

Squaw Bay Wooded Dune and Swale Complex

Administrative Information:

- Location
 - Atlanta Forest Management Unit; Alpena Lake Plains Management Area; Compartments 89 and 92
 - Alpena County; T30N R08E, Sections 9, 16, 21, and 28
- Dale Parris, Forester, Atlanta Management Unit
- State of Michigan Owned Lands
- Existing infrastructure/facilities: None
- Other Documents Related to this ERA:
 - (1) Wooded Dune and Swale Complex Element Occurrence Record EO ID: 403; EO NUM: 10
 - (2) MI DNR Publication: Natural Community Management Guidance; Wooded Dune Swale
 - (3) MNFI Wooded Dune and Swale Complex – Community Abstract
 - (4) Other pre-existing plans at a different scale, species specific management/conservation plans, MOU/MOAs with partners, reports with area specific information, etc. may exist.

Conservation Values

Description of the natural community occurrence for which the ERA is recognized:

- Wooded Dune and Swale Complex, EO_ID: 403, EORANK: BC, and Last Observed: September 22, 2006 from shore to 100 m inland, cedar dom. very low (<1 m) ridges & swales. Deep organic (to 50 cm) over medium sands. More distinct ridges & dry swales from 100-320 m inland dom. by 2nd growth northern hardwoods & aspen. (MNFI:MSU)
- Wooded dune and swale complex is a large complex of parallel wetland swales and upland beach ridges (dunes) found in coastal embayments and on large sand spits along the shorelines of the Great Lakes. The upland dune ridges are typically forested, while the low swales support a variety of herbaceous or forested wetland types, with open wetlands more common near the shoreline and forested wetlands more prevalent further from the lake. Wooded dune and swale complexes occur primarily in the northern Lower and Upper Peninsulas and Thumb region. (NCMG:WDS)

High-quality wooded dune and swale complexes have the full range of natural communities juxtaposed by associated communities with an unaltered natural disturbance regime (windthrow and fire on the forested dunes and hydrology in the swales). The range of communities expected to occur depends on location, with southern and more northerly complexes supporting different community assemblages.

- Refer to the MNFI Abstract for detailed descriptions of expected communities by location. (NCMG:WDS)
http://mnfi.anr.msu.edu/abstracts/ecology/Wooded_dune_and_swale_complex.pdf

Summary Description of the ERA

- **General Site Description:** (2006) The Squaw Bay Wooded and Dune Swale Complex is a very large wooded dune and swale complex on Squaw Bay bordered by roads to the west, the city of Alpena to the north, degraded wooded dune and swale to the south, and a large Great Lakes Marsh to the east. The marsh grades to a rich conifer swamp dominated by white-cedar (*Thuja occidentalis*), black spruce (*Picea mariana*), and tamarack (*Larix laricina*) with balsam fir (*Abies balsamea*) (locally dense) in the understory; a shrub layer of tag alder (*Alnus rugosa*) and conifer seedlings and a moderate groundcover of royal fern (*Osmunda regalis*), rough goldenrod (*Solidago rugosa*), goldthread (*Coptis trifolia*), miterwort (*Mitella nuda*), calico aster (*Aster lateriflorus*), etc. on relatively shallow muck over sand. To the west, swales become narrow and shrub (*Alnus rugosa*, *Ilex verticillata*) dominated with a groundcover of locally dominant bluejoint grass (*Calamagrostis canadensis*), red manna grass (*Glyceria grandis*), sensitive fern (*Onoclea sensibilis*), crested woodfern (*Dryopteris cristata*), and other wet meadow species. Soils of swales are deep (> 36 in) neutral mucks. The series of low upland ridges are mostly dominated by successional species such as paper birch (*Betula papyrifera*), red maple (*Acer rubrum*), quaking aspen (*Populus tremuloides*), big-toothed aspen (*Populus grandidentata*), and balsam fir (*Abies balsamea*) with occasional red oak (*Quercus rubra*). The ground layer has bracken fern (*Pteridium aquilinum*), black huckleberry (*Gaylussacia baccata*), and Canada blueberry (*Vaccinium myrtilloides*). The western most upland is dominated by mature red pine (*Pinus resinosa*). Ridge soils are 2-3 inches of humus over acidic sands. Soils of rich conifer swamps are circumneutral (pH 7.0) fibric peat (20-30 cm) over sapric peats (3-75 cm) over sand or sand mixed with cobbles. Soils of the boreal forest inclusions are 10 cm of loamy sand over cobble or cobble mixed with sand. (MNFI:MSU)

Element Occurrence Data: BSS and RKS 2006: From the shore to 100 m inland, northern white-cedar (*Thuja occidentalis*) dominates the swales and very low (< 1 m) ridges. Canopy associates include black spruce (*Picea mariana*) and tamarack (*Larix laricina*) with balsam fir (*Abies balsamea*) in the understory, a shrub layer of tag alder (*Alnus rugosa*) and conifer seedlings, and a moderate ground cover of royal fern (*Osmunda regalis*), goldthread (*Coptis trifolia*), rough goldenrod (*Solidago rugosa*), and naked miterwort (*Mitella nuda*). In the western portion of the complex, swales become narrow and dominated by shrubs with tag alder and winterberry (*Ilex verticillata*) and a ground

cover locally dominated by bluejoint grass (*Calamagrostis canadensis*), red manna grass (*Glyceria grandis*), and sensitive fern (*Onoclea sensibilis*). Distinct ridges and dry swales occur 100 to 320 m inland and are dominated by second-growth northern hardwoods and aspen (*Populus* spp.). Series of low upland ridges are mostly dominated by successional species, such as paper birch (*Betula papyrifera*), quaking aspen (*Populus tremuloides*), big-toothed aspen (*P. grandidentata*), red maple (*Acer rubrum*), and balsam fir with occasional red oak (*Quercus rubra*). The ground layer is dominated by Canada blueberry (*Vaccinium myrtilloides*), huckleberry (*Gaylussacia baccata*), and bracken fern (*Pteridium aquilinum*). In the western portion of the complex, dune ridges are dominated by red pine (*Pinus resinosa*). (MNFI:MSU)

General description of the northern portion of the Squaw Bay Wooded Dune and Swale Complex (T30N R08E Sections 9 and 16) from the forester visit during the 2019 YOE Inventory; Observations made in February 2017: The north-south running parallel valleys and ridges in the Squaw Bay Wooded Dune and Swale Complex had timber stands that vary in overstory and understory species composition. The ridges were 1 meter or less high than the swale valleys in most instances. One stand in Section 16 had ridges dominated with 80 to 90 year-old red maple and paper birch with lesser amounts of white pine and trembling aspen (upland deciduous). The parallel swale valleys were dominated by lowland shrub and trace amounts of red maple. Another stand just south of the aforementioned stand and located in Section 16 has a different species composition. On the ridges, this stand was dominated by red maple and white pine, with lesser amounts of red pine, paper birch and balsam fir (upland mixed forest). The swale valleys were dominated by northern white cedar, and balsam fir with lesser amounts of red maple, spruce, and hemlock (lowland coniferous).

- Other high value conservation (HVC) attributes would need to be identified through a rigorous assessment that included consultation with qualified specialists (including MDNR and Michigan Natural Features Inventory staff), independent experts and local community members. These attributes would need to be verified using Appendix F of the FSC-US Forest Management Standard. (To the authors knowledge this type of rigorous assessment has not been completed and upon reviewing Appendix F, the Squaw Bay Wooded Dune and Swale Complex may meet the criteria for this type of evaluation based on it being a fragment of the larger area complex.)

Other priority species: Representative and Rare Plants and Animals

- Rare animal species include: northern goshawk (*Accipiter gentilis*, state special concern), red-shouldered hawk (*Buteo lineatus*, state threatened), gray wolf (*Canis lupus*, state

threatened), piping plover (*Charadrius melodus*, federal/state endangered), dune cutworm (*Euxoa aurulenta*, state special concern), merlin (*Falco columbarius*, state threatened), bald eagle (*Haliaeetus leucocephalus*, state threatened), migrant loggerhead strike (*Lanius ludovicianus migrans*, state endangered), osprey (*Pandion haliaetus*, state threatened), eastern massasauga (*Sistrurus c. catenatus*, federal candidate species and state special concern), and Lake Huron locust (*Trimerotropis huroniana*, state threatened). (NCMG:WDS)

- Beaver (*Castor canadensis*) can dam streams that flow through wooded dune and swale complexes, causing vegetation in affected swales to shift from forest to emergent marsh and northern wet meadow. (NCMG:WDS)
- Seventeen rare plant species are associated with wooded dune and swale complexes throughout its range (refer to Kost et al. 2007 for a list). Wooded dune and swale complexes consist of a distinct series of successional vegetative zones or communities determined by factors such as distance from the lake, amount of soil development, groundwater input, and light availability. Component communities typically proceed from primary open dunes and interdunal wetlands along the shore to grassland, then shrubland, and finally forested dune ridges and swales farther inland. With increasing distance from the lakeshore, there is greater protection from wind and wave action and subsequently greater soil development and more complex natural communities. (NCMG:WDS)
- Vegetation growing on the low foredunes along the shorelines commonly includes marram grass (*Ammophila breviligulata*), dune grass (*Calamovilfa longifolia*), autumn willow (*Salix serissima*), sand dune willow (*S. cordata*), and balsam poplar (*Populus balsamifera*). (NCMG:WDS)
- Behind foredunes, where saturated lake-influenced, calcareous sands form the substrate, common species include twig-rush (*Cladium mariscoides*), sweet gale (*Myrica gale*), shrubby cinquefoil (*Potentilla fruticosa*), bluejoint grass (*Calamagrostis canadensis*), Kalm's lobelia (*Lobelia kalmii*), false asphodel (*Tofieldia glutinosa*), grass-of-Parnassus (*Parnassia glauca*), rushes (i.e., *Juncus balticus*, *J. pelocarpus*, and *J. nodosus*), spike-rush (*Eleocharis acicularis*), and three-square (*Schoenoplectus pungens*). (NCMG:WDS)
- A low dune field is often present and typically supports a scattered overstory of jack pine (*Pinus banksiana*), white pine (*P. strobus*), and red pine (*P. resinosa*) and an understory and ground layer of common juniper (*Juniperus communis*), creeping juniper (*J. horizontalis*), bearberry (*Arctostaphylos uva-ursi*), marram grass, and June grass (*Koeleria macrantha*). (NCMG:WDS)
- Inland of the dune field, both the dune ridges and swales are typically forested, although open, herbaceous wetlands may be common in the swales closer to the

shoreline. Moist swales typically contain saturated organic soils and support partial to closed canopies of northern white-cedar (*Thuja occidentalis*), tag alder (*Alnus rugosa*), willows (*Salix spp.*), and red maple (*Acer rubrum*). (NCMG:WDS)

- Swales where standing water is present through most of the year typically lack an overstory and instead are dominated by sedges (*Carex aquatilis* and *C. stricta*), twig-rush, marsh marigold (*Caltha palustris*), swamp candles (*Lysimachia terrestris*), sweet gale (*Myrica gale*), and swamp cinquefoil (*Potentilla palustris*). Where organic soils have accumulated to greater depths farther from the shoreline, vegetation in open swales may reflect more acid conditions and support species such as leatherleaf (*Chamaedaphne calyculata*), bog rosemary (*Andromeda glaucophylla*), Labrador tea (*Ledum groenlandicum*), bog laurel (*Kalmia polifolia*), large cranberry (*Vaccinium macrocarpon*), cottongrass (*Eriophorum virginicum*), pitcher-plant (*Sarracenia purpurea*), and sphagnum mosses (i.e., *Sphagnum centrale*, *S. wulfianum*, *S. warnstorffii*, *S. magellanicum*, and *S. squarrosum*). Shrub-dominated swales with scattered trees are also common and typically include species such as tag alder, black chokeberry (*Aronia prunifolia*), red-osier dogwood (*Cornus stolonifera*), bog birch (*Betula pumila*), as well as sedges (*Carex lasiocarpa*, *C. oligosperma*, *C. aquatilis*, and *C. stricta*), wool grass (*Scirpus cyperinus*), and marsh fern (*Thelypteris palustris*). (NCMG:WDS)
- Forested beach ridges tend to be dominated by species common to dry-mesic northern forest and mesic northern forest including red pine, white pine, and red oak (*Quercus rubra*). Subcanopy dominants often include paper birch (*Betula papyrifera*), big-toothed aspen (*Populus grandidentata*), balsam fir (*Abies balsamea*), and red maple. Common species of the shrub and ground layers of inland beach ridges include bracken fern (*Pteridium aquilinum*), huckleberry (*Gaylussacia baccata*), Canada blueberry (*Vaccinium myrtilloides*), bunchberry (*Cornus canadensis*), and wintergreen (*Gaultheria procumbens*). (NCMG:WDS)
- On lower dune ridges, where soils are moister, white pine may share dominance with white spruce (*Picea glauca*), black spruce (*P. mariana*), red maple, balsam fir, northern white-cedar, and occasionally tamarack (*Larix laricina*). Common shrub and ground layer species on the lower dune ridges may include American fly honeysuckle (*Lonicera canadensis*), mountain holly (*Nemopanthus mucronata*), twinflower (*Linnaea borealis*), dwarf raspberry (*Rubus pubescens*), Canada mayflower (*Maianthemum canadensis*), and starflower (*Trientalis borealis*). (NCMG:WDS)
- **Michigan indicator species:** The community is too widespread to identify a small group of representative species. Refer to the MNFI abstract for a complete list of flora for each regional sub-type. (NCMG:WDS)

Archaeological/Cultural

- Native Americans are known to have inhabited this area. Before any management activity can be completed in the general area of T30N R08E, in or out of the ERA, the state archeologist must be contacted and an on the ground survey must be completed.

Recreation

- Recreation within the ERA is limited to the few forest trails/forest roads that exist within the State of Michigan owned portion of the ERA. Any motorized activities within the State of Michigan owned portion of this ERA should be limited to these designated trails/forest roads.
- The portion of this ERA owned by the State of Michigan can be used by hunters who are properly licensed and who follow all guidelines for forest use set forth by the Michigan DNR.

Aesthetics/Visual Management

- All management activities within the ERA should consider aesthetics and visual management. Because the wooded dune and swale complex can vary largely on a visual basis, from area to area within the ERA, aesthetics and visual management decisions should be made on a site by site basis.
- The dumping of trash and yard waste is an ongoing issue in this ERA. Monitoring, ticketing, and public awareness are keys to minimizing this issue.

Timber products/Management Overview

- There are short and long term value advantages to managing the Squaw Bay Wooded Dune and Swale Complex for timber. All timber management decisions within the ERA should be made on a site by site basis. If management activities are deemed to threaten the ecological function of this ERA at a specific site on a small or large scale, especially long-term, the management activity should be denied.
- Conservation efforts should focus on protecting wooded dune and swale complexes from further fragmentation, preserving natural hydrology, and controlling invasive species. Emphasis should be on allowing natural processes (fire, windthrow, beaver flooding) to operate unhindered where possible and create the disturbances necessary to maintain the component communities. Fire control decisions are required to consider human health, safety and resource protection requirements. Restoring wooded dune and swale complexes should be guided by baseline sampling and monitoring as a large amount of floristic data on existing sites is available from surveys completed in the early 90's by Comer and Albert and in 2006 and 2007 by Cohen et al. Where listed species occur, permits may be needed. (NCMG:WDS)

- Because wooded dune and swale complexes are an integration of forested and non-forested communities on a unique topography, conservation strategies should evaluate management needs for each component or nested community, with the end goal to maintain the overall function of the complex. For example, a more northerly wooded dune and swale complex might include open dunes, northern shrub thicket, northern wet meadow, and dry-mesic northern forest communities. The important ecological characteristics to conserve when integrating these multiple conservation strategies is the sharp juxtaposition between upland and wetland, the wind and fire disturbance regime on the ridges, and the full range of community types that are expected for the site. (NCMG:WDS)

Threats Assessment

- Wooded dune and swale complexes are threatened in various ways. Habitat fragmentation, hydrologic disruption, wetland filling, nutrient loading and invasive species introductions occur from roads, rail grades, utilities, and shoreline development. For example In the Eastern Upper Peninsula US Highway 2 bisects several wooded dune and swale complexes. Additional threats documented in recent surveys (Cohen et al 2008) include deer herbivory which affects hemlock and cedar regeneration, logging on private lands and mine tailings. In some locations there is intense recreational use including excessive foot traffic, mountain bike trails and ATV use. (NCMG:WDS)
- Because of the wide diversity of habitats provided by wooded dune and swale complexes, invasive plants threatening the diversity and community structure include species from all ends of the moisture and light continuums. Particularly aggressive invasives to monitor and promptly control include garlic mustard (*Alliaria petiolata*), Dame's rocket (*Hesperis matronalis*), purple loosestrife (*Lythrum salicaria*), narrow-leaved cat-tail (*Typha angustifolia*), hybrid cat-tail (*Typha xglauca*), reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), European marsh thistle (*Cirsium palustre*), spotted knapweed (*Centaurea maculosa*), common buckthorn (*Rhamnus cathartica*), glossy buckthorn (*R. frangula*), autumn olive (*Elaeagnus umbellata*), Eurasian honeysuckles (*Lonicera morrowii*, *L. japonica*, *L. maackii*, *L. sempervirens*, *L. tatarica*, *L. xbella*, and *L. xylosteum*), multiflora rose (*Rosa multiflora*), and Norway maple (*Acer platanoides*). (NCMG:WDS)
- Element Occurrence Record EO ID: 403; EO NUM: 10 states: Difficult to control ORV access. (2006) Glossy buckthorn (*Rhamnus frangula*) is common throughout the complex (particularly in swales) and threatens to dominate large portions of the wetlands. A two-track parallels the swales and has allowed weedy natives and non-natives to invade the complex. This wooded dune and swale complex has been heavily impacted by logging and road building. Management recommendations include eliminating the illegal off-road vehicle activity and controlling glossy buckthorn before it expands into larger portions of the complex. Control efforts should be monitored. If possible, roads throughout the complex should be closed. Early successional forest on

upland ridges should be allowed to mature. Acquisition of private inholdings that occur within the wooded dune and swale complex or establishment of conservation easements would help protect this community and limit future development and off-road vehicle damage. (MNFI:MSU)

Resources for Threat Assessments:

- The ERA would benefit from constant monitoring/reporting of any ERA threatening activity. This monitoring/reporting could be done by the public, state employees, and general recreationists.
- Current damage and future damage can be minimized by blocking the access to illegal trails by motorized vehicles and ORVs when identified.
- To take full advantage of the partners available, community wide and otherwise, resources at local, statewide, and national levels would need to be investigated and contacts would need to be made.

Management Goals

Goals should be broad statements about conditions that are desired in the ERA(s) and for any identified HCV attributes

- Restoration of Wooded Dune and Swale ERA where applicable
- Allow natural ecological processes to occur
- Manage for unfragmented forest
- Invasive Species: Ideally, the best goal would be to eliminate invasive species (or maintain an absence of invasive species), but in some areas that may not be possible and a goal that recognizes this may be necessary
- Reduce other Threats (Encroachment of Woody Vegetation, ORVs, etc.)
- The ERA has representation of native plants, indicator species, and rare species (The management goals were taken from (NCMG:WDS) and modified slightly.)

Management Objectives

Management objectives are the means to achieve the management goals of the specific site and should be time specific if possible.

- Identify and eliminate illegal ORV access points
- Identify and prioritize critical areas within the ERA to treat for invasive species
- Determine if there are impacts to hydrological system
- Allow blowdown/windthrow and insect mortality to occur without salvage harvest
- Assess forest regeneration within the planning period
- Assess EO quality every 10-20 years
- Work with adaptation specialist to determine threats associated with climate change (The management objectives were taken from (NCMG:WDS) and modified slightly.)

Management Actions

Actions should be specific items that identify how the objectives will be achieved.

(M= Maintenance action, R= Restoration action)

- If current data/knowledge are not available regarding the management goals, actions may address needed assessments (i.e. surveys may be needed) (M, R)
- Identify vectors of invasive species and reduce their introduction to the site (M, R)
- Remove invasive plants using appropriate control methods for that particular species (hand-pull, herbicide, Rx) using partnerships where appropriate, develop FTP's and PAP's (M, R)
- Use periodic burning to maintain presence of native plant species, reduce invasives, and to reduce woody encroachment (M, R)
- Write a wildfire plan to incorporate a "let it burn" policy where safety concerns allow. (M, R)
- Avoid establishment of new fire lines to reduce invasive species encroachment (M, R)
- Where forest regeneration is found to be inadequate: (R)
 - In pine types, consider use of prescribed fire as a management option using existing natural firebreaks to avoid introduction/spread of invasive species
 - In cedar and/or hemlock, determine if lack of regeneration is caused by deer herbivory and if so, consider limiting winter cutting intended to feed deer adjacent to the ERA and explore other potential solutions
- Close illegal roads and trails (M, R)
- Work with LED to increase patrols for illegal ORV activity and enforce state land use rules (M,R)
- Work with MNFI and other experts to update EO inventory (M, R)
- Update plan with additional knowledge as it becomes available (M)
(The management actions were taken from (NCMG:WDS) and modified slightly.)

Monitoring

Monitoring approaches and indicators appropriate for the natural community and in line with the objectives and management actions are suggested, including appropriate frequency and timing considerations. Monitoring needs must be achievable and realistic in terms of what can be done with expected available resources. Evaluation of the plans effectiveness must be based on a realistic assessment of available resources and how these resources become available or unavailable over time.

(Unless otherwise specified, monitoring is expected to occur once every 10-year cycle)

- Rare species- species occurrences
- Presence of rare animals
- Populations of invasive species- number and scope by species

- Change in EO rank
- Evaluate the effects of invasive species treatment- growing year post treatment and for two successive years thereafter (dependent upon removal method and species)
- Illegal ORV activity- Number of new instances and number of citations issues (The monitoring info was taken from (NCMG:WDS) and modified slightly.)

Monitoring Summary Chart

Indicator	Current Status	Desired Future Status	Summary Assessment
Invasive Species 1 Present	Unknown	Unknown	TBD
Invasive Species 2 Present	Unknown	Unknown	TBD
Etc...			
Rare Species 1 Present	Unknown	Unknown	TBD
Rare Species 2 Present	Unknown	Unknown	TBD
Etc...			
Motorized Vehicle/ORV Damage Site 1	Unknown	Unknown	TBD
Motorized Vehicle/ORV Damage Site 2	Unknown	Unknown	TBD
Etc...			

Imagery:



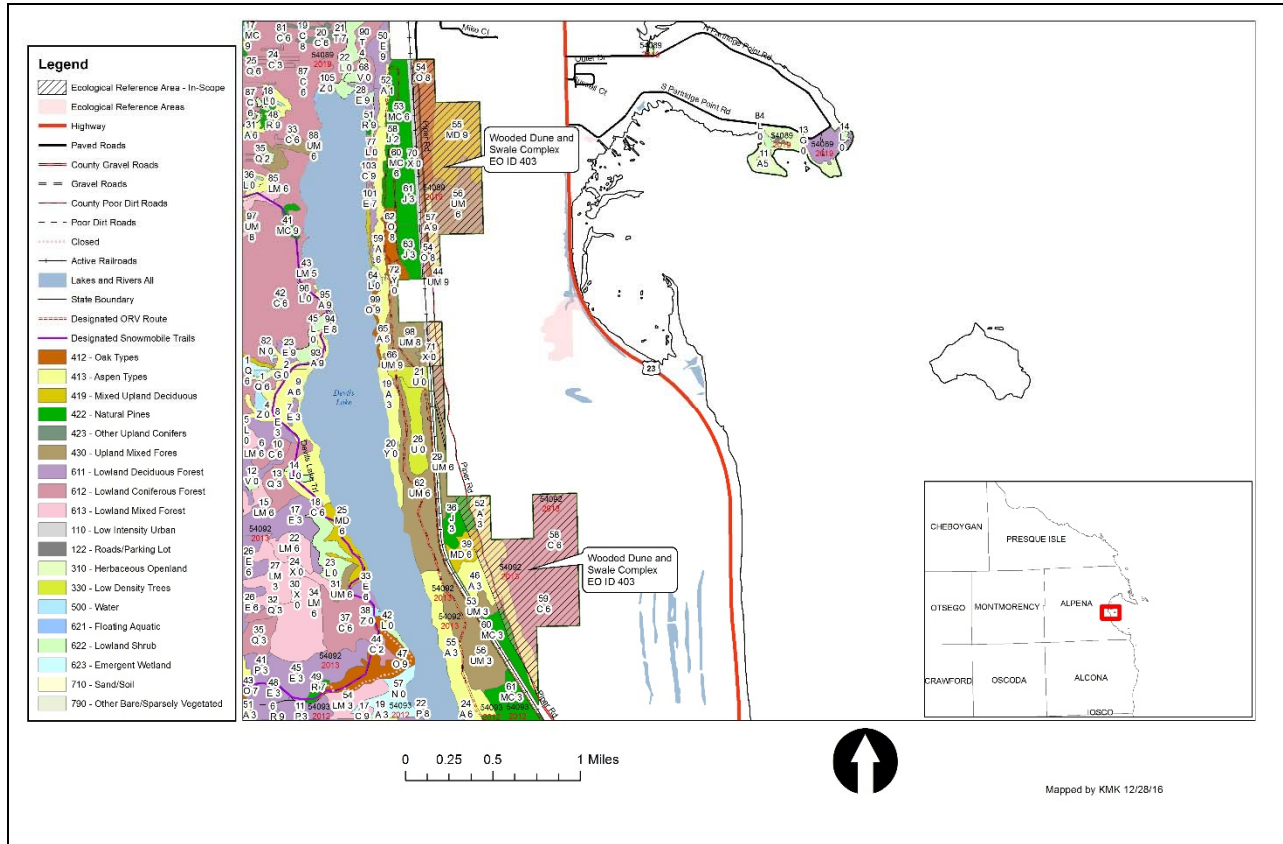
Over head image of a portion of the Squaw Bay Wooded Dune and Swale Complex with an example of damage to the ERA on private land in the top right corner.



Image depicting the larger pattern of the Squaw Bay Wooded Dune and Swale Complex which encompasses both private and State of Michigan owned land. The image also shows how development has encroached on this ERA.

Squaw Bay Wooded Dune and Swale Complex ERA

Site Map:



References and Resources:

Resources within this document copied directly from the Michigan Natural Features Inventory at Michigan State University are followed by the acronym MNFI:MSU.

Much of the documentation for this document was copied (per the direction of Forest Resources Division Personnel) from the document entitled Natural Community Management Guidance; Wooded Dune and Swale, created for use by the Michigan DNR. This document already had much of the information needed for the completion of this ERA document as required for forest certification with the Forest Stewardship Council. Portions of this document copied from the Natural Community Management Guidance; Wooded Dune and Swale document is followed by the acronym NCMG:WDS.

Natural Community Management Guidance; Wooded Dune and Swale; References and Resources:

Albert, D.A., and P.J. Comer. 1999. Natural community abstract for wooded dune and swale complex. Michigan Natural Features Inventory, Lansing, MI. 8 pp. Updated June 2010.

Cohen, J. G.; B. S. Slaughter, and M. A. Kost. 2008. Natural community surveys of potential ecological reference areas on state forest lands for Michigan Department of Natural Resources, Forest, Mineral and Fire Management Division and Wildlife Division, Michigan Natural Features Inventory, Report Number 2008-04 Version 1, Lansing, MI. 272 pp.

Comer, P.J., and D. A. Albert. 1993. A survey of wooded dune and swale complexes in Michigan. Report to Michigan DNR, Land and Water Management Division, Coastal Zone Management Program. 159 pp.

Kost, M.A., D.A. Albert, J.G. Cohen, B.S. Slaughter, R.K. Schillo, C.R. Weber, and K.A. Chapman. 2007. Natural communities of Michigan: Classification and description. Michigan Natural Features Inventory, Report No. 2007-21, Lansing, MI. 314 pp.