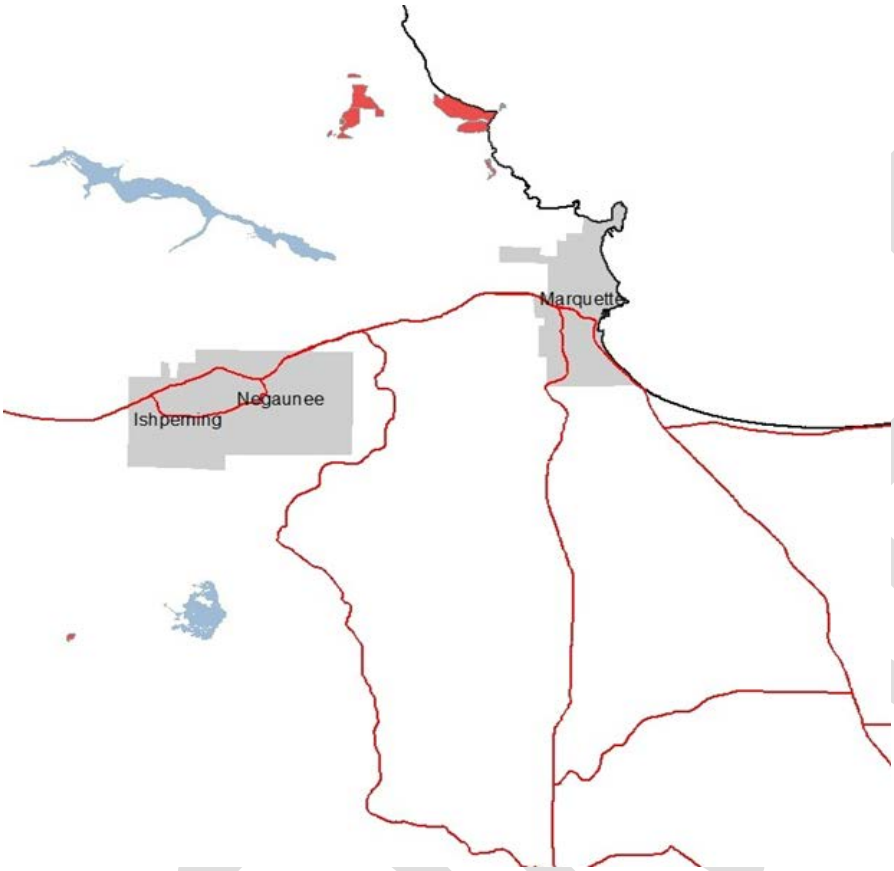
Little Presque Isle-Harlow Lake ERA Complex

Ecological Reference Area (ERA) Plan

Figure 1. Little Presque Isle-Harlow Lake ERA Locator Map



Administrative Information:

- Little Presque Isle-Harlow Lake ERA Complex plan encompasses group of 10 ERAs made up of 13 element occurrences (EO), linked by unfragmented forest. Most of these occurrences are related to the areas unique geography, Lake Superior frontage, old growth, and high quality forest types.

- All of the ERA's are located on state forest land, county land, commercial forest land, and The Nature Conservancy (TNC) land in the Gwinn Forest Management Unit (FMU), Little Presque Isle Recreation Area, Huron Mountain Management Area, Compartments 203, 204, 298.
- Marquette County, Marquette Township, T.49N.-R. 25W. sections 17, 18, 19, 20, 29, 30, and 32 and T.49N-R.26W sections 9, 13, 15, 16, 21, 22, and 24,

- Many of the ERAs are located within the Little Presque Isle Recreation Area which is Managed State by the Department of Natural Resources, Forest Resources(FRD), Wildlife Division(WLD), and Park and Recreation Division(PRD).

- The Western Portion of this complex lies on state forest land as well as the Echo Lake Nature Preserve managed by TNC, some of the EOs in the south-east end of the complex extend onto Marquette County Land and commercial forest land (CFR) owned by Weyerhaeuser.

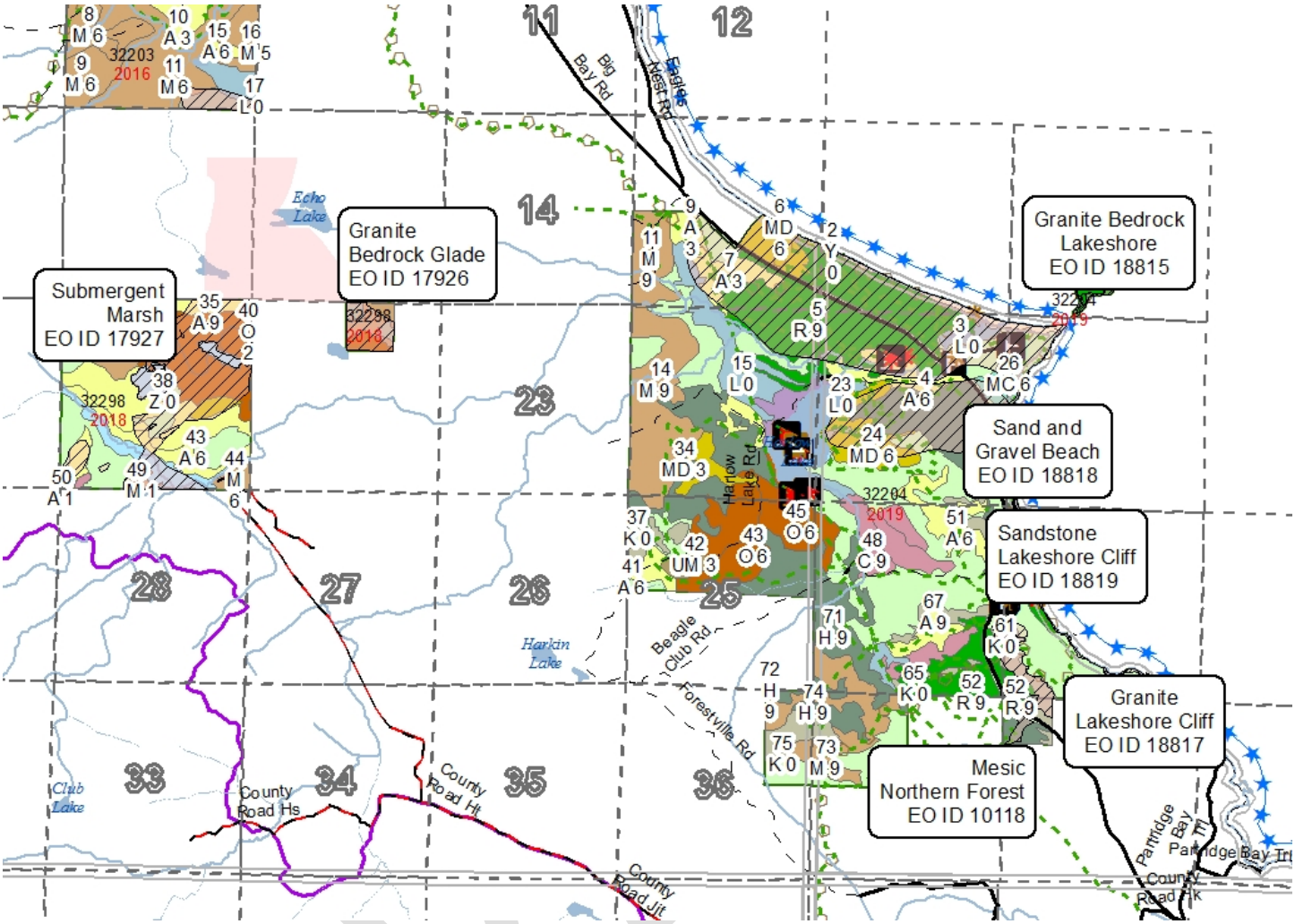
- The east half of this complex is part of a larger recreation area that is quite popular with residents and visitors. This area features 6 rental cabins, approximately 25 miles of trails, beaches, and picnic areas. The Echo Lake area managed by TNC has hiking trails, while the adjacent state land has little recreation infrastructure**.**

- Large portions of this ERA complex are within the boundaries of a Non-Dedicated Natural Area.
- Local Foresters, Biologists and Parks Staff: Tom Seablom Unit Manager, Brian Roell Habitat Biologist, Doug Berry Van Riper State Park Manger, Rick Hill Forester Ishpeming Field Office (Gwinn FMU), and Tina Hall Ph. D. Director of Land Resources TNC.

- Primary plan author Rick Hill Forest Resource Division (FRD) Forester
- Plan reviewer's Monica Weis (FOD), Kristen Matson (FRD), Keith Kintigh (FRD), Sherry MacKinnon (WLD)

- Figure 2. Little Presque Isle Recreation area sign

Figure 3. Little Presque Isle-Harlow Lake ERA Map detail



Conservation Values

- This area is a diverse group of ERA's dominated by Great Lakes shoreline communities, geologically dominated communities, and communities defined by high quality vegetation that have had minimal anthropogenic disturbance.

- This ERA complex is recognized for natural communities including: wooded dune and swale, mesic northern forest, dry-mesic northern forest, granite bedrock glade, granite cliff, submergent marsh, northern wet meadow, sand and gravel beach, sandstone lakeshore cliff, granite bedrock lakeshore, and granite lakeshore cliff. It is recognized for both having natural communities that are rare as well as those representative examples being of high quality.

1. Wooded Dune and Swale Element Occurrence
    a. EO_ID: 3390, EORANK: BC, LASTOBS: 2007-06-12
2. Mesic Northern Forest include the following 2 Element Occurrences: (From north to south)

    a. EO_ID: 3138, EORANK: B, LASTOBS: 2007-06-05
    b. EO_ID: 10118, EORANK: C, LASTOBS: 1981-07-01
3. Dry-Mesic Northern Forest Element Occurrence:
    a. EO_ID: 1910, EORANK: B, LASTOBS: 2007-06-05
4. Granite Bedrock Glade Occurrences: (From east to west)
    a. EO_ID: 18814, EORANK: B, LASTOBS: 2011-08-18
    b. EO_ID: 17926, EORANK: AB, LASTOBS: 2010-09-14
5. Granite Cliff Element Occurrences: (From east to west)
    a. EO_ID: 18816, EORANK: B, LASTOBS: 2011-08-18
    b. EO_ID 17928, EORANK: B, LASTOBS: 2010-09-14
6. Submergent Marsh Element Occurrence:
    a. EO_ID: 17927, EORANK: A, LASTOBS: 2010-09-14
7. Northern Wet Meadow Element Occurrence:
    a. EO_ID: 17929, EORANK: B, LASTOBS: 2010-09-14
8. Sandstone Cliff Lakeshore Element Occurrence:
    a. EO_ID: 18819, EORANK: AB, LASTOBS: 2011-08-18
9. Sand and Gravel Lakeshore Element Occurrence:
    a. EO_ID: 18818, EORANK: AB, LASTOBS: 2011-08-18
10. Granite Bedrock Lakeshore Element Occurrence:
    a. EO_ID: 11815, EORANK: AB, LASTOBS: 2011-08-18

Figure 4. Little Presque Isle Point WDS EO ID 3390

- Little Presque Isle Point WDS EO ID 3390: This wooded dune and swale community is ranked BC with good or fair estimated viability. This EO is located on a 1.5-2 mile stretch of silt/clay lake plain backed by shallow bedrock with low liner sand dunes running north-south parallel to the lakeshore. The site covers 604 acres of state forest land. The community is characterized by well-developed dune and dry swale topography featuring uneven aged conifer forest. This EOs diversity is improved by areas of blowdown, and Harlow Creek. Dune ridges rise about 3-9 feet above the swales. Most of the swales are narrow 6-30 feet wide. Many of the swales are dry due to the rapid rise of dune ridges above Lake Superior water levels after the end of the last ice age. Inland and closer to Harlow Creek some swales are wet. Dune ridges and dry swales have vary acidic sands with a shallow needle layer and O horizon overlaying finely textured dune sands. Wet swales are characterized by slightly acidic muck of variable depth over wet acidic sand. This is a fire ecosystem with frequent low intensity surface fires. The area surrounding Harlow Creek features a northern shrub thicket. This sites adjacency to Lake Superior moderates the local climate.
  Most of the EO is dominated by uneven aged red pine (*Pinus resinosa*) with white pine *(Pinus strobus*), jack pine (*Pinus banksiana*), red maple (acer rubrum), paper birch (*Betula papyrifera*), big-toothed aspen (*Populus grandidentata*), and white spruce (*Picea glauca*) present as well. Portions of the occurrence are dominated by balsam fir (*Abies balsamea*) and bigtooth aspen resulting from past blowdown events. The understory varies in density with more open areas featuring a well-developed understory and areas of heavy red pine canopy having a sparse understory. The understory is composed of balsam fir, white pine, white spruce, paper birch, and red maple. Low shrubs within this element occurrence are made up of blueberry (*Vaccinium Spp.),* huckleberry (*Gaultheria procombens*), and serviceberry *(Amelanchier Spp.*). Bracken fern (Pteridium aquilinum), wintergreen (Gautheria procombens), starflower (Trientlais borealis), poverty grass(Danthonia spicata), and lichens(Cladina spp.) make up the herbaceous ground cover. Inland where some of the swales are wet species such as tag alder (*Alnus incana*), leather leaf (Chamaedaphne Calyculata), and winterberry (Ilex verticillate) dominate. The understory consists of tussock sedge (Carex strictra) and Bluejoint grass (Calamagrostis canadensis). The EO rank dropped from B in 2005 to BC in 2007. High recreational use particularly close to Lake Superior has degraded portions of the EO. County road 550 major county road passes thought the EO. This EO is located within the Echo Lake Deer Wintering Complex thus deer herbivory may affect species composition. This EO has many trails located within it. Prior to inclusion within the EO there was some localized logging in the 1980's on the west end of the EO. There was also some turn of the century logging within the EO that most likely changed the species composition of the EO slightly. The above factors, as well as relatively small size, all have contributed to the BC rank of this EO.

  Harlow Lake MNF EO ID 3138: This EO is ranked B with good estimated viability. The ERA is located on a ground moraine ranging from moderate to rugged topography and covers 192 acres of State land. This mesic northern forest community is characterized by well-developed pit and mound topography and uneven aged structure. Many of the structural characteristics of old growth forests including canopy gaps, large diameter woody debris, and species composition are present within these areas. Both sites display some variability in soil depth with granite bedrock approaching the surface in areas and eventually becoming granite bedrock glade communities. There are also granite boulders scattered thought the site. Soils are acidic sands of medium texture. Depressions and draws feature mucky and loamy soils. There are numerous drains and intermittent streams that are a product of the local topography and geology present within this EO. Windthrow and fire have historically been the primary drivers of succession in this area.

  Dominant forest canopies species in this EOs are hemlock (*Tsuga canadensis*) with minor amounts of sugar maple (*Acer saccharum*), paper birch, red pine, white pine, red maple, and yellow birch (*Betula*

alleghaniensis). The understory of this area is sparse in large part due to heavy deer herbivory. Where an understory is present it is made up of red maple, striped maple (*Acer pensylvanicum*), and balsam fir. The low shrub layer is primarily thimbleberry (*Rubus parviflorus*). The vegetative groundcover present in this EO is large leafed aster (*Aster macrophyllus*), sugar maple, and bracken fern.
This community is located within the Echo Lake Deer Wintering Complex thus deer herbivory is a major issue for this area. Over the past few decades, herbivory has affected species composition. The long-term effects of herbivory will continue to effect community and will degrade the ERA. This element occurrence has some non-motorized trails that pass though posing a slight risk of erosion as well as providing a vector for invasive species.

Figure 4. Harlow Lake MNF EO 3138

- Sugarloaf Grove MNF EO ID 10118: This EO is ranked BC with good or fair viability. This site was observed in summer of 2016 (the new report is still being compiled). However, much like the Harlow Lake site, Sugarloaf Grove is located on a ground moraine with variable topography. Sugarloaf Grove and Harlow Lake are nearly identical in community stricture and make up. Many of the structural characteristics of old growth forests including canopy gaps, large diameter woody debris, and species composition are present within these areas. Both sites display some variability in soil depth with granite bedrock approaching the surface in areas and eventually becoming granite bedrock glade communities. There are also granite boulders scattered thought the site. Soils are acidic sands of medium texture. Depressions and draws feature mucky and loamy soils. There are numerous drains and intermittent streams that are a product of the local topography and geology present within this EO. Windthrow and fire have historically been the primary drivers of succession in this area.

  Dominant forest canopies species in this EOs are hemlock with minor amounts of sugar maple, paper birch, red pine, white pine, red maple, and yellow birch. The understory of this area is sparse in large part due to heavy deer herbivory, where an understory is present it is made up of red maple, striped

maple, and balsam fir. The low shrub layer is primarily thimbleberry. The vegetative groundcover present in this EO are made up of large leafed aster, sugar maple, and bracken fern.
This community is located within the Echo Lake Deer Wintering Complex thus deer herbivory is a major issue for this area. Over the past few decades, herbivory has affected species composition. The long-term effects of herbivory will continue to effect community and will degrade the ERA. This element occurrence has some non-motorized trails that pass though posing a slight risk of erosion as well as providing a vector for invasive species.

- Little Presque Isle DMNF EO ID 18813: This EO is Ranked B with good estimated viability. This dry-mesic northern forest is a relatively small element occurrence covering only about 6 acres. The community is growing on thin soils over granite bedrock. This occurrence has a relatively open canopy with extensive blow down. This community lies within a larger high quality bedrock glade community. Rugged terrain has limited access here allowing this site to avoid anthropogenic disturbance. Primary forms of disturbance in this area have historically been fire and windthrow.
  In the summer of 2011 the canopy of this EO was dominated by red pine and white pine. Hemlock, red oak (*Quercus rubra*), white spruce, and red maple are minor components of the forest canopy. The understory included white pine, white spruce, red maple, and striped maple. The herbaceous ground cover and low shrubs of this site where made up of blueberry, american fly honeysuckle (*Lonicera canadensis*), bunchberry (*Cornus Canadensis*), and star flower (*Borago officinalis*) among other minor components.
  Much of this site burned in the fall of 2011 and since then the overstory has died and blown over. As this was a fall fire; soil moistures where low causing the fire to burn hot and consume much of the available organic material including much of the soil. Due to accessibility, this fire was fought with hand tools and water, keeping disturbance from firefighting minimal. At this point, much of this site is more characteristic of a bedrock glade. This site will be allowed to naturally recover from this disturbance.

- Little Presque Isle GBG EO ID 18814: This EO is ranked AB excellent good estimated viability. This site was opportunistically surveyed in the summer of 2016 (these reports are being compiled). The occurrence has grown significantly and now is also present on county and commercial forest lands adjacent to state forest lands. Soils, where present, are shallow and vary acidic silty organics overlying granite bedrock. Soils tend to accumulate at the base of and between boulders, in flat areas, depressions, crevasses and at the base of tree boles. Local topography is quite steep with a wide range of slopes ranging from sheer cliffs to flat areas.
  The occurrence is characterized by scattered and stunted overstory made up of white pine, red pine, jack pine, red oak, red maple, and bigtooth aspen. Shrub layers here include sapling of canopy trees, serviceberry, common juniper (*Juniperus communis*), wild red raspberry (*Rubus spp.*), and choke cherry (Prunus virginiana). The herbaceous layer, where present, is made up of cow-wheat(*Melampyrum pretense*) , large leafed aster, Jumpseed (*Persicaria virginiana)*, wild strawberry(*Fragaria vesca*), pennsylvania sedge(*Carex pensylvanica*), hair grass (*Deschampsia cespitosa*), and various lichens among others.

Many trees within the glade are stressed due to drought and wind and are showing canopy mortality. The primary drivers of disturbance in these EOs include wind and fire. Non-motorized trails are present in the community and may provide a vector for the introduction of invasive species.

- McFadden Glade GBG EO ID 17926: This EO is ranked AB excellent or good viability. This site was surveyed in 2010 and covers 875 acres on state forest, TNC, and commercial forest lands. Soils where present are shallow overlying granite bedrock. Soils tend to accumulate at the base of and between boulders, in flat areas, depressions, crevasses, and at the base of tree boles. Local topography is quite rugged with a wide range of slopes ranging from sheer cliffs to flat areas. An extensive bedrock glade, with species composition and structure pattered by natural processes. Numerous beaver influenced wetlands occur in channels and low areas between granite knobs.
  The occurrence is characterized by scattered and stunted overstory made up of white pine, paper birch, red maple, sugar maple, bigtooth aspen, balsam fir, red pine, red oak, and white spruce. Shrub layers here include sapling of canopy trees, serviceberry, common juniper, wild red raspberry, and choke cherry. The herbaceous layer, where present, is made up of cow-wheat, large leafed aster, Jumpseed, wild strawberry, pennsylvania sedge, hair grass, and various lichens among others.
  The primary forms of disturbance in this area are wildfire, windthrow, and beaver. The steep and rugged topography have limited road building and logging in the area. Though areas adjacent with more moderate topography have been logged. The canopy of this area is diverse and of variable density much of the overstory is stressed due to thin soils. There is a fair number of invasive species present in the area possibly due to birds moving seed.

- Little Presque Isle GC EO ID 18816: This EO is ranked B with good estimated viability. This community is located within state forest land. This granite cliff face support sparse vegetarian confined to ledges, crevices, and cracks. This occurrence is associated with a granite bedrock glade. This community is defined by 20-50 foot high cliffs with talus slopes below. Soil development here is limited, due to extreme slopes, and occurs in cracks, crevices, ledges, and flat areas.
  Scattered vegetation present in this community include red oak, striped maple, common polypody (*Polypodium virginianum*), blueberry, thimbleberry, lichens, liverworts (*Conocephalum conicum*), and mosses.

- McFadden GC EO ID 17928: This EO is ranked B with good estimated viability. This community is located within state forest land. Much like the Little Presque Isle cliff the granite cliff face support sparse but has dense patches of lichens mosses and liverworts particularly on the northern and eastern exposers where there is more moisture present. This occurrence is associated with a granite bedrock glade. This community is defined by 20-30 foot high cliffs with talus slopes below. Soil development here is limited, due to extreme slopes and occurs in cracks, crevices, ledges, and flat areas.

Scattered vegetation present in this community include red oak, striped maple, common polypody, blueberry, thimbleberry, lichens, liverworts, and mosses. This occurrence has some non-native plants in close proximity so there is a risk that these plants may colonize areas of the cliff community.

- McFadden Pond SM EO ID 17927: This EO is ranked A with excellent estimated viability. This large submergent mash is sited on state land and covers 23 acres. Average water depth here seems to be 10-20 inches. Pond substrates are loose unconsolidated peat overlying granite bedrock. This community is part of a larger complex including high quality granite bedrock glades and cliffs.
  Submergent vegetation here includes both rooted and non-rooted submergent plants as well as rotted and non-rooted floating leaved plants. Some of these species include pondweeds (*Potamogeton spp.*), small duckweeds (*Lemna minor*), water shield (*Brasenia schreberi*), and coontail (*Certophyllum demersum*).
  The scatted dead overstory shows a long history of beaver flooding in this wetland. Many beaver lodges and dams were noted in the survey as well. At the time of survey no invasive plants were noted here.
- McFadden Meadows NWM EO ID 17929: This EO is ranked B with good estimated viability. This northern wet meadow community occurs between granite bedrock glade nobs. Water levels here remain at or near the soil surface thought the year. This area is dominated by tussock sedge, bluejoint grass (*Calamagrostis canadensis*), as well as wiregrass sedge (*Carex lasiocarpa*). Groundwater is the main influence here although beaver induced flooding may be important to the local hydrology. Beaver flooding may also be an important part of succession here by raising water levels to kill encroaching vegetation. Wildfire also can drive succession particularly during droughts.

- Little Presque Isle SLC EO ID 18819: This EO is Ranked AB with excellent or good estimated viability. This community is located on state land along the shore of Lake Superior and occurs near several other high quality communities. Sandstone lake shore cliffs are characterized by sandstone cliffs and groundwater seeps. These cliffs range from 10-60 feet with talus slope below. Sparse vegetation is restricted to ledges and cracks, fissures, talus slopes, and the upper lip of the cliffs. The vertical structure as well as the wave action restrict soil development to sheltered areas. Where vegetation is present it is often stunted due to wind and ice damage.

Little Presque Isle SGB SO ID 18818: This EO is ranked AB with excellent or good estimated viability. This sand and gravel beach lies between Wetmore Landing to Little Presque Isle Point covering about 9 acres. This community is intermixed with sandstone lakeshore cliffs and granite bedrock lakeshore. The site is characterized by both a low diversity of plant species and low levels of plant cover. The lack of vegetation in these community types is due to wind and wave action resulting in constantly moving sand. This area receives heavy recreation use.

Figure 5. Little Presque Isle SGB SO ID 18818

- Little Presque Isle GBL EO ID 18815: This EO is ranked AB with excellent or good estimated viability This granitite bedrock lakeshore occurs along a 2 mile stretch of Lake Superior shoreline from Wetmore Landing to Little Presque Isle point. This community is intermixed with sandstone lakeshore cliffs and sand and gravel beach. Rock in these areas is among the oldest in the state. Vegetation growth here is limited to fishers and cracks. Mosses and lichens are the primary vegetative cover here. Waves and ice keep much of the area vegetation free. Small pools are present where blocks of stone where removed by winter ice and storm waves.

Figure 5. Little Presque Isle SGB SO ID 18818

High Conservation Value (HCV) Attributes:

- The Little Presque Isle-Harlow Lake ERA complex is approximately 3000 acres and is part of a large landscape level forest with minimal road density and management activity and contains nearly 3 miles of intact shoreline. It is characterized by unique topography, undeveloped Great Lakes shoreline, and high quality natural communities creating a diverse mix of communities. Natural ecological processes (windthrow, fire, beaver flooding, senescence, etc.) are the dominant factors structuring patterning, and driving succession. Some ERAs are showing old growth characteristics including large woody debris and natural gaps as a result of windthrow. There is longterm evidence of fire occurring throughout the ERA complex with charring and fire scars occurring on the boles of trees, as well as fires in the recent past. (MNFI EO Records).

- The Little Presque Isle area has long been a popular area that is highly valued by the Marquette community. Much of the area was long in private hands, the bulk of the track was acquired in a series of land exchanges in the late 1970's. The primary drivers of the acquisition were the tracts with recreational and scenic values. Wildlife, fisheries, and ecological values have also become significant in local management since the state's acquisition. Recreation use has been heavy in this area since at least the time of the state's acquisition of the property. Damage related to ORVs and foot trails was noted in the early 1980's. Steps were taken at the time to correct many of these issues. The closure of access points and regular law enforcement presence has for the most part solved the ORV issues. Foot traffic and issues related to trails will continue to be an concern here due to in large part to the number of visitors the area receives yearly.

- Recreational use in this area is diverse. The area has 6 state owned rental cabins on the tract that are rented regularly year-round. Swimming, wading, sunbathing, walking, weddings, and picnicking are quite popular on the Lake Superior beaches. There are a variety of trails available ranging from beach access trails, to the North Contrary Trail, and an extensive mountain bike/ hiking trial network. Many of these trails lead to scenic locations and overlooks with spectacular views of Marquette County and Lake Superior. There are a few events that use the trails regularly including a mountain bike race and a trail marathon. Fishing is also popular here both on cold water streams and on Harlow Lake. There is a small boating access site and barrier free fishing pier located on Harlow Lake. Hunting is another common use here (though not allowed on TNC lands). Popular species include ducks, squirrels, and whitetail deer. Other common uses include rock climbing, backcountry camping (within regulations), geocaching, backcountry skiing, snowshoeing, ice climbing, and birdwatching.
- High Conservation Value Areas (HCVAs) within the ERA complex include Little Presque Isle Point non-dedicated natural area and Little Presque Isle Island non-dedicated wilderness areas. Echo Lake Nature Preserve(TNC), Sugar Loaf peak and trail, Weyerhaeuser's Wetmore Pond tract and trail system, and Kamehameha Conservation Easement (Northern Great Lakes Forest Project). Special Conservation Areas (SCA's) include an extensive wintering deer complex, archeology sites, type 1 and 2 old growth (near the Sugarloaf Mountain, and Harlow Lake), cold water streams, (Harlow Creek, Nash Creek, Bismarck Creek, And Potluck Creek), and associated buffers.

- The ERA Complex is important for song birds, shore birds, and interior forest birds. The cold-water streams in the area are high quality brook trout fisheries and provide important spawning habitat for fish in Lake Superior. Deer use this area heavily particularly in the winter within the mesic conifer EOs and other hemlock stands in the area. The deer wintering use is both biologically and socially important with local sportsman's groups taking interest in management. Many local advertisements and tourism materials highlight this area as a defining feature of the Marquette area adding to the social importance of the area.

Threats Assessment

- Wooded Dune and Swale

  Primary threats to the wooded dune and swale complexes within this ERA complex include impacts from trail use, cross country hiking off trail, invasive species, fire suppression, and excessive deer herbivory. Steps should be taken to ensure that trails in the area are built sustainably, with minimal erosion and disturbance. This area receives a lot of recreational use. Attempts should be made to limit off trail use, leading to both Lake Superior and Harlow Creek. Invasive species are introduced along roads and trails, though so far have been limited to spotted knapweed along the county road 550 corridor. The high usage rate in this area make it quite likely that more invasive species are likely to be found, as they are found, they will be controlled. The whole EO will be actively monitored for new invasive species hits. This area is a fire prone ecosystem and users here often accidently start fires. Mechanized firefighting would be more damaging to the site then a fire

(invasive species vector, ground disturbance, etc.) A fire suppression plan should be developed for this area so future fires are suppressed with minimal impact suppression techniques. The EO is within a deer wintering complex. While this area has not shown much browse damage yet some informal monitoring should occur to assess if browsing will become an issue.

- Mesic Northern Forest

  The primary threat to this community type is posed by deer herbivory, which over the long term will alter species composition. Other threats in this ERA complex include impacts from trail use, and invasive species. Steps should be taken to ensure that trails currently present within the area are built sustainably to minimize erosion and disturbance, trails showing symptoms of erosion should be rerouted. Good trail design will keep trail foot prints narrow and reduce effects to vegetation within the EO. Invasive species are introduced along roads and trails; so far, they are limited to spotted knapweed along the county road 550 corridor. The high usage rate in this area make it quite likely that more invasive species are likely, to be found as they are found, they will be controlled. The whole ERA will be actively monitored for new invasive species hits.

- Granite Bedrock Glades, Granite Cliff and Dry-Mesic Northern Forest

  The primary threats in this ERA complex include impacts from trail use and invasive species. Steps should be taken to ensure that trails currently present within the area are built sustainably to minimize erosion and disturbance, trails showing symptoms of erosion should be rerouted. Good trail design will keep trail foot prints narrow and reduce effects to vegetation within the EO. Invasive species are introduced along roads and trails; the high usage rates in this area make it quite likely that more invasive species are likely to be found, as they are found, they will be controlled. The whole ERA will be actively monitored for new invasive species hits. (Note Dry-Mesic Northern Forest was included due to its current conditions post fire.) This area is a fire prone ecosystem and users here often accidently start fires. Mechanized firefighting would be more damaging to the site than a fire (invasive species vector, ground disturbance, etc.) A fire suppression plan should be developed for this area so future fires are suppressed with minimal impact suppression techniques.

- Submergent Marsh, and Northern Wet Meadow

  The primary threat to these natural communities is invasive species. Monitoring for invasive species will be opportunistic as these communities are quite isolated and little used. When found, species will be treated as needed. Other threats to these areas would be variations of local hydrologic regimes. If any logging would take place in the vicinity, large buffers would be put in place to protect these areas.

- Granite Bedrock Lakeshore, Sand and Gravel Lakeshore, Sandstone Lakeshore Cliff

  The primary threats in this ERA complex include impacts from trail use and invasive species. . Steps should be taken to ensure that trails currently present within the area are built sustainably to minimize erosion and disturbance, trails showing symptoms of erosion should be rerouted. Good trail design will keep trail foot prints narrow and reduce effects to vegetation within the EO. Invasive species are introduced along roads and trails. The high usage rates in this area make it

quite likely that more invasive are likely to be found, as they are found, they will be controlled. The whole ERA will be actively monitored for new invasive species hits.

- A general assessment of potential threats associated with climate change for these natural communities would be a useful management tool for long range management goals.

Figure 5. Fall view of the Little Presque Isle Tract

General Management of ERAs

- ERAs will generally not be managed for timber harvest. Management activities or prescriptions in Ecological Reference Areas are limited to low impact activities compatible with the defined attributes and values of the community type, except under the following circumstances:

- Harvesting activities where necessary to restore or recreate conditions to meet the objectives of the ERA, or to mitigate conditions that interfere with achieving the ERA objectives. In this regard, forest management activities (including timber harvest) may be used to create and maintain conditions that emulate an intact, mature forest or other successional phases that may be under-represented in the landscape.

- Road building only where it is documented that it will contribute to minimizing the overall environmental impacts within the FMU and will not jeopardize the purpose for which the ERA was designated.

- Existing and new land use activities should be evaluated in the context of whether they detract from achieving the desired future conditions of the natural community for which the ERA was designated. The acceptability of land use activities within DNR administered ERAs will be evaluated using severity, scope, and irreversibility criteria, as established in DNR IC4199, Guidance for Land Use Activities within DNR Administered Ecological Reference Areas.

- Threats such as fire, natural or exotic pests or pathogens may warrant other management measures.

- Harvesting and other management activities in presently accessible areas located within the peripheral boundary of an ERA that are NOT the natural community of focus and which may or may not be typed as a separate stand or forest type (e.g. an upland island of previously managed aspen within a bog complex) may be prescribed for treatments, contingent upon a determination of no anticipated direct or indirect adverse impact to the defined attributes and values of natural community for which the ERA was designated. The FRD Biodiversity Conservation Program leader shall be consulted regarding the determination of any direct or indirect adverse impact.

- Land management activities immediately adjacent to an ERA should consider any anticipated direct or indirect adverse impact to the defined attributes and values of natural community for which the ERA was designated. Management will be adaptive. ERAs will be monitored to determine if implemented management activities are moving the natural communities forward, or maintaining them at their desired future condition. The network of ERAs will be evaluated every five years for their contribution to the overall goal of biodiversity conservation. This review cycle will allow for the potential addition or subtraction of lands from an ERA, designation of new ERAs, or removal of the ERA planning designation.

Management Goals

- Allow natural ecological processes to occur.
- Manage for unfragmented forest.
- Reduce or mitigate recreational impacts to the ERA.
- Manage to reduce/control current invasive species and prevent new invasive species from becoming established.
- Manage for the full suite of representative and rare species.
- Reduce deer herbivory effects on mesic northern forest ERA.

Management Objectives

- Maintain a monitoring and control treatment for invasive species treatments across the ERA complex for the next 10 years.
- Write and implement a fire plan for the ERA complex that allows for wildfire to occur with minimal impact suppression techniques in this planning period in areas where feasible.
- Allow blowdown/windthrow to occur without salvage harvest.
- Assess pine regeneration during this planning period.
- Assess hemlock regeneration during this planning period.
- Assess EO quality every 10-20 years.
- Monitor recreation use, establish reroutes to mitigate any erosion or other degradation caused by recreational use.
- Decommission unauthorized trails that are damaging to the ERA complex.
- Determine additional threats to ERA complex (continuous).
    - Work with climate change specialist to determine threats associated with climate change.

Management Actions

Suggested actions or series of actions that would help to achieve the above objectives. (M=Maintenance action, R= Restoration action)

- Partner with Superior Watershed Partnership (SWP) and the Central UP Cooperative Invasive Species Management Association (CISMA) to map and treat priority invasive species using the best methodology for the species; develop FTP's and PAP's. (M, R)
- Work with PRD, and Law Division (LED) to increase patrols for enforcement state land use rules. (M)
- Work with volunteer organizations and local residents to reroute unsustainable trails and decommission unauthorized trails. (R)
- Consider fencing and signage to protect beech and cliff vegetation in the little Presque isle point area. (R)
- Develop educational materials about the ERA's natural communities and natural processes to distribute or display at the Sugerloaf mountain parking lot, Wetmore pond parking lot, All LPI parking lots, and along trails that pass thought ERAs. (M, R)
- Where forest regeneration is found to be inadequate:
    - In pine types, consider use of prescribed fire as a management option using existing natural firebreaks to avoid introduction/spread of invasive species, also consider allowing low risk fires to burn to further this goal. (M, R)
    - In hemlock, consider limiting winter cutting in close proximity to the ERA, limit supplemental feeding adjacent to ERA, Limit deer yard related habitat work in the ERA, consider trying to move wintering deer away from the ERA using timber sales and other management activates to concentrate deer away from ERAs, and explore other potential solutions such as enclosures around canopy gaps and nurse logs. (R)
- Work with MNFI and other experts to update EO inventory. (M)
- If possible, acquire industrial adjacent forest lands with EOs present. (M, R)
- Update plan with additional knowledge as it becomes available. (M)

Monitoring

Metric	Current Status	Desired future status	Assessment
Populations of Invasive Species- number and scope by species	Invasive species survey was done by PRD in 2015, Survey should be updated and treatments should be monitored appropriately; detection monitoring opportunistically or every two years maximum.	Eliminated/fewer occurrences	
Reroute/close unsustainable or unauthorized trails in ERAs	Mountain bike trail plan complete, unauthorized trails to be decommissioned. Work with Trail groups, and PRD to trail analyses and reroutes/closures.	Eliminate unauthorized trails/insure sustainable trails	
Representative and rare species- species occurrences	Baseline EO Records; updated when EO's are updated every 10-20 years or opportunistically.	No decreases	
Regeneration of Pine and Hemlock	Poor hemlock, and pine regeneration. Perform regeneration surveys during inventory explore methods to allow for pine and hemlock recruitment.	Forest Regeneration and multi storied stands	

MiFi Treatment added to bulk of area for invasive species monitoring and control.

Per mountain bike trail plan some trails are to be closed within the Harlow Lake mesic northern forest. Funding is in place to accomplish this goal.

Site conditions and other necessary coding will be updated as MIFI is completed.

Additional Resources:

MNFI Natural Community Abstracts: http://mnfi.anr.msu.edu/pub/abstracts.cfm#Communities

Michigan Department of Natural Resources Forest Certification Work Instruction 1.4: http://www.michigan.gov/documents/dnr/WI_1.4BiodMgt_320943_7.pdf