increase in stressors from pathogens and non-native plant species. Potential positive impacts include a longer growing season that

could benefit some native plant and animal species, and the migration of more southern species that could fill important roles on the land. These impacts are considerations that should be considered when planning land management activities.

B. Infrastructure and Use Recommendations:

Signs:

- **LTC Logo/Name Sign:** A standard LTC logo sign was installed on Montgomery Road near the entrance to the reserve. A small logo sign may be purchased if a parking area further back from the road is established.
- **Other signs:** The standard LTC rule sign will be placed on the property. Other signage will be placed only if the need arises or if there are encroachment issues.

Parking Areas/Access: There are three drives that access the reserve. The drive along the southern boundary can be accessed by LTC staff, contractors, and volunteers, but it is not a public road and its use should be discouraged. The northern most drive that used to go to the residence should be abandoned or maintained for staff use only. The main access point will be an access drive that had been used to access a barn. This drive will need to be improved to the site of the parking area. Beyond the parking area, the two-track should be kept open and improved only as necessary for land management purposes. Any further access points created during forest or other land management should be closed off and abandoned after use.

There are multiple sites suitable for the parking area along the access drive and each would only require normal parking area improvements (vegetation removal, gravel, but limited tree removal or grading). Parking area option one is located immediately off of Montgomery Road (a 5-6 car parking area could be located anywhere in this area, approximately100' from road, see map below). Parking area option two is located at the field/forest transition area within sight of Montgomery Road (~1350' from road). Parking Area option three is located in the interior of the reserve (~4,000' from road). The pros and cons of each option are as follows:

Parking Area option #1:

Pro: Close proximity to Montgomery Road means less access drive improvements needed, lower likelihood of trash being dumped on site, and easier access for more people (if only a perception).
Con: Long walk to experience a majority of the reserve

Parking Area option #2:

Pro: Beautiful setting overlooking wet meadow, tree line and set among large maple trees; compromise between pros of nearness to road and bulk of reserve.
Con: Further from road to warrant some of the cons of option 3 and 1

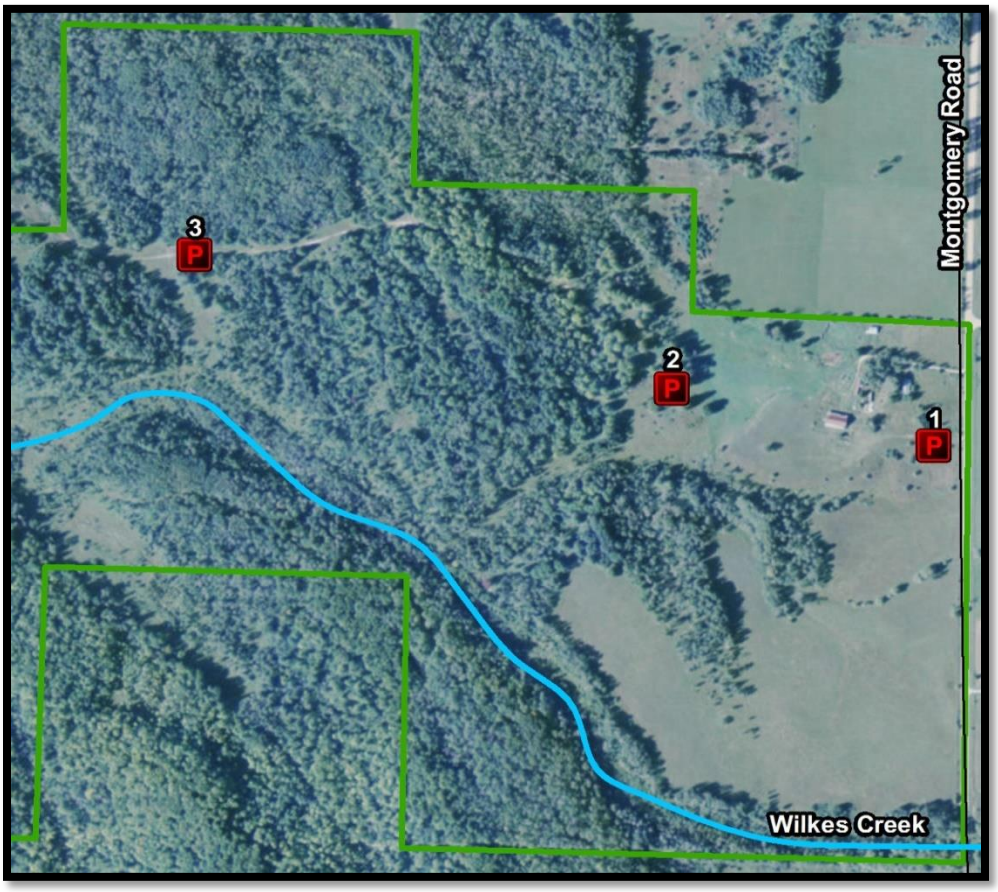
Parking Area option #3:

Pro: Closest proximity to bulk of Reserve, which would facilitate recreational opportunities, especially hunting

Con: Out-of-sight from public road means there is an increased likelihood for illegal activity; significant increase in expense to improve access road to this site

Update (10/31/2017): A parking area was created near the road (option 1), subsequent parking area options can still be considered

Other options include creating a rustic parking area and a minimally maintained access drive (i.e. control rutting) for option three and opening vehicular access to this area during a specified hunting season. The property can also be accessed by boat from the Pigeon River. There is not a good location for establishing access points for recreational boaters should there be a request; the Helmer's Dam Nature Preserve would be better suited for such a request.



Parking area options map

Trails and Recreation: There is a network of old logging road and other two tracks previously used for the cattle farm across the property. These tracks need to be mapped. The main access drive after the parking area will be maintained as the primary trail to enter

into the reserve. The adjoin Helmer's Dam Nature Preserve does not receive many visits and thus the current recommendation is that the reserve remain primarily for off-trail exploration. Any investment in a trail system should be triggered by trail camera monitoring data; future trail loops from the main access trail can be developed if the need and interest arises as long as it is compatible with any ongoing habitat improvements and does not threaten any identified sensitive features.

Additional features (bridges, viewing platforms, benches, gates, etc.): The three access drives along Montgomery Road have been blocked with a gate. The drive along the southern boundary is gated and owned by the abutting landowner (see files for discussion). Split rail was installed to help define the parking area. There are several viewpoints that would be good places for benches should an interest to build and place one be shown.

Surveys and Boundary Marking: A recent survey of part of the northeast boundary was transected and LTC staff installed carsonite at four corners (map stored on server). There is a survey pin in the middle of the road along the southern boundary. Further site visits will be made to try to locate survey pins and mark the corners with carsonite. An additional survey is not required at this time but if problems or concerns arise actions will be taken as needed. Requests from the neighbors precipitate the need to mark the boundaries with LTC signs.

Removal and Cleanup: An extensive trash and structure cleanup occurred at the site of the former residence area through contractual work (see appendix for photo documentation). There will be some farm trash that will remain buried in the ground that is likely to appear occasionally. This site will be left undisturbed, potentially planted with native grasses should exotics become a nuisance, but otherwise it should not be developed in any manner. There are some culverts on the property and an old railroad grade that runs roughly north to south through the property (see restoration section below for more discussion on this railroad grade).

Trail camera monitoring: A trail camera will be very useful in directing future management and therefore placing one here at the trailhead should be a high priority. A trail camera will also be valuable for documenting wildlife.

Hunting: The entire property will be open to hunting (as approved by the stewardship committee on March 29th, 2017) and fishing and will be managed with a goal of maintaining or improving habitats for game species. Portions of the property may be enrolled in the Commercial Forest Program which mandates that the land be open to hunting, fishing and trapping as well. This property was used during the special HandiCapable Hunt in 2018 and will continue to be a good spot for this special hunt and food plots may be established for these hunters.

Other special uses or restrictions: Equestrian use would be permitted but not encouraged. Hay leases or grazing may be utilized to help maintain grassland communities.

Overall level of use promotion: Regular use promoted. Given the size, unique topography, and hunting opportunities, we see this as providing great opportunities for traditional recreational uses. However, until a demonstrated need triggers an expansion of

the trail system, any publications or descriptions of the reserve should depict the limited trail system and that most of the reserve must be explored without the guide of designated trails.

C. Active Management (Habitat improvements, forest health timber management, other restoration activities):

Forest Management: The forest stands on the reserve vary in age, species composition, and wetness; for detailed descriptions of each stand refer to the Forest Management Plan (appendix). The goals that will be outlined in the forest management plan when completed include, 1) improving forest health and maintaining a diversity of forest stand types, species, and age classes, 2) creating diverse forest types including early successional forest habitats and managing for wildlife, specifically upland game birds, 3) establishing a forest system that can adapt to a changing climate, and 4) producing timber resources. The forest management plan will provide the harvest prescriptions for each stand.

To accomplish these goals, the following are potential objectives that may be sought:

1. Improving forest health (diversity)
   a) Create early successional forests –This would ensure a diversity of age structure if other stands are managed for maturity or over-maturity, while serving other goals as well.
   b) Favor dry-mesic northern hardwood species over mesic northern hardwood species – This can be accomplished through creating larger gaps and openings leaving identified seed trees for species such as oaks and pines. Seedlings of these desirable species can also be identified and protected during harvest and from deer browse. Removing mesic species in the understory with herbicides, cutting, or prescribed fire, and scarifying the soil during thinning operations are additional options. An under planting of pine-seedlings could be implemented if necessary. Some understory species associated with drier forest communities have been identified and this community type may be better adapted to future conditions.
   c) Timber stand improvements – some stands will benefit from traditional TSI cuts to keep the individual trees and stand healthy by thinning to an appropriate basal area and identifying minority species and good genetic legacy trees.
   d) Transition portions of the closed canopy forests to a savanna or oak-pine barren community – The history of grazing that occurred throughout the property has degraded the property by limiting tree recruitment, compacting soils and introducing non-native vegetation. This action will add a unique habitat structure to the property that is less common in Michigan today. It will increase biological diversity and serve as a transition between the grasslands and interior forests.

2. Creating early successional habitat
   a) Clearcut aspen (and surrounding young forest plots)- Establishing young aspen forests is the favored recommendation for creating ruffed grouse and American woodcock habitats along with a suite of other early-succession

dependent species. The intent should be to keep stands between 5-15 years of age.

b) Create patches of early successional forests in multiple locations- Spread the young forests out in patches throughout the property because there are not large stands of aspen currently, the diverse mosaic will provide more resilience (see next goal). This option would create more edge habitat for American Woodcock, who tend to utilize only the edges of aspen stands.

c) Focus early successional forest cuttings on red maples, balsam firs, or alder – Given the priority of creating early successional forests, limited aspen stands, and climate considerations (see below), creating heavily cut patches of other species will be beneficial. There are patches of alder thickets that would be good candidates, balsam fir thickets are prevalent and could provide dense regrowth, as could red maple stands.

3. Climate change adaptations
   a) Climate winners – Some species have been identified as winners, meaning they are predicted to thrive or expand ranges in a warming climate, while the losers are vulnerable to new stressors and to disappearing from a site. Management techniques that favor stable species or a diversity of species will help the land adapt to the changing conditions. The most vulnerable species on the reserve are northern white cedar, quaking aspen, big-toothed aspen, balsam fir, white spruce, paper birch, and yellow birch. Species that are predicted to do well or could expand their range into Cheboygan County include American and slippery elm, ironwood, oak species (black, bur, chinkapin, white), pignut hickory, black walnut, and sassafras. There is less certainty around species like white and red pine, American basswood, sugar maple, and northern red oak. Identifying and favoring minority species of "winners" would be wise. Microclimate variations could mean that some of the "losers" will find refuge and should not necessarily be given up on in future prescriptions.
   b) Diversify stands and prescriptions – see the above objectives. Creating young forests with a couple different species, creating different community types, using heavy and lighter cuts and leaving some reserves or untouched stands, as well as allowing some trees to over-mature (economically) will increase diversity and could prove useful for managing the forests under different climatic conditions.

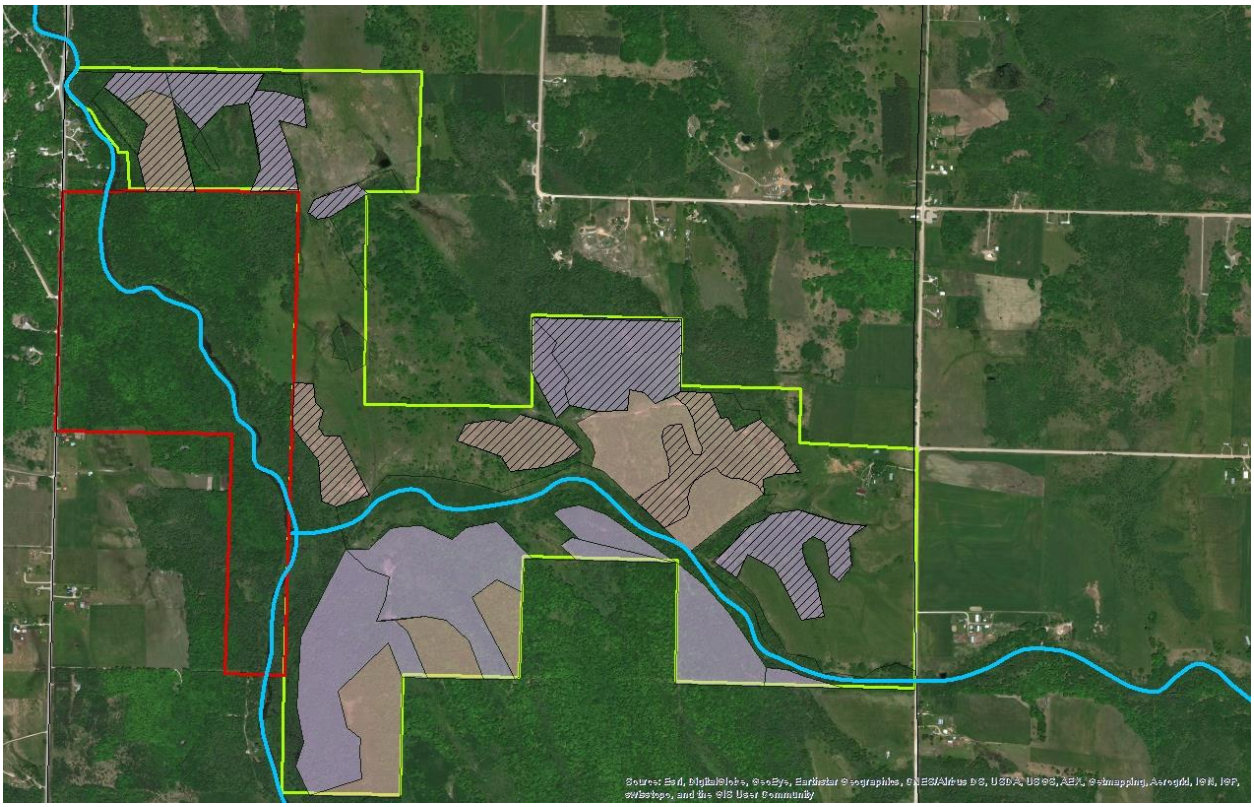
4. Produce timber resources
   a) Increase tree growth productivity – this is compatible with many silviculture techniques used to achieve the above goals and objectives.
   b) Find multiple markets for different wood products – The timber removed to create young forests could generate revenue, support the local economy, and the active management of the reserve.

Habitat Improvements:

Forestry. The forest timber management activities will help improve forest health and habitat. The prescriptions will include steps to maintain or increase habitat for cavity

nesting wildlife, animals utilizing den trees, and a suite of fauna benefiting from coarse woody debris on the forest floor. Should raptor nests, bat roosts, vernal pools, or other important observations be documented, the timber management plan will be adjusted to address these priorities. Bald Eagles have been spotted on the reserve in visits in 2017.

Update 3/6/2019: In partnership with the American Bird Conservancy and local USDA office, a USDA conservation program was initiated to create young successional forest habitat for Golden-winged warblers. The clear-cut with reserve prescription follows best management prescriptions for this bird species. The map below depicts the approximately 140 acres that will be cut in this way in 2019-2020. This cut will accomplish the goal of improving forest health because the forest was stunted as a result of grazing and this cut should produce new vibrant growth; it will create wildlife habitat for upland game birds, Golden-winged Warblers, and other species; and might help the forest adapt to climate change, too, because the aspen will be younger and healthier to resist stresses and it might provide for conditions favorable to oaks, "climate winners". Additionally, the project includes planting native shrubs and trees that will add diversity and bolster resilience.



Cross-lined areas show approximate boundaries of the 2019 or 2020 Golden-winged Warbler clear-cut with reserves harvest at the Jack and Tucker Harris Reserve. Purple=conifer dominated, Peach=hardwood dominated.

Invasive Species. Surveying the openings created by timber harvests for invasive species infestations and treating them promptly is a top priority for protecting the integrity of the

property's habitat. Later stage infestations (low priority species or an infestation that has been well established) will be given a lower priority and evaluated with other management goals organization-wide.

Grasslands. Along the eastern boundary there are open fields that could provide significant habitat for grassland dependent wildlife. An American Kestrel was observed on the edge of these fields during a visit in 2016. A grassland restoration project could occur in these fields to revitalize grasslands and eventually plant native forbs (see map of meadow locations on page 18). Preparation for this project could involve hiring a contractor with special grassland restoration experience, taking it on as staff either as a whole or in smaller management chunks, or having a local farmer plant the field in soybeans for three or more years and then plant the grass seeds in the soybean stubble in the fourth year. These meadows would be a good location to install a Kestrel nest box.

The old homestead restoration site should not be disturbed drastically (i.e. no deep tilling). The open meadow along the northern border has been fallow for some time and shrubs and small trees are prevalent. Maintaining an open condition here would require substantial effort. Treating the autumn olive here should be the priority to aid the succession back to forest land (started in 2018). If a farmer were interested utilizing the meadow as grazing land and could assist with the shrub clearing, this could still be an option for some time. The remaining open areas will be either incorporated in the savanna restoration plan below or allowed to continue through natural succession. One wet meadow area needs to be explored further for species diversity and should be protected from invasive species and hydrological alterations.

Update 3/6/2019: A $25,500 Michigan DNR Wildlife Habitat grant was awarded to LTC to restore 55 acres of grasslands and plant native shrubs and trees. A contractor has been engaged to complete this work.

Savanna. A savanna-like community is one where tree canopy cover is generally no more than 60% of the canopy. The ground flora is comprised mostly of grasses and sedges and is mix of species that would be found in open areas with those associated with forests. In northern Michigan, the two savanna type natural communities are oak-pine and pine barrens. Pine barrens are common to the southeast of this property and would occur on drier, sandier soils. Oak-pine barrens are generally found at drier, sandy sites as well, but this property could potentially support this type of community, especially given future climate predictions. A diverse oak-pine barrens community will have some areas of thickets amongst the savanna-like woods (Kost et al. 2007). Managing for this community type on the reserve would add habitat diversity and may ultimately increase biological diversity and resilience to climate change (potential savanna sites on map, page 16).

Historically, it appears that the northern mesic forests on this land were more extensive with pines, and aspen comprised the remaining acreage (See historical map in Appendix). There are a few reasons for considering an Oak-Pine Barrens target.

- The soils are an appropriate droughty, sandy-loam mix that when combined with a hotter, drier (at times) climate, means that more mesic forests would not do as well.
- If passively managed (no intervention), the site would remain stagnant and unhealthy for a long time.

- Oaks and pines are abundant in the vicinity north, west , and south of the reserve.
- Grazing has added to the stressors of climate change and lack of natural disturbance.
- Oak-pine barrens typically occur in bands surrounding prairie and so would be compatible with the grasslands restoration considered on the property.
- The past grazing has stunted a lot of tree growth and created openings that may be difficult to reestablish a productive forest.
- Working to establish a healthy Oak-Pine Barrens system adds diversity to the property and would be a system more adapted to predicted future climatic conditions.
- This habitat is also able to support ruffed grouse and if young thickets can be maintained, woodcock could also be supported.

Establishing this community type may involve a heavy timber cut as part of the forest management plan, substantial tree plantings, grass, sedge, and forb plantings, and low-intensity prescribed fires or in the absence of prescribed fire, some sort of disturbance such as mowing. More research and expert opinions from consulting foresters, prescribed fire professionals, other natural resource professionals, and more site inventories for indicator species, are needed to develop a detailed oak-pine barrens restoration plan. Reconstructed barrens such as this will require an initial time and resource investment for establishment and a commitment to regular maintenance. Potential barrens locations are depicted in the map below.

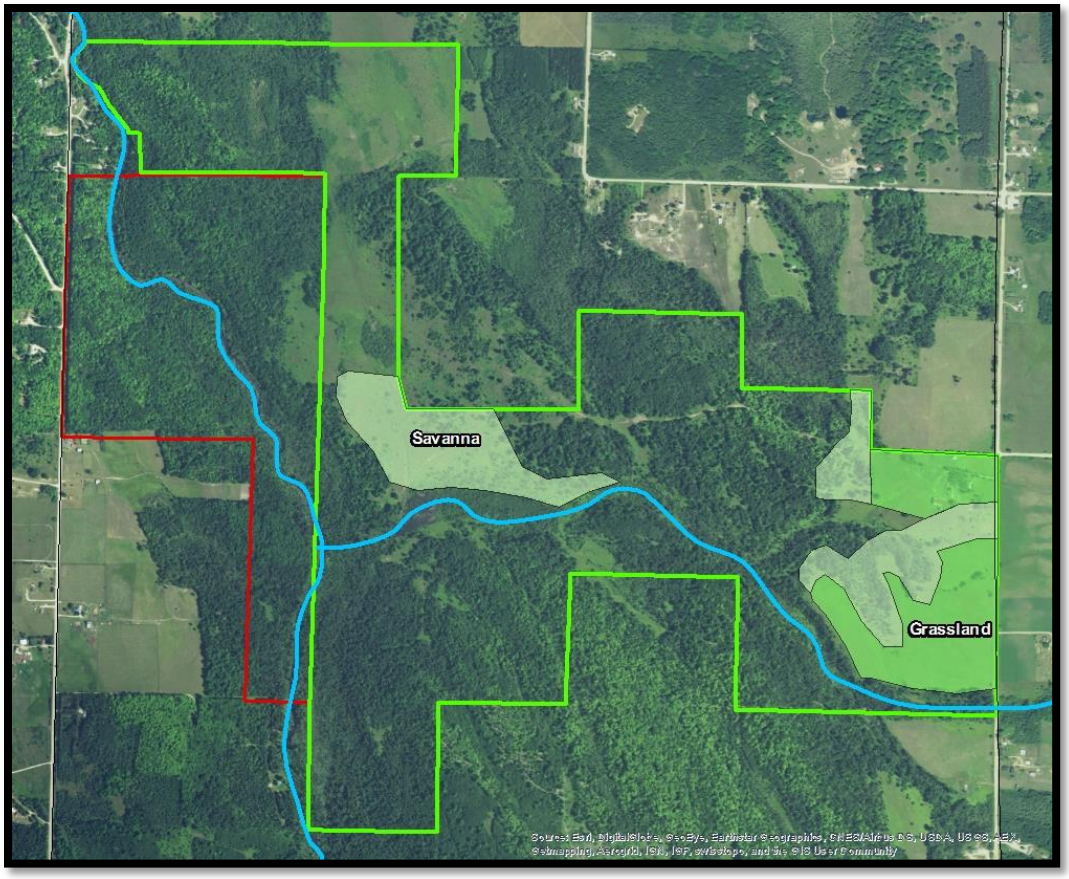
Other. Potential habitat improvements that could be considered in the future if appropriate include, vernal pool creation (only if in a disturbed site) in coordination with timber harvest activities (i.e. using the heavy equipment), planting native shrubs/trees to increase diversity, installing various nest boxes (American Kestrel Nest Boxes) or food plantings, or creating deer exclusion areas.

Stream or other hydrological Improvements:

There are a few places where old logging trails cross Wilkes Creek that may need to be repaired or restored, including the largest impediment of the abandoned railroad grade. The old railroad grade has also disrupted hydrology for a large stretch of the riparian forest south of Wilkes Creek. LTC should bring in other professionals such as Huron Pines to help evaluate the restoration opportunities and options for improving hydrological connectivity and creek continuity. There are also about seven culverts needed along the main access trail that need to be installed.

D. Contacts/Partnerships/Volunteers

A reserve steward volunteer will need to be assigned. EcoStewards volunteers can be assigned to the reserve as interest arises. Huron Pines/other professionals should be consulted about water drainage issues. The local Soil and Water Conservation District Office has provided helpful land management information.



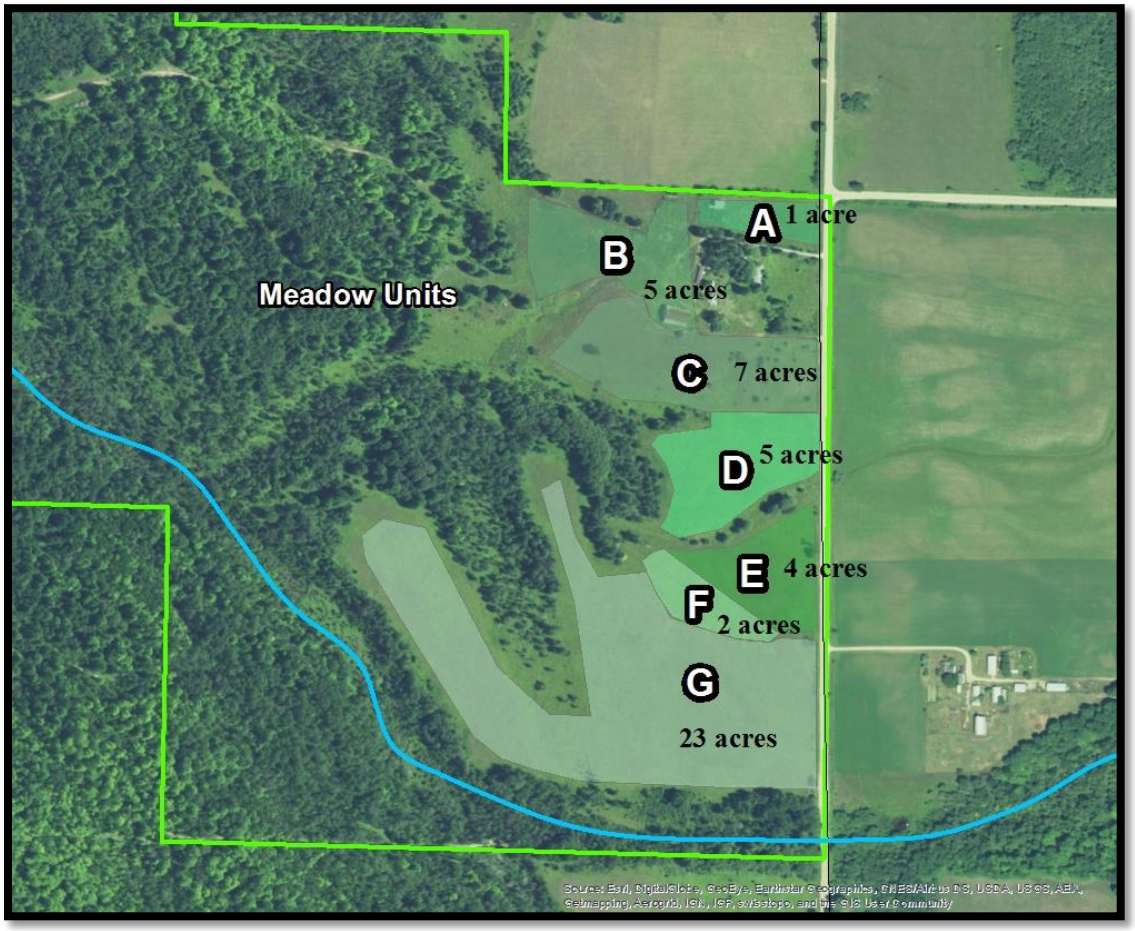
Potential location of habitat restoration sites. This is only a preliminary assessment with approximate boundaries.

E. Climate Change

Forest managers are encouraged to plan for changing climate scenarios to assess management needs and implement steps to increase the resilience of their forests and the likelihood their land will be able to maintain its health and integrity. Climate change models and forest impact scenarios have been developed and analyzed for northern Michigan forests, which provide information about climate change risk and vulnerability (Handler et al. 2014). Risk assessments for different tree species and forest types provide managers with information to plan for various management programs for at-risk and climate change vulnerable species and systems.

An LTC staff member (Derek Shiels) attended a Climate Change Forest Adaptation workshop in the fall of 2016 and examined the Harris Reserve using the Adaptation Workbook, developed by the Northern Institute of Applied Climate Science, as a planning tool to consider climate change information and develop adaptation actions for the property (Swanston et al. 2016). The workshop focused on identifying the property's target management goals, regional climate change impacts and vulnerabilities, the ensuing challenges to, or opportunities for, meeting the management goals, potential adaptation actions, and adaptation monitoring steps. Workshop worksheets can be found in the

Appendix and potential adaptation strategies have been incorporated into this management plan.



Potential location of grassland restoration sites. Unit names were assigned to the meadows (letters) to facilitate future communication. Unit B would be the first potential rehabilitation site. Unit C is recommend to be left idle or actively managed for a savanna-like community. Unit F contains wetland soils and plants.

F. References

Handler et al. 2014. Michigan Forest Ecosystem Vulnerability Assessment and Synthesis. GTR-NRS-129. www.nrs.fs.fed.us/pubs/45688

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www.mymlsa.org /managing-michigan-streams/. Website. Accessed 6/20/17.

10-year management table (2017-2027)

Start Year	Duration	Activity	Location	Project Lead(s)	Status
2017	yearly	Natural Features Inventory	Throughout	Staff and EcoStewards	
2017	once	Develop Forest Management (FM) Plan	Throughout	Staff, Metcalfe Forestry and Glen Mathews	
2017	When there is a void	Assign Reserve Steward	Throughout	Staff - Cacia	
2018	occasional or as need arises	Invasive Species Inventory	Throughout /Restoration Sites	FM crew/staff and EcoStewards	
TBD	TBD	Active forest management	TBD	Metcalfe Forestry	
2018	once	Access hydrological connectivity issues	Wilkes Creek, Rail grade, main drive	Staff with Huron Pines	
2017	yearly	Grassland management	TBD	Staff or Contractor	
2017-18	once	Create a parking area	TBD	Staff - Charles	
2018	Potential	Establish a Trail System	TBD	Staff	
2017	As need arises	Boundary Marking - carsonite at corners & boundary signage	property perimeter	Staff - Mike	
TBD	As need arises	Invasive Species Treatment	Throughout	Staff and Volunteers	
2017	seasonally	Trail Camera Monitoring	Trailhead	Staff	

V. EVALUATION - Adaptive management table

Goal	Objective	Monitoring Variable	Evaluation Criteria	Implementation or Potential Adaptation Strategies
Manage Public Access	Establish trail system	Trail camera use, ecological monitoring, and comments from users and stakeholders	Are sensitive resources being damaged?	Close off trail and restore trails
			Documented public demand or unmet needs from user groups	Design expanded trail system
			Staff determination on trail capacity or feasibility	Install permanent signage or add trails
Stream and hydrology management	Improve drainage culverts	connectivity score or other indicator TBD	Is restoration feasible and what is the level of damage to conservation value?	Act on recommendations
Habitat Improvements	Invasive species management	Volunteer and staff mapping data	Top priority invasive species, species impacting sensitive or restoration area	Conduct removal following best practices - follow-up surveys
	Natural features monitoring	Direct volunteers and collect mapping data	Is there a complete inventory? Has a survey been conducted within 10 years?	Dedicate staff time to inventory or hire consultant
	Grassland and barrens restoration	indicator species, professional opinions	Funds available for lengthy implementation and long term management? What is Organizational commitment level?	Develop and initiate detailed implementation plan or facilitate natural succession to a northern forest community
Forest Management	Multiple	stand stocking, average dbh, and diseases	Is timber quality improving? Habitat? Etc.	Consult with forester wildlife biologist

MANAGEMENT PLAN WRITING, REVIEW, AND APPROVAL HISTORY

Written (and subsequently edited by): Name: Derek Shiels (11/02/2017)

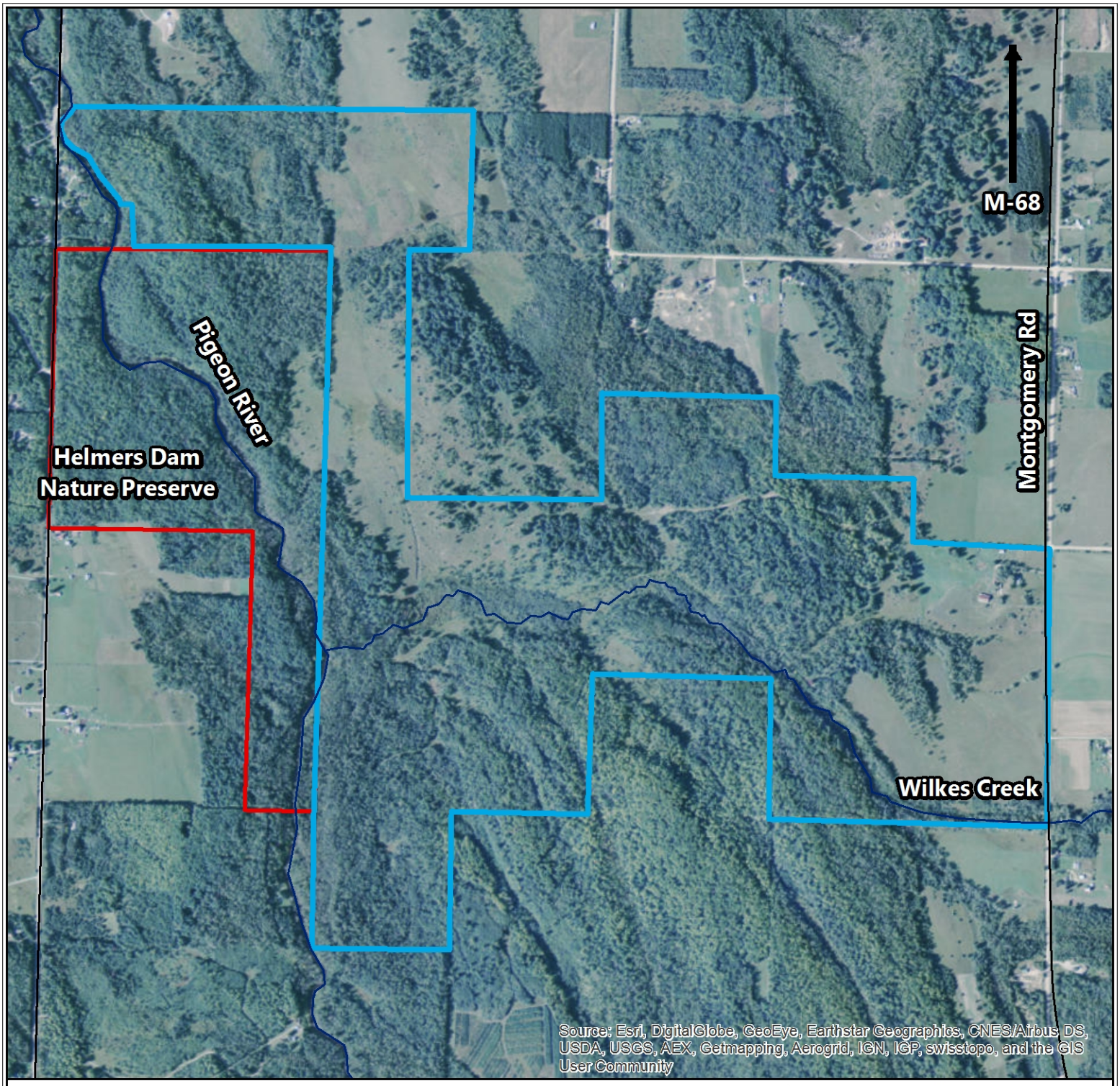
Reviewed by:

Stewardship Staff	(initial and date) CD, ML, CL 1/17
Lead Land Protection Staff	(initial and date) KCF, CD2 1/17
Other LTC Staff	(initial and date) TR 1/17
Stewardship Committee	(initial and date)
Community Stakeholders	(initial and date) Stephen Handler 5/17

Executive Director Approval: _____ Date: 3/6/19

Appendix

Contents



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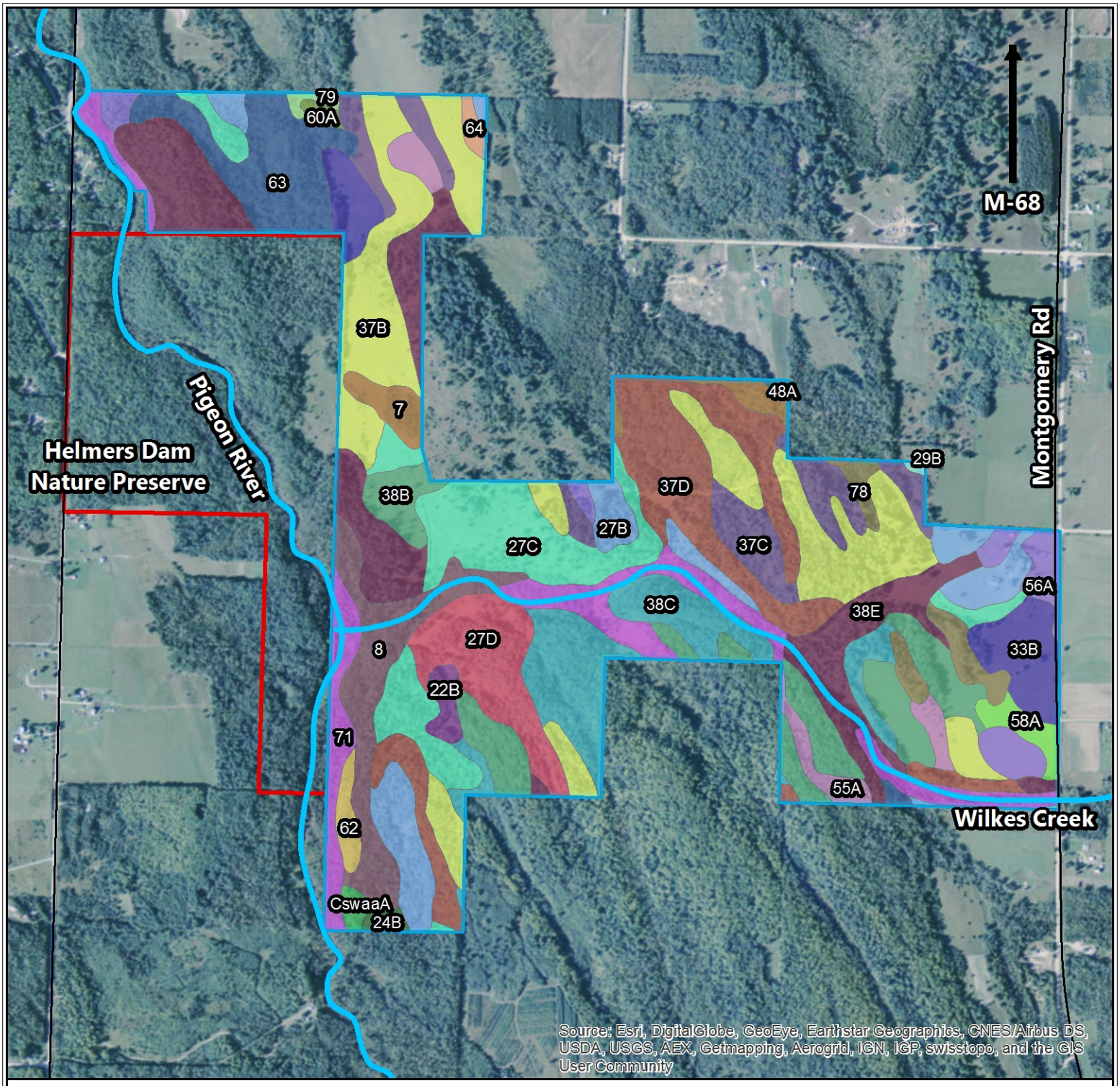
Jack and Tucker Harris Working Forest Reserve Air Photo 640 +/- acres Cheboygan County, Michigan

0 0.15 0.3 0.45 0.6

Miles



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Jack and Tucker Harris Working Forest Reserve Soils Units 640 +/- acres Cheboygan County, Michigan

0 0.15 0.3 0.45 0.6

Miles

Description of Soil Units Found on Property

22B Leelanau loamy sand, 0-6% slopes – This deep, nearly level and undulating, well drained soil is on knolls, ridges, and broad plains in the uplands and is fairly well suited for crops but mostly used as woodland. This soil is poorly suited to most recreational development but is moderately well suited to building site development although the instability of cutbanks is a limitation. This soil is poorly suited to septic tank absorption sites because of poor filtering capacity.Limitations for pond construction are severe due to seepage.

24B Ocqueoc fine sand, 0-6% slopes – This deep, nearly level and undulating, well drained soil is on low knolls and ridges in the uplands and broad plains. Although this soil is fairly well suited to crops, most areas are used as woodland. This soil is suited to recreational development and is moderately well suited to building site development although the moderate shrink-swell potential and instability of cutbanks are limitations. This soil is poorly suited for septic tank absorption fields because of the moderately slow permeability. Limitations for pond construction are severe due to seepage.

27B Cheboygan loamy sand, 0-6% slopes – This nearly level and undulating, well drained soil is on broad plains and low knolls in the uplands and is suited to crops but mostly used as woodland. This soil is poorly suited to recreational development but moderately well suited to building site development although the instability of cutbanks is a limitation. The soil is poorly suited to septic tank absorption fields because of the seasonal high water table and the very slow permeability. Windthrow is a hazard. Limitations for pond construction are severe due to seepage.

27C Cheboygan loamy sand, 6-12% slopes – This gently rolling, well drained soil is on ridges, plains, and side slopes in the uplands and is fairly well suited for crops but is mostly used as woodland. This soil is poorly suited to recreational development but moderately well suited to building site development although the slope and instability of cutbanks are limitations. The soil is poorly suited to septic tank absorption fields because of the slope and the very slow permeability. Limitations for pond construction are severe due to the slope and seepage.

27D Cheboygan loamy sand, 12-30% slopes – This rolling to steep, well drained soil is on ridges and side slopes in the uplands and is mostly used as woodland. This soil is poorly suited to recreational development and building site development because of the slope and instability of cutbanks. The soil is poorly suited to septic tank absorption fields because of the slope and the very slow permeability. Erosion is a hazard. Limitations for pond construction are severe due to the slope and seepage.

29B Fairport fine sandy loam, 1-8% slopes – This moderately deep, nearly level to gently rolling, well drained soil is on broad plains, low knolls, and low ridges in the uplands and is fairly well suited for crops but used mostly as woodland. This soil is suited to recreational development but is poorly suited to building site development and unsuited to

septic tank absorption fields because of the moderate depth to bedrock and the moderate shrink-swell potential. Limitations for pond construction are severe due to the slope, depth to rock, and seepage.

33B Ontonagon silty clay loam, 2-6% slopes – This deep, nearly level and undulating, moderately well drained soil is on knolls and in broad areas in the uplands and well suited to crops but is mostly used as woodlands. This soil is suited to recreational development and is moderately well suited to building site development although the high clay count and high shrink-swell potential are limitations. This soil is poorly suited to septic tank absorption fields because of the seasonal high water table and the very slow permeability. Limitations for pond construction are moderate due to the slope.

37B Emmet sandy loam, 1-6% slopes – This deep, nearly level and undulating, well drained soil is on broad plains, knolls, and ridges in the uplands and is suited to crops but many areas are used as woodland. This soil is suited to recreational development and well suited to building site development but the instability of cutbanks is a limitation. This soil is poorly suited is poorly suited to septic tank absorption fields because of the moderately slow permeability. Limitations for pond construction are severe due to seepage.

37C Emmet sandy loam, 6-12% slopes – This deep, gently rolling, well drained soil is on knolls and ridges in the uplands and is suited to crops but many areas are used as woodland. This soil is suited to recreational development and moderately well suited to building site development but the slope and instability of cutbanks is a limitation. This soil is poorly suited to septic tank absorption fields because of the slope and moderately slow permeability. Limitations for pond construction are severe due to the slope and seepage.

37D Emmet sandy loam, 12-18% slopes – This deep, rolling, well drained soil is on high knolls and ridges in the uplands and is mostly used as woodland. The soil is poorly suited to recreational development and building site development because of the slope and instability of cutbanks. This soil is also poorly suited to septic tank absorption fields because of the slope and moderately slow permeability. Limitations for pond construction are severe due to the slope and seepage.

38B Onaway loam, 1-6% slopes – This deep, nearly level and undulating, well drained soil is on knolls, ridges, and broad plains in the uplands and is well suited to crops and pasture but mostly used as woodland. This soil is suited to recreational development and well suited to building site development with no major concerns. This soil is poorly suited to septic tank absorption fields because of the moderately slow permeability. Limitations for pond construction are moderate due to the slope.

38C Onaway loam, 6-12% slopes – This deep, gently rolling, well drained soil is on knolls, ridges, and broad plains in the uplands and is moderately well suited to crops and pasture but mostly used as woodland. This soil is suited to recreational development and moderately well suited to building site development but the slope is a limitation. This soil is

poorly suited to septic tank absorption fields because of the slope and moderately slow permeability. Limitations for pond construction are severe due to the slope.

38E Onaway loam, 19 - 25% slopes – This deep, steep, well drained soil is on hills and ridges in the uplands and is mostly used as woodland. This soil is poorly suited to recreational development and building site development because of the slope. This soil is poorly suited to septic tank absorption fields because of the slope and moderately slow permeability. Erosion is a hazard. Limitations for pond construction are severe due to the slope.

48A Allendale sand, 0-3% slopes – This deep, nearly level, somewhat poorly drained soil is on low ridges in the uplands and is fairly well suited to crops and pasture but is mostly used as woodland. This soil is poorly suited to recreational development and building site development because of the seasonal high water table. This soil is also poorly suited to septic tank absorption fields because of the wetness, poor filtering capacity, and moderately slow permeability. Windthrow is a hazard. Limitations for pond construction are severe due to seepage.

55A Solona Sandy Loam, 0-3% slopes – This deep, nearly level and undulating, somewhat poorly drained soil is on low plains and low knolls in the uplands and is well suited to crops and pasture but mostly used as woodland. This soil is poorly suited to recreational development and building site development because of the seasonal high water table. This soil is also poorly suited to septic tank absorption fields because of the wetness and moderately slope permeability. Windthrow is a hazard. Limitations for pond construction are moderate due to seepage.

56A Riggsville Loamy Sand, 0-3% slopes – This nearly level, somewhat poorly drained soil is on low plains and toe slopes in the uplands and is well suited to crops but mostly used as woodland. This soil is poorly suited to recreational development and building site development because of the seasonal high water table. This soil is also poorly suited to septic tank absorption fields because of the seasonal high water table and the very low permeability. Windthrow is a hazard. Limitations for pond construction are moderate due to seepage.

58A Alstad loam, 0-3% slopes – This deep, nearly level and undulating, somewhat poorly drained soil is on low plains and low knolls in the uplands and is well suited to crops and pasture but mostly used as woodland. This soil is poorly suited to recreational development, building site development, septic tank absorption fields because of the wetness and moderately slope permeability. Windthrow is a hazard. Limitations for pond construction are moderate due to seepage.

60A Rudyard loam, 0-3% slopes – This deep, nearly level, somewhat poorly drained soil is on low knolls and low broad plains in the uplands and is moderately well suited to crops and pasture but mostly used as woodland. This soil is poorly suited to recreational development and building site development because of the seasonal high water table and

the high shrink-swell potential. This soil is also poorly suited to septic tank absorption fields because of the seasonal high water table and very slow permeability. Windthrow is a hazard. Windthrow is a hazard. Limitations for pond construction are slight.

62 Wheatley loamy sand – This deep, nearly level, poorly drained soil is on low plains and is mostly used as woodland. It is subject to ponding and windthrow is a hazard. This soil is unsuited to recreational development and building site development because of the ponding and instability of cutbanks. This soil is also unsuited to septic tank absorption fields because of the ponding and poor filtering capacity. Limitations for pond construction are severe due to seepage.

63 Brevort mucky loamy sand – This deep, nearly level, very poorly drained soil is on broad, low plains and is mostly used as woodland. It is subject to ponding and windthrow is a hazard. This soil is unsuited to recreational development and building site development because of the ponding and instability of cutbanks. This soil is also unsuited to septic tank absorption fields because of the poor filtering capacity, moderately slow permeability, and ponding. Limitations for pond construction are severe due to seepage.

64 Burleigh mucky sand – This deep, nearly level, very poorly drained soil is on broad, low plains and in swales and is mostly used as woodland. It is subject to ponding and windthrow is a hazard. This soil is unsuited to recreational development and building site development because of the ponding and instability of cutbanks. This soil is also unsuited to septic tank absorption fields because of the poor filtering capacity and moderately slow permeability. Limitations for pond construction are severe due to seepage.

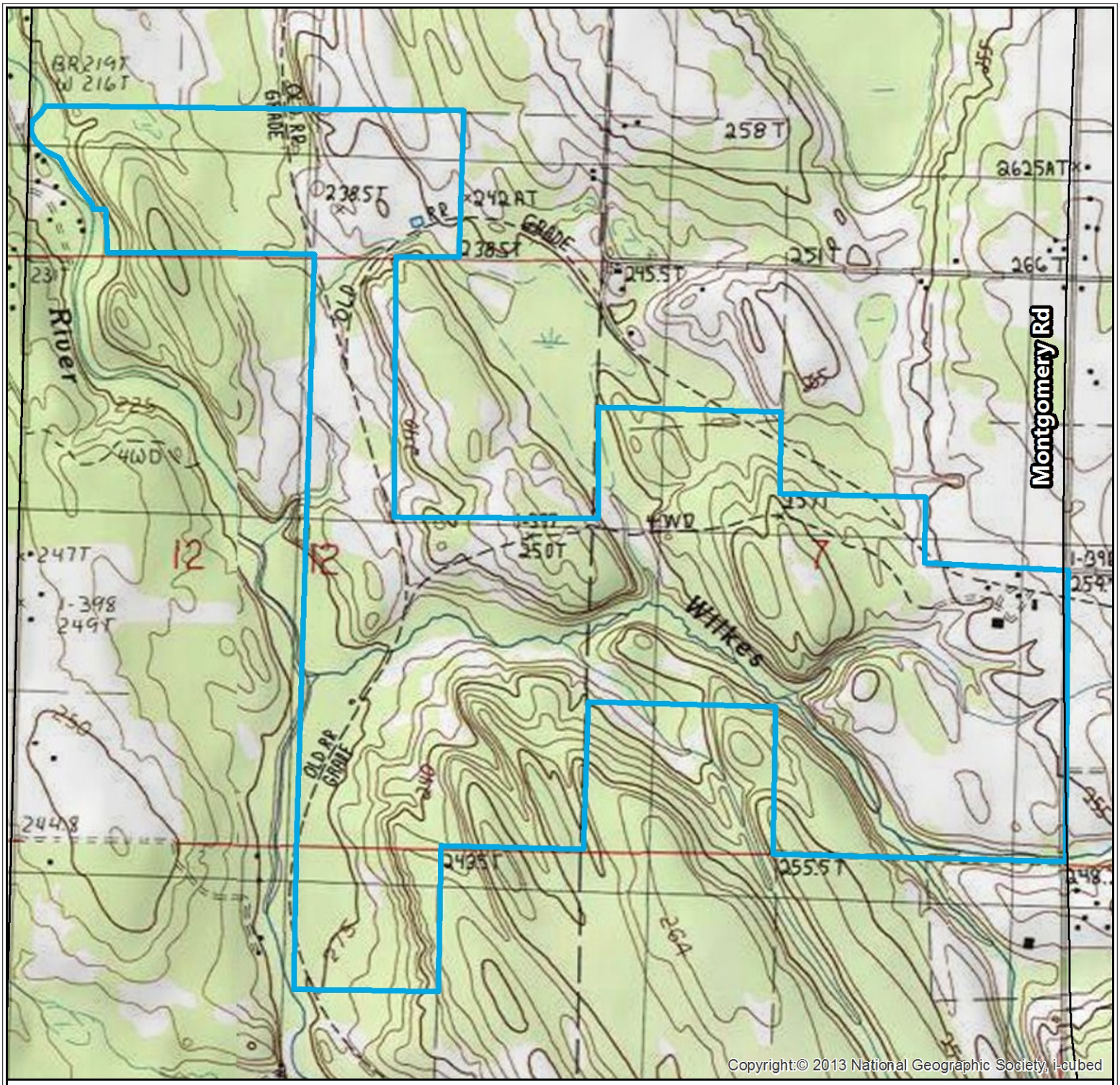
71 Bowstring muck, frequently flooded – This deep, nearly level, very poorly drained soil is on flood plains and is poorly suited to woodland. This soil is unsuited to recreational development, building site development, septic tank absorption fields because of the flooding high water table, low soil strength and high potential for frost action. Windthrow is a hazard. Limitations for pond construction are severe due to seepage.

78 Angelica mucky sandy loam – This deep, nearly level, very poorly drained soil is in low areas and narrow drainage ways in the uplands and is mostly used as woodland. It is subject to ponding and windthrow is a hazard. This soil is unsuited to recreational development and building site development because of ponding. This soil is also unsuited to septic tank absorption fields because of the moderately slow permeability and ponding. Limitations for pond construction are slight.

79 Charity fine sandy loam – This deep, nearly level, poorly drained soil is on low plains and is mostly used as woodland. It is subject to ponding and windthrow is a hazard. This soil is unsuited to recreational development and building site development because of the high shrink-swell potential and ponding. This soil is also unsuited to septic tank absorption fields because of the very slow permeability and ponding. Limitations for pond construction are slight.

7 Grousehaven Variant muck – This deep, nearly level, very poorly drained black and dark reddish brown muck is in bogs and other depressional areas on flood plains. It is subject to ponding and flooding of long duration in the spring. This soil is poorly suited to woodland and windthrow is a hazard. This soil is generally unsuited for recreational development because of the seasonal high water table and the instability of the organic material. It is generally unsuited to building site development and septic tank absorption fields because of the hazard of ponding, the high water table, low soil strength, and a high potential for frost action. Limitations for pond construction are severe due to seepage.

8 Tawas peat – This deep, nearly level, very poorly drained dark brown peat is in drainageways and depressions on plains. It is subject to ponding. This soil is poorly suited to woodland and windthrow is a hazard. This soil is generally unsuited to recreational development because of the seasonal high water table and instability of organic material. The soil generally is unsuited to building site development and septic tank absorption fields because of the hazard of ponding, the high water table, low soil strength, and a high potential for frost action. Limitations for pond construction are severe due to seepage.



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Jack and Tucker Harris
Working Forest Reserve
Topo Map
640 +/- acres
Cheboygan County, Michigan

0 0.1 0.2 0.3 0.4

Miles

Location: Jack and Tucker Harris Working Forest Reserve - Little Traverse Conservancy
FQA DB : Reznicek et al. 2014. Michigan Floristic Quality Assessment Database.
Survey Dates: 8/19/16, 8/31/16, 9/26/16
Practitioner: Derek Shiels

Conservatism-Based Metrics:

Total Mean C:	3.9	% C value 0:	11.5	Native Tree Mean C:	3.7
Native Mean C:	4.3	% C value 1-3:	27.7	Native Shrub Mean C:	4.6
Total FQI:	44.5	% C value 4-6:	50.8	Native Herbaceous Mean C:	4.3
Native FQI:	46.7	% C value 7-10:	10		
Adjusted FQI:	41				

Species Richness:

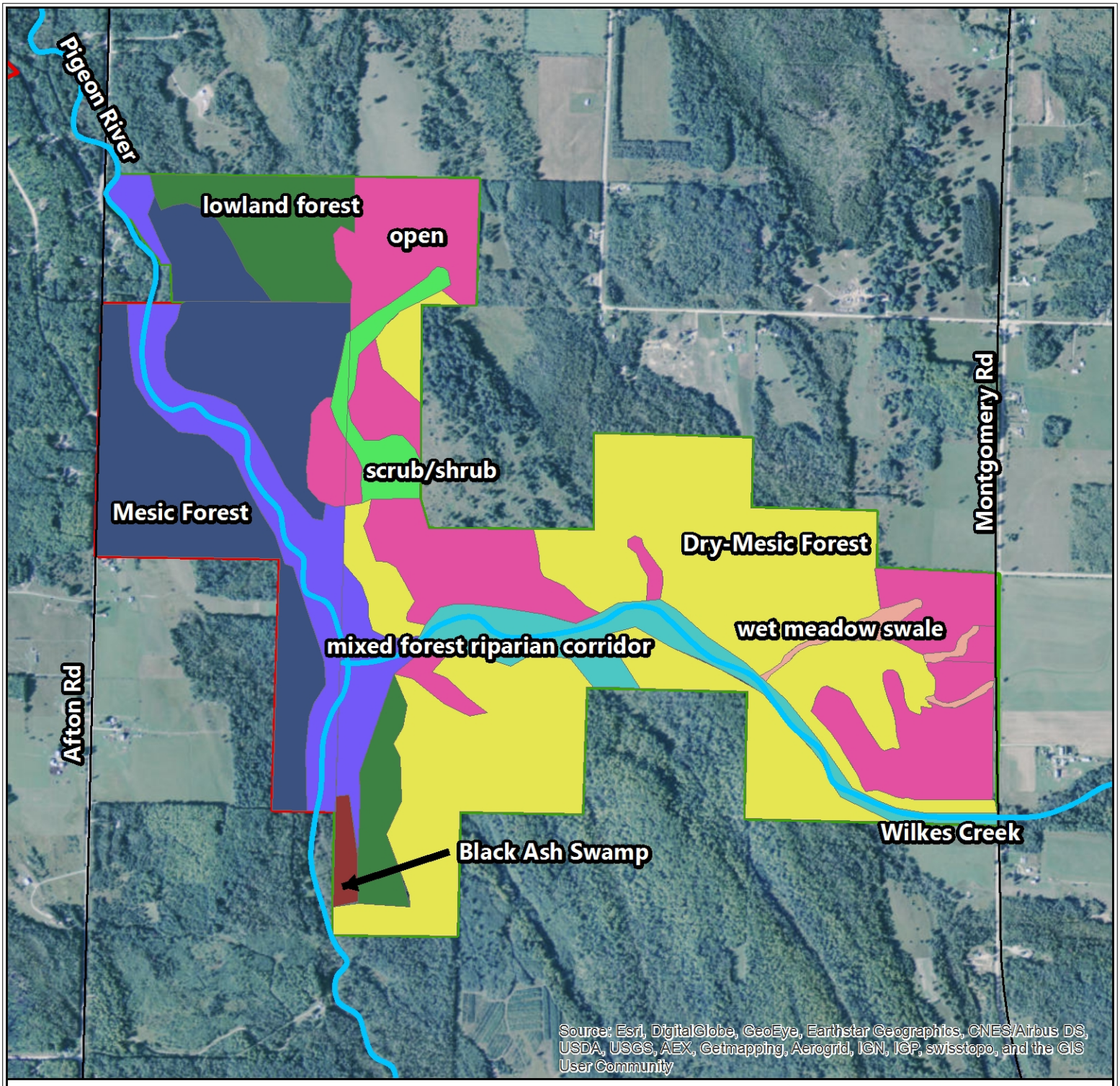
Total Species:	130	
Native Species:	118	90.80%
Non-native Species:	12	9.20%

Species List:

Scientific Name	Native?	C	W	Physiognomy	Duration	Common Name
Abies balsamea	native	3	0	tree	perennial	balsam fir
Acer rubrum	native	1	0	tree	perennial	red maple
Acer saccharum	native	5	3	tree	perennial	sugar maple
Actaea pachypoda	native	7	5	forb	perennial	dolls-eyes
Actaea rubra	native	7	3	forb	perennial	red baneberry
Adiantum pedatum	native	6	3	fern	perennial	maidenhair fern
Agrimonia gryposepala	native	2	3	forb	perennial	tall agrimony
Alisma triviale	native	1	-5	forb	perennial	northern water-plantain
Alnus incana; a. rugosa	native	5	-3	shrub	perennial	speckled alder
Anemone virginiana	native	3	3	forb	perennial	thimbleweed
Aralia nudicaulis	native	5	3	forb	perennial	wild sarsaparilla
Arisaema triphyllum	native	5	0	forb	perennial	jack-in-the-pulpit
Aronia prunifolia	native	5	-3	shrub	perennial	chokeberry
Asclepias incarnata	native	6	-5	forb	perennial	swamp milkweed
Athyrium filix-femina	native	4	0	fern	perennial	lady fern
Betula alleghaniensis	native	7	0	tree	perennial	yellow birch
Betula papyrifera	native	2	3	tree	perennial	paper birch
Bidens cernua	native	3	-5	forb	annual	nodding beggar-ticks
Bidens frondosa	native	1	-3	forb	annual	common beggar-ticks
Boehmeria cylindrica	native	5	-5	forb	perennial	false nettle
Carex flava	native	4	-5	sedge	perennial	sedge
Carex gracillima	native	4	3	sedge	perennial	sedge
Carex intumescens	native	3	-3	sedge	perennial	sedge
Carex retrorsa	native	3	-5	sedge	perennial	sedge
Carex scoparia	native	4	-3	sedge	perennial	sedge
Carex tuckermanii	native	8	-5	sedge	perennial	sedge
Carex utriculata; c. rostrata	native	5	-5	sedge	perennial	sedge
Centaurea stoebe	non-native	0	5	forb	biennial	spotted knapweed
Chelone glabra	native	7	-5	forb	perennial	turtlehead
Cicuta maculata	native	4	-5	forb	biennial	water hemlock
Circaea alpina	native	4	-3	forb	perennial	small enchanters-nightshade
Clematis virginiana	native	4	0	vine	perennial	virgins bower
Clintonia borealis	native	5	0	forb	perennial	bluebead-lily; corn-lily
Comptonia peregrina	native	6	5	shrub	perennial	sweetfern
Cornus amomum	native	2	-3	shrub	perennial	silky dogwood
Cornus canadensis	native	6	0	shrub	perennial	bunchberry
Corylus cornuta	native	5	3	shrub	perennial	beaked hazelnut
Cystopteris bulbifera	native	5	-3	fern	perennial	bulblet fern
Cystopteris tenuis	native	5	5	fern	perennial	fragile fern
Diervilla lonicera	native	4	5	shrub	perennial	bush-honeysuckle
Dirca palustris	native	8	0	shrub	perennial	leatherwood
Dryopteris cristata	native	6	-5	fern	perennial	crested shield fern

Dryopteris intermedia	native	5	0	fern	perennial	evergreen woodfern
Dryopteris marginalis	native	5	3	fern	perennial	marginal woodfern
Dulichium arundinaceum	native	8	-5	sedge	perennial	three-way sedge
Elaeagnus umbellata	non-native	0	3	shrub	perennial	autumn-olive
Elymus virginicus	native	4	-3	grass	perennial	virginia wild-rye
Epilobium parviflorum	non-native	0	-5	forb	perennial	willow-herb
Equisetum palustre	native	8	-3	fern	perennial	marsh horsetail
Equisetum sylvaticum	native	5	-3	fern	perennial	woodland horsetail
Erigeron annuus	native	0	3	forb	biennial	daisy fleabane
Eupatorium perfoliatum	native	4	-3	forb	perennial	boneset
Eutrochium maculatum	native	4	-5	forb	perennial	joe-pye-weed
Fragaria virginiana	native	2	3	forb	perennial	wild strawberry
Fraxinus nigra	native	6	-3	tree	perennial	black ash
Fraxinus pennsylvanica	native	2	-3	tree	perennial	red ash
Galium triflorum	native	4	3	forb	perennial	fragrant bedstraw
Hypericum ascyron	native	8	0	forb	perennial	giant st. johns-wort
Hypericum perforatum	non-native	0	5	forb	perennial	common st. johns-wort
Iris virginica	native	5	-5	forb	perennial	southern blue flag
Laportea canadensis	native	4	-3	forb	perennial	wood nettle
Leersia oryzoides	native	3	-5	grass	perennial	cut grass
Lithospermum officinale	non-native	0	5	forb	perennial	gromwell
Lobelia cardinalis	native	7	-5	forb	perennial	cardinal-flower
Lobelia siphilitica	native	4	-3	forb	perennial	great blue lobelia
Lonicera canadensis	native	5	3	shrub	perennial	canadian fly honeysuckle
Ludwigia palustris	native	4	-5	forb	perennial	water-purslane
Lycopus americanus	native	2	-5	forb	perennial	common water horehound
Lycopus uniflorus	native	2	-5	forb	perennial	northern bugle weed
Lysimachia ciliata	native	4	-3	forb	perennial	fringed loosestrife
Lysimachia terrestris	native	6	-5	forb	perennial	swamp-candles
Maianthemum trifolium	native	10	-5	forb	perennial	false mayflower
Malus pumila	non-native	0	5	tree	perennial	apple
Matteuccia struthiopteris	native	3	0	fern	perennial	ostrich fern
Mimulus ringens	native	5	-5	forb	perennial	monkey-flower
Mitchella repens	native	5	3	forb	perennial	partridge-berry
Muhlenbergia mexicana	native	3	-3	grass	perennial	leafy satin grass
Mycelis muralis; lactuca m.	non-native	0	5	forb	biennial	wall lettuce
Nasturtium officinale	native	4	-5	forb	perennial	watercress
Oenothera biennis	native	2	3	forb	biennial	common evening-primrose
Onoclea sensibilis	native	2	-3	fern	perennial	sensitive fern
Parthenocissus quinquefolia	native	5	3	vine	perennial	virginia creeper
Pedicularis canadensis	native	10	3	forb	perennial	wood-betony
Persicaria maculosa	non-native	0	0	forb	annual	ladys-thumb
Phalaris arundinacea	native	0	-3	grass	perennial	reed canary grass
Physocarpus opulifolius	native	4	-3	shrub	perennial	ninebark
Picea glauca	native	3	3	tree	perennial	white spruce
Pinus resinosa	native	6	3	tree	perennial	red pine
Plantago lanceolata	non-native	0	3	forb	perennial	english plantain
Polygonatum pubescens	native	5	5	forb	perennial	downy solomon seal
Populus balsamifera	native	2	-3	tree	perennial	balsam poplar
Populus grandidentata	native	4	3	tree	perennial	big-tooth aspen
Populus tremuloides	native	1	0	tree	perennial	quaking aspen
Prunus virginiana	native	2	3	shrub	perennial	choke cherry
Pteridium aquilinum	native	0	3	fern	perennial	bracken fern
Pyrola chlorantha	native	8	3	forb	perennial	shinleaf
Quercus alba	native	5	3	tree	perennial	white oak
Quercus velutina	native	6	5	tree	perennial	black oak
Ribes cynosbati	native	4	3	shrub	perennial	prickly or wild gooseberry
Rubus pubescens	native	4	-3	shrub	perennial	dwarf raspberry

Sagittaria latifolia	native	4	-5	forb	perennial	common arrowhead
Sambucus racemosa	native	3	3	shrub	perennial	red-berried elder
Schizachyrium scoparium	native	5	3	grass	perennial	little bluestem
Scirpus atrovirens	native	3	-5	sedge	perennial	bulrush
Scirpus cyperinus	native	5	-5	sedge	perennial	wool-grass
Scirpus pendulus	native	3	-5	sedge	perennial	bulrush
Scutellaria galericulata	native	5	-5	forb	perennial	marsh skullcap
Scutellaria lateriflora	native	5	-5	forb	perennial	mad-dog skullcap
Sium suave	native	5	-5	forb	perennial	water-parsnip
Smilax hispida; s. tamnoides	native	5	0	vine	perennial	bristly greenbrier
Solanum dulcamara	non-native	0	0	vine	perennial	bittersweet nightshade
Solidago canadensis	native	1	3	forb	perennial	canada goldenrod
Solidago hispida	native	3	5	forb	perennial	hairy goldenrod
Solidago patula	native	6	-5	forb	perennial	swamp goldenrod
Solidago rugosa	native	3	0	forb	perennial	rough-leaved goldenrod
Symphyotrichum lateriflorum	native	2	0	forb	perennial	calico aster
Symphyotrichum ontarionis	native	6	0	forb	perennial	lake ontario aster
Symphyotrichum urophyllum	native	2	5	forb	perennial	arrow-leaved aster
Thelypteris palustris	native	2	-3	fern	perennial	marsh fern
Thuja occidentalis	native	4	-3	tree	perennial	arbor vitae
Tilia americana	native	5	3	tree	perennial	basswood
Trifolium repens	non-native	0	3	forb	perennial	white clover
Triosteum aurantiacum	native	5	5	forb	perennial	horse-gentian
Typha latifolia	native	1	-5	forb	perennial	broad-leaved cat-tail
Ulmus americana	native	1	-3	tree	perennial	american elm
Verbena hastata	native	4	-3	forb	perennial	blue vervain
Veronica officinalis	non-native	0	3	forb	perennial	common speedwell
Viburnum acerifolium	native	6	5	shrub	perennial	maple-leaved viburnum
Viburnum cassinoides	native	6	3	shrub	perennial	wild-raisin
Zanthoxylum americanum	native	3	3	shrub	perennial	prickly-ash



Jack and Tucker Harris Working Forest Reserve
Broad Natural Community Types
643 +/- acres
Cheboygan County, Michigan

0 0.15 0.3 0.45 0.6

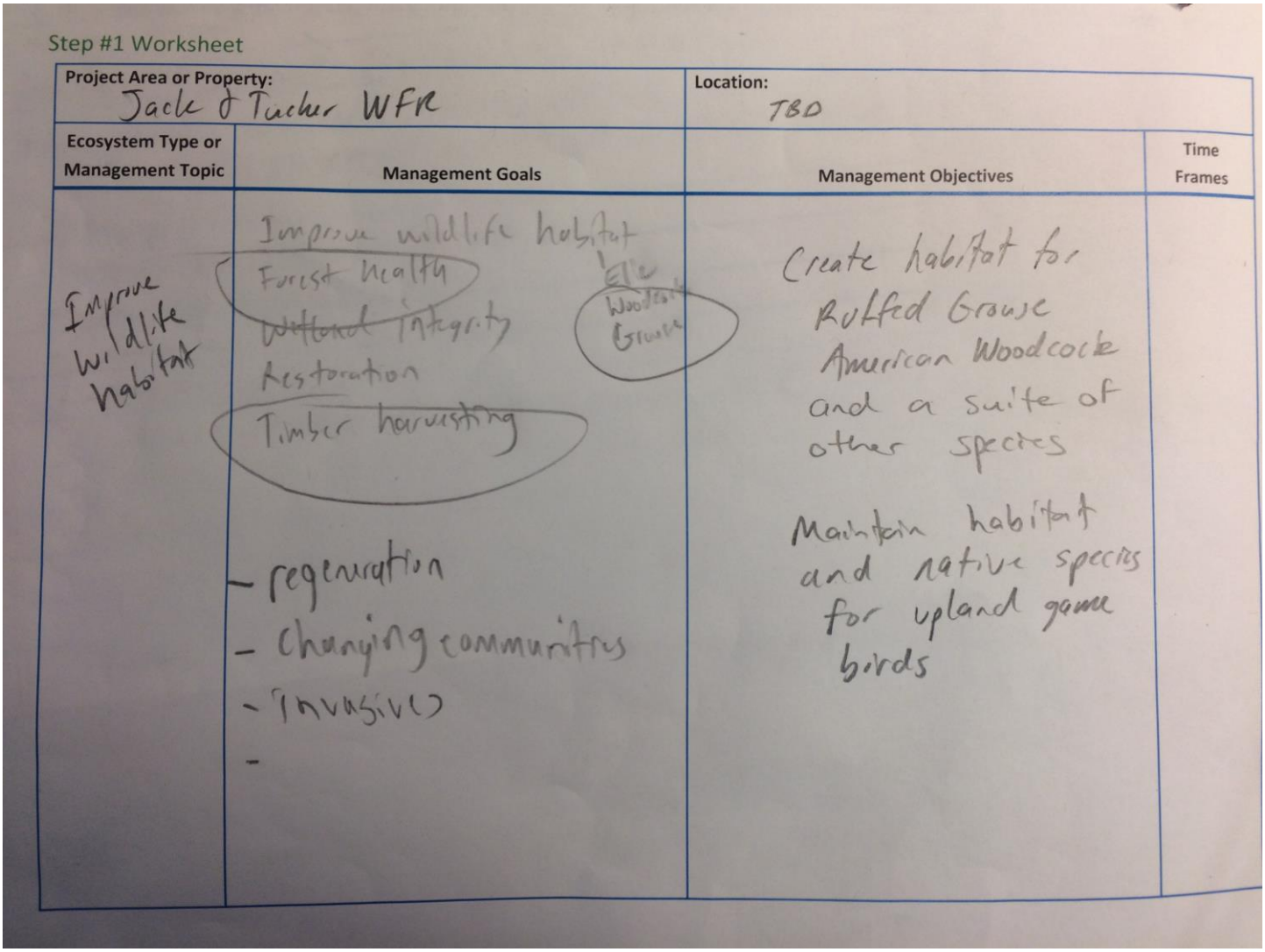
Miles

Prepared By

Little Traverse Conservancy
3264 Powell Rd - Harbor Springs, MI 49770
Telephone: 231.347.0991 - Fax: 231.347.1276
www.landtrust.org - LTC@landtrust.org

Climate Change Forest Adaptation Workshop – 9/28/2016

The following worksheets were completed as part of the workshop. These served as learning tools for how to plan and prepare for the impact that a changing climate will have on LTC lands. The Harris Reserve was used as the case study for the workshop and the management goal that was chosen that day to focus on was on improving upland game bird habitat. While these notes were quickly taken in the course of a short one-day workshop, they provided valuable guidance for creating management proposals in the management plan.



Step #1 Worksheet

Project Area or Property: Jack & Tucker WFR	Location: TBD		
Ecosystem Type or Management Topic	Management Goals	Management Objectives	Time Frames
Improve wildlife habitat	Improve wildlife habitat Forest health Wetland Integrity Restoration Timber harvesting - regeneration - Changing communities - Invasives -	Create habitat for Ruffed Grouse American Woodcock and a suite of other species Maintain habitat and native species for upland game birds	

Step #2 Worksheet

Ecosystem Type or Management Topic (from Step #1)	Regional Climate Change Impacts and Vulnerabilities	Climate Change Impacts and Vulnerabilities for the Project Area or Property	Vulnerability Determination
Improve Wildlife habitat	↓ extreme cold 1 ~~↓ snowpack~~ ↑ Extreme heat 5 • shorter winters 2 • Declines in boreal sp. 5 • pests 5 • invasive sp. 2	• invasives increasing • Pests increasing • Boreal species less adapted • Extreme heat -> more droughty conditions	

Step #3 Worksheet

Ecosystem Type or Management Topic (from Step #1)	Management Objectives (from Step #1)	Challenges to Meeting Management Objective with Climate Change	Opportunities for Meeting Management Objective with Climate Change	Feasibility of Objectives under Current Management	Other Considerations
Aspen Regeneration Early Successional forests	Upland game bird habitat	• inv. species competition • aspen moving north – harder to regenerate • More stressors on aspen heat events, pests • ~~Fir, and popular sp~~ • Degraded forest due to grazing history	• other early succ. forest species could do well and provide habitat • longer growing season	Short term: High Long term: Low	Winters that meet opportunities

Slow down to consider...

other species?

soils would impact regenerat

Step #4 Worksheet

Ecosystem Type or Management Topic (from Step #1)	Adaptation Actions: Approach	Adaptation Actions: Tactic	Time Frames	Benefits	Drawbacks and Barriers	Practicability of Tactic	Recommend Tactic?
Provide recreational opportunities for upland game bird hunting	6.1/9.8	Create patches of E.S.F. in several location across the property	present to	Creating multiple habitat location & age class structures	more edge logistically challenging • match with timber harvest plans	Med-High	
	9.1 - create patches on favorable species	Create young forests of maples, etc.	present to	more diversity more resilience (redundancy)	• deer browse • loss $ on uneconomical trees	med-low	
	9.3/9.4	Encourage red oak & other potential mast plant white oak & others?	present incrementally w/ harvests	• diversity • ensure forest cover	• might influence the species using the forest • deer browse • expense • org. buy-in	High Med Low	
	10.3	Manage for Oak-pine barrens/ Savanna systems					

less focus on grouse

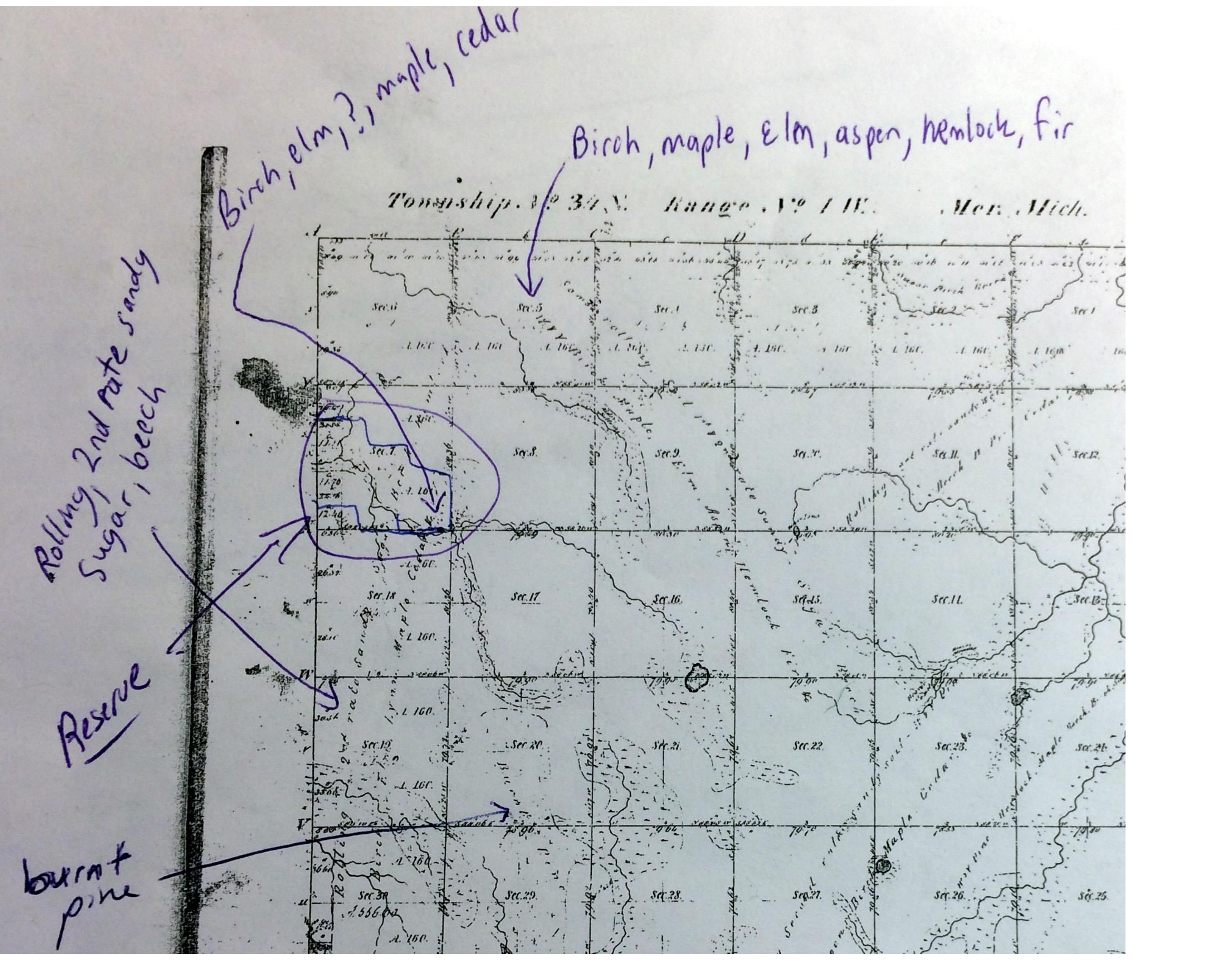
Resistance - Resilience Transition

Thinking, choosing what to encourage (connectivity / managed relocation/assis

Step #5 Worksheet

Ecosystem Type or Management Topic (from Step #1)	Adaptation Monitoring Variable	Criteria for Evaluation	Monitoring Implementation
Improve wildlife habitat	• # of successful hunts from hunter reports	• Are hunters satisfied?	• Request for feedback for this reserve
	• habitat type regeneration	• Are thickets reappearing or are native species surviving versus non-natives?	• yearly monitoring of restoration sites

partners?


Birch, elm, ?., maple, cedar
Birch, maple, Elm, aspen, hemlock, fir
Township. No 34 N. Range. No 1 W. Mer. Mich.
Rolling, 2nd rate sandy
Sugar, beech
Reserve
burnt pine
Sec. 6
Sec. 5
Sec. 4
Sec. 3
Sec. 2
Sec. 1
Sec. 7
Sec. 8
Sec. 9
Sec. 10
Sec. 11
Sec. 12
Sec. 18
Sec. 17
Sec. 16
Sec. 15
Sec. 14
Sec. 13
Sec. 19
Sec. 20
Sec. 21
Sec. 22
Sec. 23
Sec. 24
Sec. 30
Sec. 29
Sec. 28
Sec. 27
Sec. 26
Sec. 25


Disturbed/Cleanup Area
4.67 Acres
bing
State of Michigan © 2017 Microsoft Corporation


REPUBLIC
SERVICES

FOREST STEWARDSHIP PLAN
Harris Timberlands
Prepared in February of 2018

Property Owner: Little Traverse Conservancy (LTC)
3264 Powell Rd.
Harbor Springs, MI 49740

Telephone: (231)344-1006

Email: kcfleming@landtrust.org

Property Description: Parcel ID #: 210-012-200-001-02
E1/2 OF SEC 12, T34N,R2W. **EXC** PART OF THE NE 1/4, SECTION 12, T34N, R2W, ELLIS TOWNSHIP, CHEBOYGAN COUNTY, MICHIGAN DESCRIBED AS COMMENCING AT THE NORTHEAST CORNER OF SAID SECTION; THENCE S 00°10'37" E, ALONG THE EAST LINE OF SAID SECTION, 33.00 FT., TO THE POINT OF BEGINNING; THENCE CONTINUING S 00°10'37" E, ALONG SAID EAST LINE, 1259.91 FT., TO THE EAST NORTHEAST 1/16 CORNER OF SAID SECTION; THENCE S 00°07'08" E, ALONG SAID EAST LINE, 1024.09 FT.; THENCE S 88°59'23" W, PARALLEL TO THE NORTH LINE OF SAID SECTION, 1750.00 FT.; THENCE N 19°30'45" W 430.09 FT.; THENCE N 00°08'54" W 1909.09 FT.; THENCE N 88°59'23" E, PARALLEL TO SAID NORTH LINE, 1892.50 FT., TO THE P.O.B. SPLIT ON 1/12/17 FROM 210-012-200-001-00 658/530;1001/170;1114/999;1317/212;1320/164 (210.58 Acres)

Parcel ID#: 220-007-100-003-00
ENTIRE SE1/4, SEC 7, T34N,R1W. **AND** S FRL 1/2 OF NW1/4, SEC 7, T34N,R1W. **AND** N FRL 1/2 OF SW1/4, SEC 7, T34N,R1W. **AND** S 18 ACRES OF SW1/4 OF NE1/4, SEC 7, T34N,R1W. 199/511;1114/998;1320/164 (282.64 Acres)

Parcel ID#: 210-001-400-003-00
SW1/4 OF SE1/4, SEC 1, T34N,R2W. **AND** SE1/4 OF SW1/4, SEC 1, T34N,R2W. 1320/158;1320/164 (75.93 Acres)

Parcel ID#: 210-001-300-002-00
SW1/4 OF SW1/4, SEC 1, T34N,R2W, LYING E OF PIGEON RIVER. *EXC: S 397.98FT OF W 740FT OF SW1/4 OF SW1/4. 1320/158;1320/164 (27.32 Acres)

Parcel ID #: 210-013-200-001-00
NW1/4 OF NE1/4, SEC 13, T34N,R2W. 658/530;1001/170;1114/999;1320/164 (36.24 Acres)

Total Acreage: 632.71 acres

Forested Acreage: 379.51

Plan Expiration Date: 2038

Prepared By: Bryce & Susan Metcalfe

Company: Metcalfe Forestry Co.

Address: 402 Chestnut St. Grayling, Michigan 49738

Telephone: (989) 348-3596

Email: metcalfeforestry@yahoo.com

TABLE OF CONTENTS

Introduction

The purpose of this report is to provide the following information:

- A statement of the owner's forest management objectives
- A description of the forestry practices that will be undertaken
- A corresponding timeline for operations
- A description of wildlife management
- A forest timber type map
- A description of soil types

Metcalfe Forestry Co. has been contracted by the landowners to perform the required data collection and analysis, as well as the composition of this management plan. This plan covers the time period of 20 years from 2018 to 2038 and should be reviewed in 2037. More than 75% of the land specified in this plan is forested and eligible for CFA enrollment. The land is productive forest and is capable of growing more than 20 cubic feet per acre per year. Landowners must notify the Michigan DNR in writing 30 days prior to any tree cutting, tree harvesting, or tree removal on listed land (CF). Natural disasters can and do happen throughout the life cycle of a forest. If your property is damaged by fire, heavy winds, flooding or other natural disasters, you should contact your forester to determine what changes need to be made to your management plan. Submit harvest notifications to:

Michael Hanley
9870 Stoll Rd
Haslett, Michigan 48840

Metcalfe Forestry Co. is a family owned and operated forest consultant business based in Grayling, Michigan. Metcalfe Forestry has been managing forests in Michigan since 1998. Metcalfe Forestry Co. is centered on managing natural resources related to timber for private landowners in the northern lower peninsula of Michigan. This involves the planning of when, where and why to harvest timber, as well as selling and administering timber harvesting sales.

MANAGEMENT OBJECTIVES

The objectives for the forest are based around the goal of maintaining a healthy forest that provides or improves habitat for wildlife and recreational opportunities. The following is a list of their management objectives:

- Manage the property for public recreation.
- Manage the property for wildlife.
- Improve and maintain the forest health, including age class and species diversity.
- Sustainably generate revenue by harvesting timber

These objectives can be achieved by following the recommendations this management plan. The plan will document the conditions of the current forest as well as schedule future harvests on an annual and sustainable basis.

DESCRIPTION OF DOMINANT VEGETATION

This is a very diverse property in terms of habitat and forested ecosystems. The forest types that preside on the property include: aspen or various age classes, northern hardwoods mixed swamp conifer, mixed swamp hardwoods and cedar. There are also scattered pockets and individual red and white pine. The property has large areas of open meadows and scrub/shrub lands. Aspen and balsam fir are the two most prevalent species found on the property. Northern hardwoods timber type is dominated by sugar maple and basswood. There are lesser amounts of American beech, red maple and oak. Ironwood dominates the understory of the northern hardwoods timber types although there are several areas were sugar maple and ash are prevalent as seedlings. The property was harvested in the recent past. It appears that the harvest was a high grade, a type of selective harvest that removes the best trees from the stand and leaves poor quality, poorly formed unhealthy trees to reproduce and reseed the forest. This type of harvest is unsustainable and degrades the forest for generations. Many of the conifer and aspen stands are much healthier. The open areas and scrub lands are dominated by stunted apple trees. Many of these apple trees appear like bushes and are poorly formed due to grazing/browsing.

PROPERTY DESCRIPTION

The property was a working farm previous to its transfer to Little Traverse Conservancy. Montgomery Rd. borders the east boundary and provides one access to the property (Weir road provides the other). While the Pigeon river borders the west side of the property. There are multiple two tracks and old skid/cattle trails that can be used to explore the property. There is also an old railroad grade that crossing the western part of the property from north to south. These trails may need improvement for timber harvest operation trucking.

The terrain is rolling hills with some mostly flat areas and the occasional steep slopes. However the majority of the acreage is workable with mechanized logging equipment. Many parts of the property are fallow fields once used to produce hay or pasture animals. These fields are populated with disturbance species including spotted knapweed and autumn olive both of which are invasive species.

There are two lowland riparian areas on the property one of which is located along the Pigeon River. This area is mostly steep and access is very difficult and limited especially in the north. The second riparian area is along Wilkes creek which flows from East to west and drains into the Pigeon. Beavers have built several dams which have created wetlands behind them.

CULTURAL HERITAGE RESOURCES / THREATENED & ENDANGERED SPECIES

There are no recorded archeology sites for the Harris Property located within Sections 1,12 and 13, T34N-R2W, Ellis township and within Section 7, T34N-R1W, Walker Township, Emmet County, Michigan. However Goblin Moonwort is known to exist in the area. Information was obtained by a check Michigan in the Natural Features and Cultural Features/HAL Inventory conducted by Michael Hanley, Service Forester for the MDNR and Dean Anderson, Ph.D. State Archeologist at the State Historic Preservation Office.

FORESTS OF RECOGNIZED IMPORTANCE (FORI)

This property is <u>not</u> located within a "Forest of Recognized Importance" (FORI), which in Michigan are forests along the Great Lakes coastline, forests along Natural or Wild and Scenic Rivers, rare forest types (old growth), or forests that provide important wildlife habitat (>500 contiguous acres in the southern Lower Peninsula, or required habitat for threatened or endangered species statewide). Landowners within a FORI should manage their forest to protect the ecological integrity of that larger important ecosystem.

STANDS BY COVER TYPE AND AREA

(See Stand Map)

The property has been split up into stands that contain relatively homogenous types of forest with variability in stocking levels often being the delineating factor. The individual stands are described below. Timber harvest recommendations are also provided. Harvest timing has been based on stand quality and stocking.

Key to Forest Cover Type Symbols

Productive Forest Types:

A	Aspen	More than 50% aspen
BW	White Birch	More than 50% white birch.
NH	Northern Hardwoods	Dominated by sugar maple, yellow birch, basswood, white ash, beech, etc.
HH	Hemlock-Hardwoods	More than 50% hemlock associated with northern hardwood species.
CH	Central Hardwoods	Dominated by black walnut, black cherry, elm, white ash, hackberry, oaks, and hickory
BH	Bottomland Hardwoods	Dominated by silver maple, river birch, elm, cottonwood, etc.
SH	Swamp Hardwoods	More than 50%swamp hardwoods - black ash, red maple, elm, etc.
MR	Red Maple	More than 50% red maple
O	Oak	Dominated by red, white, and/or black oaks
OX	Scrub Oak	More than 50% stocked with oak species which,in this type, will only produce fuelwood or cellulose.
W	Black Walnut	More than 50% black walnut
PJ	Jack Pine	More than 50% jack pine
PR	Red Pine	More than 50% red pine
PW	White Pine	More than 50% white pine
SB	Black Spruce	More than 50% black spruce
C	Cedar	More than 50% cedar
FB	Balsam Fir	More than 50% balsam fir
SW	White Spruce	More than 50% white spruce
SC	Swamp Conifers	More than 50% swamp conifers
T	Tamarack	More than 50% tamarack

Non-Productive Types:

GH	Upland Grasses & Herbaceous Vegetation	SX	Noncommercial Conifer Swamp
KG	Lowland Grasses & Herbaceous Vegetation	L	Lake or Standing Water
UB	Upland Brush	ROW	Right of Way
LB	Lowland Brush	I	Industrial & Residential

Key to Stocking Levels

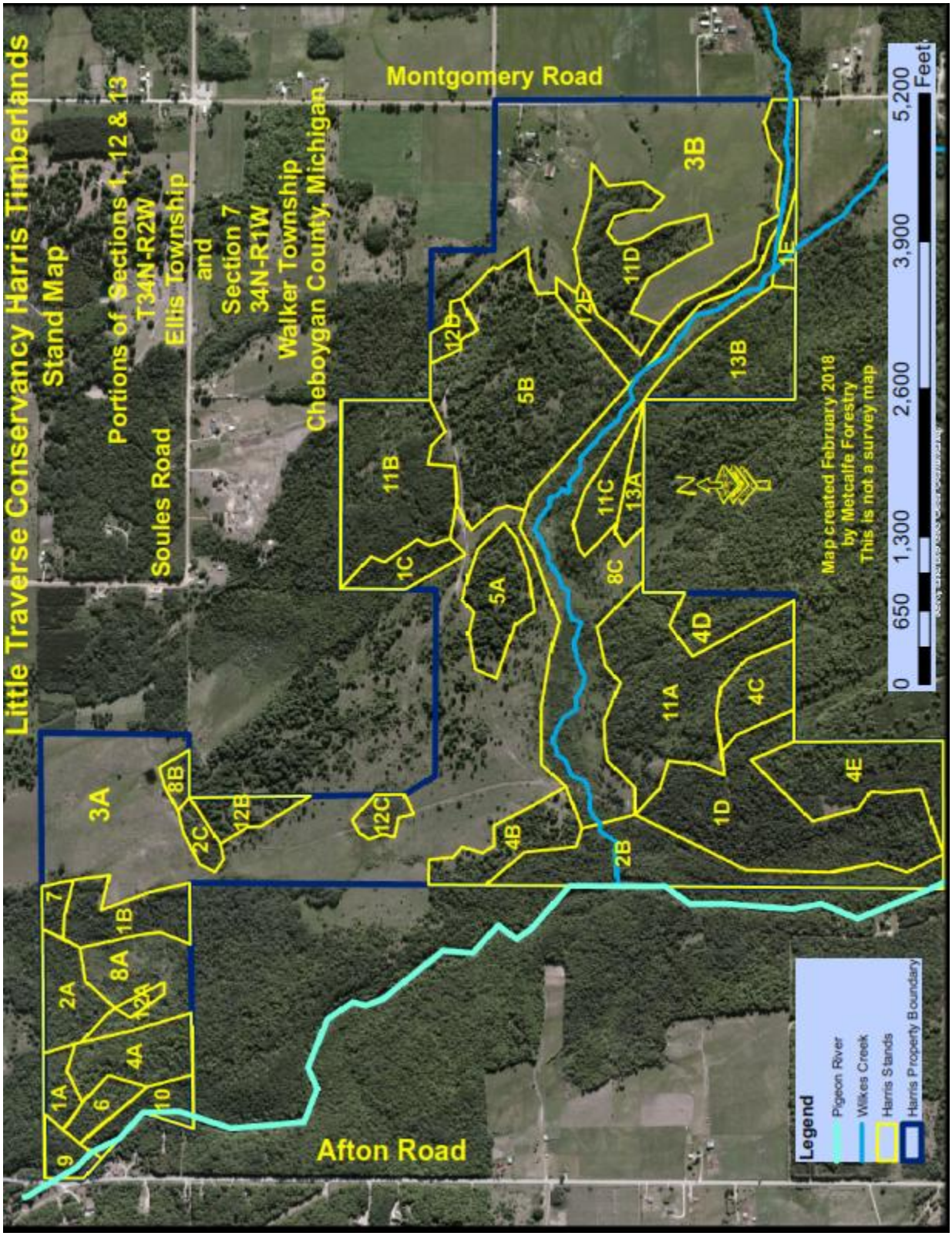
Code	Stocking	Saplings/Seedlings (stems/acre)	Pole-Timber or Codominant (cords/acre)	Sawtimber or Dominant (bdft/acre)
1	Poor	1 - 300	1 - 7	1,000 - 2,000
2	Moderate	301 - 900	8 - 13	2,001 - 3,500
3	Medium	901 - 1,500	14 - 20	3,500 - 5,500
4	Well 1	1,501 - 2,500	21 - 30	5,501 - 8,000
5	Well 2	2 501 +	31 - 40	8,001 -12,000
6	Very Well 1		41 +	12,001 - 16,000
7	Very Well 2			16,001 +

examples:

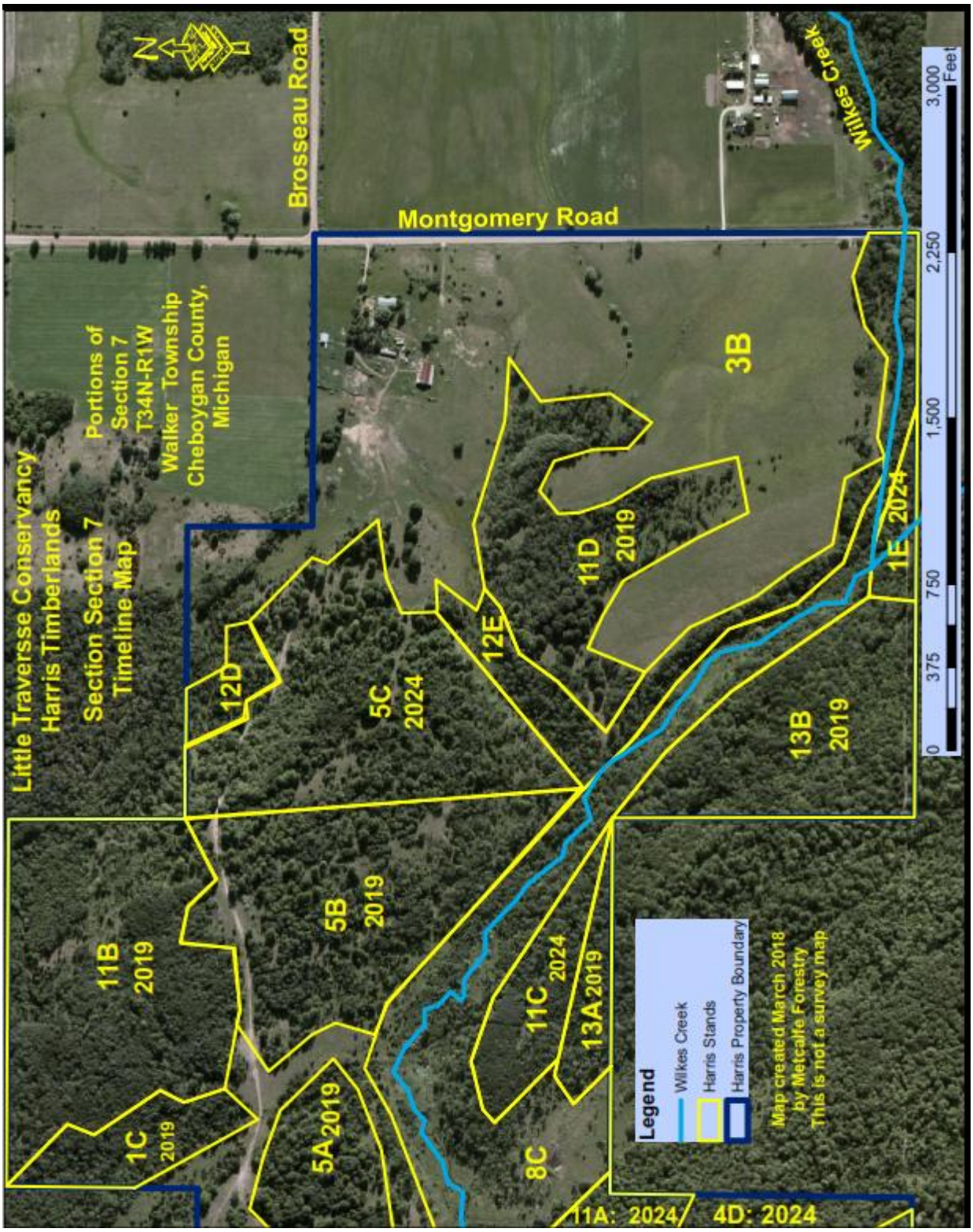
PW-MR/MR/MR-O 1/4/2 — White pine-red maple mix understory with poor stocking (1-300 stems/acre)
Dense, well stocked red maple pole timber (21-30 cords/acre)
Moderately stocked (2,001 - 3,500 bdft/acre) red maple-oak sawtimber

A/A/O 3/1/2 — Dense aspen regeneration understory (901-1,500 stems/acre)
Low amounts of aspen poletimber (1-7 cords/acre)
Moderate amounts of oak sawtimber overstory (2,001-3,500 bdft/acre)

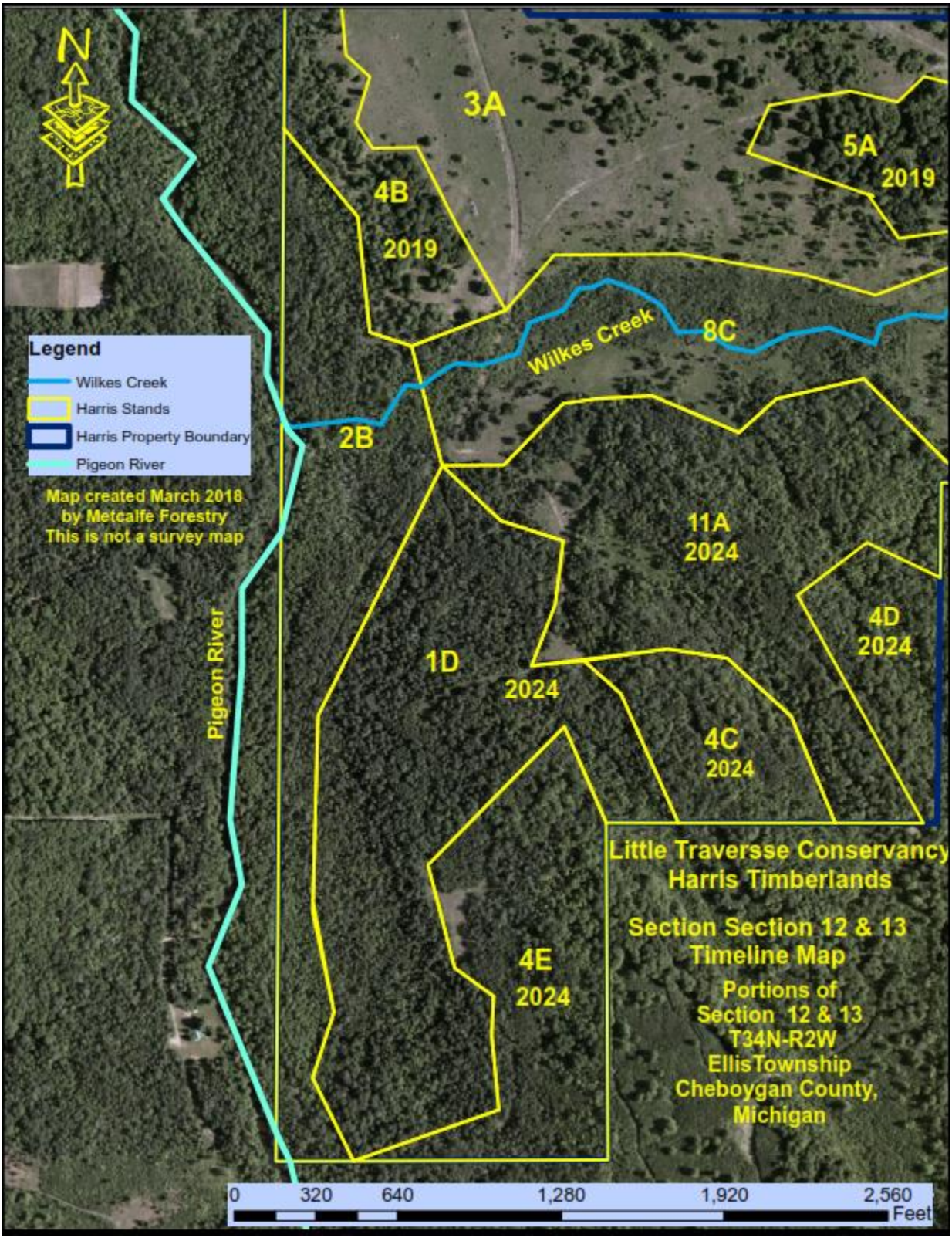
STAND MAP


Little Traverse Conservancy Harris Timberlands
Stand Map
Portions of Sections 1, 12 & 13
T34N-R2W
Ellis Township
and
Section 7
34N-R1W
Walker Township
Cheboygan County, Michigan
Soules Road
Montgomery Road
Afton Road
Map created February 2018
by Metcalfe Forestry
This is not a survey map
0 650 1,300 2,600 3,900 5,200
Feet
N
Legend
Pigeon River
Wilkes Creek
Harris Stands
Harris Property Boundary
1A
1B
2A
2B
2C
3A
3B
4A
4B
4C
4D
4E
5A
5B
6
7
8A
8B
8C
9
10
11A
11B
11C
11D
12A
12B
12C
13A
13B
1C
1D
1E

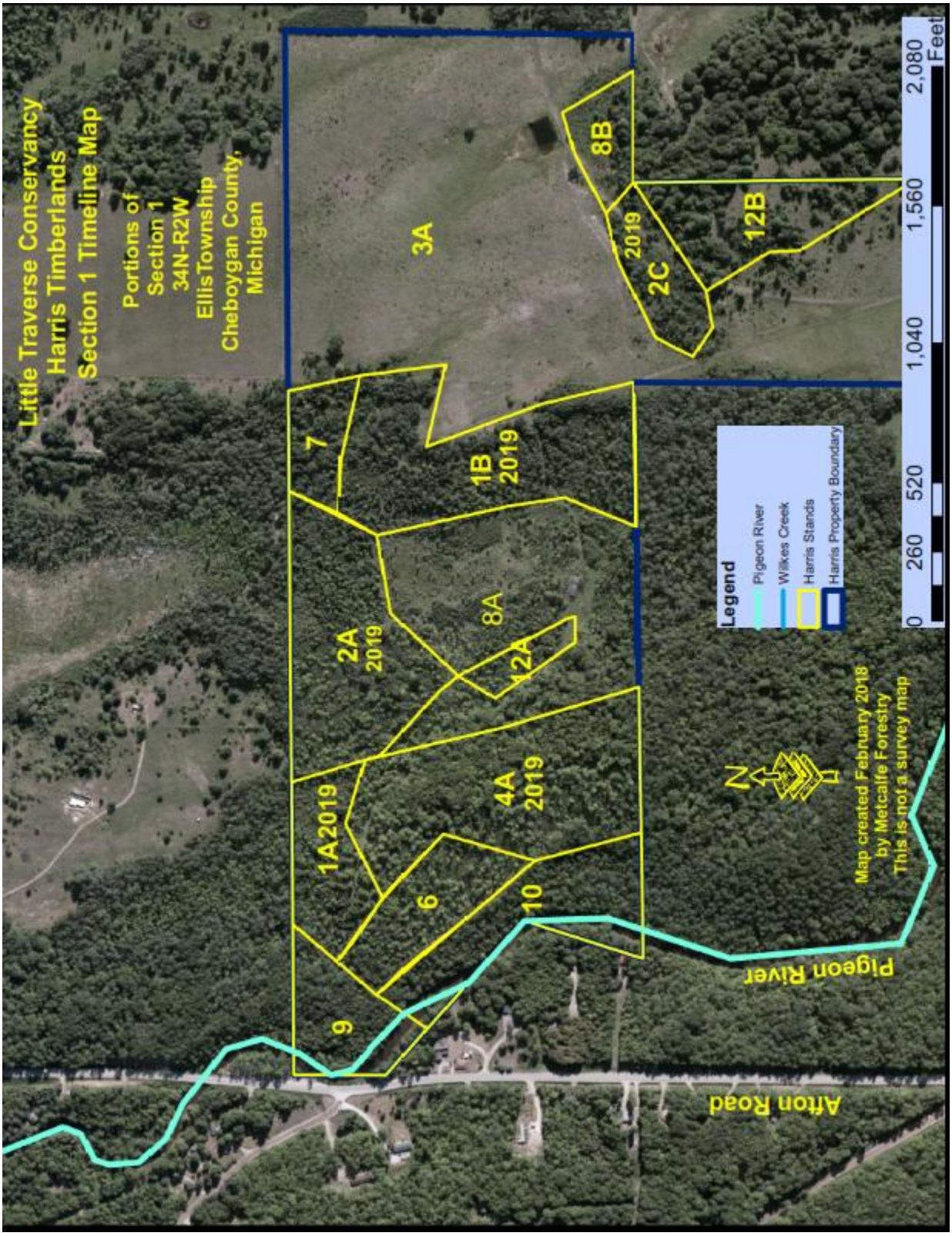
SECTION 7 TIMELINE MAP



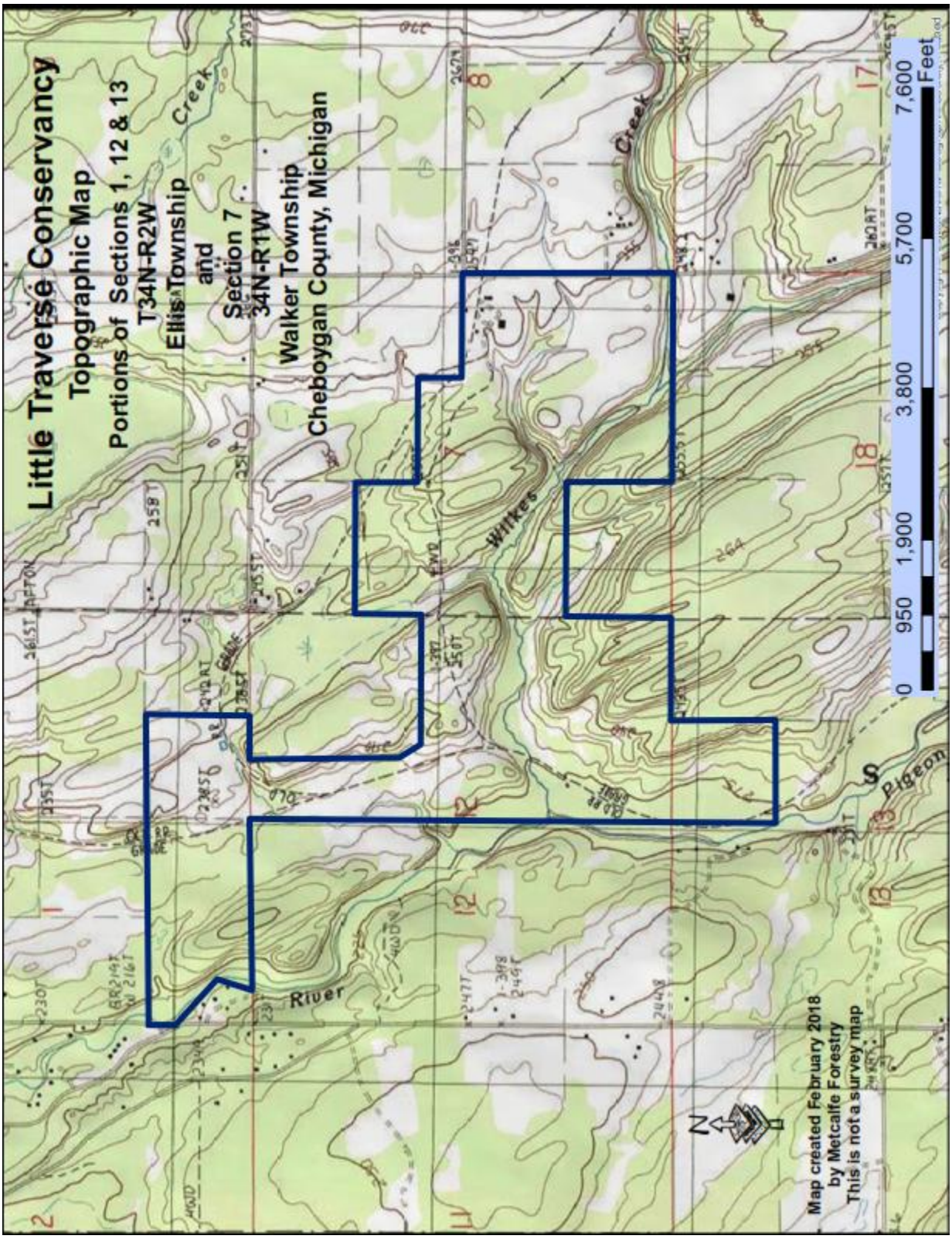
SECTION 12 AND 13 TIMELINE MAP



SECTION 1 TIMELINE MAP



TOPOGRAPHIC MAP



SUMMARY OF STANDS, ACRES, COVER TYPE, DENSITY & TIMELINE OF RECOMMENDATIONS

(Use as Stand Map Key)

STAND NUMBER	DESCRIPTION	ACREAGE	TREATMENT TYPE	YEAR PLANNED
1A-C	SC/SC-A/SC 1/4/3	3.88, 11.04, 5.91	Clear Cut with Reserves	2019
1D &E	SC/SC-A/SC 1/4/3	39.23 & 2.47	Clear Cut with Reserves	2024
2A & C	LB/SH/SH 2/3/1	9.34 & 2.95	Clear Cut with Reserves	2019
2B	LB/SH/SH 2/3/1	26.92	No Practice	NA
3A & B	UB/-/- -/-/-	107.32 & 74.68	No Treatment	NA
4A & B	NH/A/NH 3/3/1	11.7 & 11.02	Clear Cut with Reserves	2019
4C- E	NH/A/NH 3/3/1	9.17, 6.46, 19.74	Clear Cut with Reserves	2024
5A & B	NH/A/NH 3/2/1	11.93, 27.1, 26.65	Clear Cut with Reserves	2019
5C	NH/A/NH 3/2/1	26.65	Clear Cut with Reserves	2024
6	A/A/- 5/1/-	4.19	No Treatment	NA
7	KG-LB/C/C -/3/1	2.21	No Treatment	NA
8A-C	LB/SH/- 4/1/-	12.78, 2.04, 56.38	No Treatment	NA
9	-/SH/C -/4/4	3.81	No Treatment	NA
10	BF/C/WP-RP 1/4/2	6.17	No Treatment	NA
11A & C	A/A/A-BF 1/3/1	37.45 & 6.92	Clear cut with Reserves	2024
11 B & D	A/A/A-BF 1/3/1	29.02 & 19.62	Clear Cut with Reserves	2019
12A-E	LB/C/- -/2/-	1.14, 5.16, 3.12, 2.66, 9.65	No Treatment	NA
13A & B	NH/A/A-NH 1/4/3	3.61 & 19.27	Clear cut W/Reserves	2019

INDIVIDUAL STAND DESCRIPTIONS

Stand	1A-E	Stand Type	SC/SC-A/SC
Acres	3.88, 11.04, 5.91, 39.23, 2.47	Stocking	1/4/3 Forested
BA	120+	Stand Quality	Good
Next Treatment	1A-C: 2019 1 D & E: 2024	Type of Mgt.	Clear Cut with Reserves
Description: The stand is a mixture of mature and over mature aspen and mixed swamp conifers in the overstory. Many of the conifers, mostly white spruce and balsam fir are economically mature. Many of these trees are 14"+ DBH with larger trees 18"-20" DBH. There are also scattered pockets and single white cedar trees in this stand. The basal area within the stand varies considerably in places because of blowdown pockets or high water areas that are flooded throughout much of the growing season. Typically however the basal area is often 150ft²+. The stand has a mixture of other tree species as well in much lesser amounts than the ones listed above. These include white birch, elm, white pine, yellow birch, red maple and bass wood. The understory is non- existent in most places but in others it is a dense pocket of low land brush mostly represented by specked alders, red osier dogwood, willows and elder berry. These same areas also have low land grasses and other herbaceous vegetation.			
Prescriptions: The stand should be harvested by clear cutting. The stands 1A-C will be cut in 2019 and Stands 1D & 1E will be cut in 2024. This will establish an even aged stands which will be beneficial to many types of wildlife including white tailed deer, ruffed grouse and woodcock. Cedar and white pine however should be left within the stand and larger pockets of cedar could possibly be completely excluded from the harvest operation as a part of sale preparations. Clear cutting will re-established young aspen with in the stand and create dense areas of browse and cover.			

Stand	2A-C	Stand Type	LB/SH/SH
Acres	9.34, 26.92 2.95	Stocking	2/3/1 Forested
BA	60	Stand Quality	Poor
Next Treatment	2A & C: 2019 2B	Type of Mgt.	2A & C Clear Cut with Reserves 2B No Practice
Description: Stand is a mixture of swamp hardwoods mostly ash, elm, red maple, quaking aspen and lesser amounts of basswood and balsam fir. The black ash has died due to Emerald Ashe Borer, (EAB). This has created large canopy gaps, which in turn has created a lush understory of lowland grasses, herbaceous vegetation and shrubs such as red osier dogwood, elderberry, willows and speckled elder. There are areas of seasonally high water throughout the stand but other areas are likely dry most of the year.			
Prescriptions: Stand s 2A and C should be harvested where practical. The area needs to be re-evaluated during periods of dry weather to determine where harvest boundaries could be placed that would minimize rutting. All species should be harvested within these areas except for cedar and yellow birch. Any trees left within the harvest area will likely blow over due to the weak soils of the stand. Areas that have a significate amount of aspen should be the main focus of any harvesting activity however; other trees near the aspen pocket should also be removed as well to create enough of an opening to encourage aspen regeneration. These areas are likely wet throughout much			

of the year and care will need to be taken to minimize rutting. Driving on tops and harvesting during dry or frozen conditions is a must. Stand 2 B will not be harvested but will serve as a buffer for Wilkes Creek and the Pigeon River

Stand	3A & B	Stand Type	UB/-/-
Acres	107.32 & 74.68	Stocking	-/-/- Not forested
BA	<10	Stand Quality	Poor
Next Treatment	No Treatment	Type of Mgt.	NA
Description: The stand was heavily grazed over the years. The result is mostly a grass and shrub dominated ecosystem with few scattered trees. The majority of the shrubs are apple trees which have been browsed to the point where they no longer have tree form but are more of a bush. Others are native species such as hawthorn, hazelnut, dogwood, willow and crab apple. Many of the trees which can be found in the stand appear to be healthy although generally exhibit poor open grown form. Over time the stand will likely fill in with tree species, most likely pioneer species such as aspen and white birch.			
Prescriptions: Currently the stand is providing good wildlife habitat for rabbits, ruffed grouse, white tailed deer, fox and coyote. The stand is also good habitat for song birds that prefer grassy fields and shrub lands. Habitat could be improved by establishing scattered brush piles. Brush piles would provide shelter from hawk and other raptors as well as fox and coyote for small mammals and game species such as rabbits. Another recommendation would be to plant islands of conifers such as red and white pine. White pine grown in open areas is highly susceptible to white pine weevil which will damage the top leader and lead the tree to be bushier which enhances the cover it will provide.			

Stand	4A-E	Stand Type	NH/A/NH
Acres	11.7, 11.02, 9.17, 6.46, 19.74	Stocking	3/3/1 Forested
BA	70	Stand Quality	Poor
Next Treatment	4A & B: 2019 4C-E: 2024	Type of Mgt.	Clear Cut with Reserves
Description: The majority of the hardwoods stands on the property are poor quality in nature. Either these areas had been grazed for a long period of time and/or the property was high graded. A high grade is a type of selective harvest that removes the best trees from the stand and leaves poor quality, poorly formed unhealthy trees to reproduce and reseed the forest. This type of harvest is unsustainable and degrades the forest for generations. Very few of the remaining stems are healthy or have good form. In many locations the stocking is much lower than what would typically be recommended. Much of the advanced regeneration in the understory is ironwood. In some locations almost all the saplings are ironwood. Much of the younger regeneration that was observed within the stand was ash, which at this point is unsustainable due to EAB and will likely die once it reaches post/pole size. Scattered beech with Beech Bark Disease (BBD) was observed within the stand. Aspen is also found throughout the stand. Much of the aspen is merchantable or over-mature. The beech will die within the next 5 years and the aspen will ether die if it's over mature or continue to grow so long as competition is limited for light.			

Prescriptions: Aspen within the stand should be harvested. In some areas the aspen is over mature and will likely die within the next 10 years. Other aspen clones are merchantable and although it will live quite a bit longer it would be economically beneficial to harvest them with the other stands of aspen and lowland conifers. The prescriptions will follow Best Management Practices for Golden-winged Warbler habitat. Specifically, within the clear cut areas, retain approximately 10-15 trees of > 9 inches in diameter per acre (hardwood species). Stands 4A and B will be cut in 2019 and stands 4C-E will be cut in 2024. The stand should be reevaluated 12 to 15 years following the aspen removal to determine when an additional thinning should be conducted. This will likely be around 2029-2038 or when the average density in areas of residual reaches 120 BA.

Stand	5A -C	Stand Type	NH/A/NH
Acres	11.93, 27.1, 26.65	Stocking	3/2/1
BA	70	Stand Quality	Poor Forested
Next Treatment	5A & B: 2019 5C: 2024	Type of Mgt.	Clear Cut with Reserves

Description: The majority of the hardwoods stands on the property are poor quality in nature. Either these areas had been grazed for a long period of time and/or the property was high graded. A high grade is a type of selective harvest that removes the best trees from the stand and leaves poor quality, poorly formed unhealthy trees to reproduce and reseed the forest. This type of harvest is unsustainable and degrades the forest for generations. Very few of the remaining stems are healthy or have good form. In many locations the stocking is much lower than what would typically be recommended however. Much of the advanced regeneration in the understory is ironwood. In some locations almost all the saplings are ironwood. There are however a few locations in which a dense carpet of sugar maple seedlings were observed. These seedlings are probably only a few years old at most and at this time it is difficult to tell whether these will advance into the next size class. Scattered beech with BBD was observed within the stand. Aspen is also found throughout the stand. Much of the aspen is merchantable or over mature. The beech will die within the next 5 years and the aspen will either die if it's over mature or continue to grow so long as competition is limited. There is also an area within the stand in which there is really good advanced white birch advanced regeneration; this area should be avoided during any harvest operation.

Prescriptions: All aspen within the stand should be harvested. The prescriptions will follow Best Management Practices for Golden-winged Warbler habitat management. Specifically, within the clear cut area, retain approximately 10-15 trees of >9 inches in diameter per acre (hardwood species). Stand 5A and B will be harvested in 2019 and stand 5C will be harvested in 2024. The aspen occurs in small pockets and as singled stem trees. Many trees, although poor in quality from a timber prospective are healthy with full crowns and break up the openness of the rest of the property when viewing the landscape. Identify any oak saplings to protect from deer/elk and consider planting oaks and fruiting shrubs after harvest.

Stand	6	Stand Type	A/A/-
Acres	4.19	Stocking	5/1/- Forested
BA	10	Stand Quality	Good
Next Treatment	No Treatment	Type of Mgt.	NA
Description: This is a stand dominated by young aspen. The stand is located on top of a hill to the west that has a steep slope that leads down to the Pigeon River. On the east side, the ridge slopes down through a northern hardwoods stand and to a low-lying wet area. The stand was clear cut around 2006. Aspen and perhaps some northern hardwoods species were harvested. The aspen has regenerated throughout the stand. At this time the aspen will continue to grow and periodically self-thin.			
Prescriptions: Currently the stand is excellent habitat for wildlife species such as grouse and woodcock. The stand will continue to grow and self-thin for the next 50 years, perhaps longer. The stand should be evaluated in 2056 to determine if the aspen are healthy enough to continue to grow or if they should be harvested. To regenerate the stand back to aspen the entire stands needs to be clear cut. Harvesting aspen before it becomes over mature results in healthier, vigorous regeneration.			

Stand	7	Stand Type	KG-LB/C/C
Acres	2.21	Stocking	-/3/1 Forested
BA	100	Stand Quality	Good
Next Treatment	No Treatment	Type of Mgt.	NA
Description: Small pockets of good quality smaller cedar. Many pockets are around 120 BA some are slightly less depending on size of the pocket. There is very little understory throughout much of stands however near the edges of the stand or where cedar has blown down, low land shrubs, grasses and perennials can be found. Currently the sizes of the cedar pockets are too small to be considered highly desirable by wildlife for thermal cover. However, these pockets do provide concealment and nesting habitat for Swanson's thrush, black-throated green warblers and white warblers as well as game species like white tailed deer, snowshoe hares, and ruffed grouse. The cedar will continue to live and hopefully regenerate and expand out from these pockets.			
Prescriptions: These stands should be maintained as cedar dominated stands and if possible expanded. Cedar can be planted and should do well on these sites. However the seedlings will need to be protected from browsing deer by using an enclosure.			

Stand	8A-C	Stand Type	LB/SH/-
Acres	12.78, 2.04, 56.38	Stocking	4/1/- Not Forested
BA	10	Stand Quality	Poor
Next Treatment	No Treatment	Type of Mgt.	NA
Description: These stands are located along riparian areas. Where beaver dams are located, these areas are extensive. The vegetative species located in these stands are lowland grasses, lowland shrubs such as speckled alder, silky dogwood, and choke berry. The overstory is made up of mostly balsam fir, elm and dead and dying black ash. Tree species are often widely scattered throughout the stands.			
Prescriptions: The stand is currently providing good habitat for many species of			

wildlife but is especially good habitat for woodcock. These stands will never be harvestable due to the nature of the soils and the seasonally high water. Wood duck houses could be placed in the stands to encourage nesting for these and other species of wildlife. Shrouds will need to be placed in under the houses to protect the ducklings from predators.

Stand	9	Stand Type	-/SH/C
Acres	3.81	Stocking	-/4/4 Forested
BA	180	Stand Quality	Good
Next Treatment	No Treatment	Type of Mgt.	NA
Description: The stand is dominated by a cedar overstory. The cedar are doing well and many are 14-16" DBH. There are scattered swamp hardwoods in the stand as well as elm, red maple and black ash. These species however, are in far less quantity. There is little to no understory due to the dense shade the cedar provides. This area will remain a cedar stand for quite sometime provided the cedar does not die.			
Prescriptions: The area should be preserved as a cedar stand and should even be expanded. The swamp hardwoods stand to the south of this stand is in poor condition. The black ashes are dead and the aspen are over mature and will die in the near future. There is little else within the stand except scattered red maple. Cedars should do well in the soils type but this area is prone to a flooding especially in the early spring. Cedar could be planted on the edges of the stand starting at the high ground and planting towards the river. Stand 8 is likely too wet most of the year for trees to survive. Young cedars will need to be protected from deer browse by using fencing or other methods.			

Stand	10	Stand Type	BF/C/WP-RP
Acres	6.17	Stocking	1/4/2 Forested
BA	102	Stand Quality	Good
Next Treatment	No Treatment	Type of Mgt.	NA
Description: This stand stretches along the side of the ridge that is adjacent to the Pigeon River. The stand is on very steep ground. The mid-story is made up of white cedar which is the dominate species within the stand. The overstory is made of mostly red and white pine; many of these are super canopy. Along the eastern portion of the stand ruminate aspen that was inaccessible during the 2006 harvest in stand 6 can be found. Many of the aspen are over mature and likely to die and form snags. The understory is mostly balsam fir. The pines and cedar however seem to be healthy although the stand is severely overstocked. There is a trail that is approximately mid slope and appears to be used by area wildlife.			
Prescriptions: The stand is extremely dense and is providing good cover for wildlife and is acting as a travel corridor. Because of the severity of the terrain forest management is not possible within the stand however the stand has significant wildlife value and is protecting the slope from erosion.			

Stand	11A-D	Stand Type	A/A/A-BF
Acres	37.45, 29.02 6.92, 19.62	Stocking	1/3/1 Forested
BA	90	Stand Quality	Good
Next Treatment	11A & C: 2024 11B & D: 2019	Type of Mgt.	Clear cut with Reserves
Description: Currently the stand is dominated by younger aspen and balsam fir. The aspen is merchantable but is not over mature. The stand was likely clear cut maybe in the 1970's. The stand also has scattered white pine and white spruce in it as well as some white birch. At this time the stand appears healthy. However 20+ years from now the stand well likely begin to deteriorate. Aspen will begin to fade from the stand and will likely be replaced by more shade tolerant species such as spruce, fir and white pine. Although conifers can provide good habitat for many wildlife species; maintaining a mixture of young early succession hardwood species mixed with older conifers as cover and nesting habitat would be much better.			
Prescriptions: Maintaining the stand as an aspen conifer mixture is beneficial to wildlife especially deer, grouse and woodcock. All aspen and merchantable balsam fir should be harvested. These are both short lived species and generally make up the bulk of the wood fiber in the stand. Pockets of spruce, cedar and pine , as well as any wetland pockets identified pre-harvest, should be excluded from the harvest area. Merchantable white spruce mixed with aspen should also be harvested. All white cedar and pine should be left. The result of this harvest will be a mosaic of young aspen that provide browse for deer and nesting cover for woodcock and grouse. Islands of conifers will provide nesting places and cover for other species. Stands 11A and 11C will be cut in 2024 and stands 11B and D will be cut in 2019.			

Stand	12A- E	Stand Type	LB/C/-
Acres	1.14, 5.16, 3.12, 2.66, 9.65	Stocking	-/2/- Forested
BA	80	Stand Quality	Poor
Next Treatment	No Treatment	Type of Mgt.	NA
Description: Stands are made up of cedar and areas are generally poorly stocked. Cedar is the main component of the stands. It is generally mixed with dead black ash, aspen or white birch but in far lesser quantities. Lowland brush and grasses make up the understory. These stands are located near water on the property however they are generally on upper portions of the riparian area or at farther points from the water. Although the cedar appears to be stunted and is not as impressive as the cedar in stand 9, these cedar are likely healthy but are growing on a less suitable cedar site.			
Prescriptions: These areas should be maintained as they currently are. They likely provide a vantage point for wild life looking to cross wide open areas that generally surround these stands. Planting more trees help improve vertical structure and stand density but pine species should be favored over cedar. Pine such as red pine and white pine will likely thrive on the moisture rich upland sites. White pine will likely be targeted by white pine weevil; however the planting is to improve wildlife habitat and not timber production. These stands may not be as useful for larger animals but it may be critical habitat for much smaller ones. Brush piles, old logs and rocks could provide valuable structure for insects, reptiles and small mammals. Consider placing old wooden debris left from			

past timber harvesting activity in piles in and near these stands. Large rocks or piles of rocks will provide shelter and sunning locations for snakes and reptiles as well as invertebrates.

Stand	13A & B	Stand Type	NH/A/A-NH
Acres	3.61 & 19.27	Stocking	1/4/3 Forested
BA	80	Stand Quality	Good
Next Treatment	2019	Type of Mgt.	Clear cut with Reserves
Description: This stand is located on the southern edge of the property in the east. The stand is difficult to get to from the landowner's side of the property due to Wilkes Creek. There is a steep slope along the creek that is inaccessible. The slope area will be left out of the timber sale boundary and will be allowed to covert to northern hardwoods. This will also act as a buffer zone to protect the quality of the creek from erosion. Access is easier from Passio Road that runs along the southern property line. Aspen in the stand is over mature but at this point is still intact. The aspen is a mixture of quaking and big toothed and some balsam-poplar. There are also northern hardwoods species in the stand as well. The species present is mostly basswood and sugar maple, although there is likely beech and ash as well. These trees appear healthy and growing and are throughout the overstory and understory. This stand is better stocked with northern hardwoods than stands 4 and 5. The aspen will begin to fade from the stand within the next 5-10 years and will likely be replaced by the more shade tolerant northern hardwoods species unless the stand is clear cut.			
Prescriptions Manage for aspen and clear cut entire stand. Leave scattered hardwoods perhaps a pocket of a dozen or so trees for structure and species diversity. Aspen grows well in the property and is a desirable pulpwood wood tree species and can be managed on a 40-80 year even age rotation with 50-60 years being optimum this is of course dependent on site. Mast trees should be favored to leave as well as long lived conifer species in this management option. Do not leave so many however as to inhibit aspen regeneration. The south western corner of this stand is mostly Northern hardwoods with few scattered aspen. The aspen from this area should be removed but the residual northern hardwoods should be thinned to a residual BA of 80ft^2.			