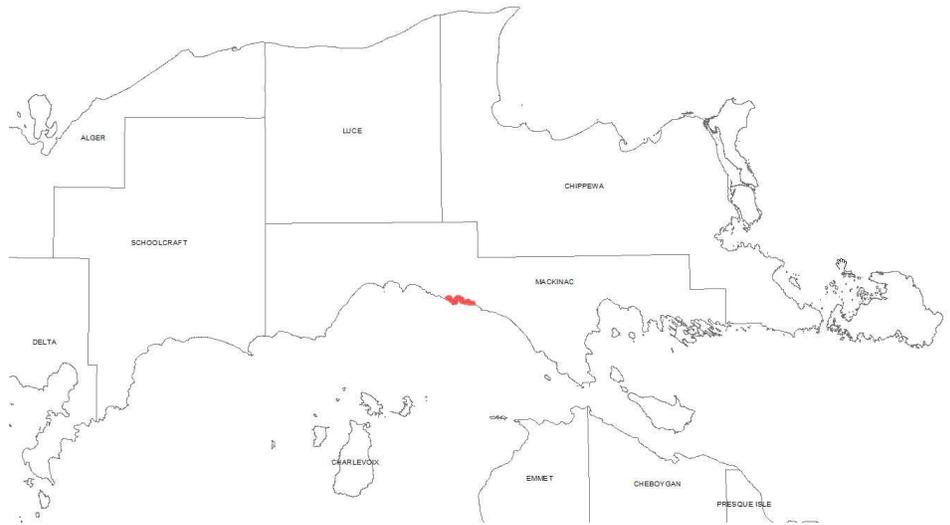


# Epoufette Bay & Kenyon Bay West Great Lakes Marsh and Wooded Dune and Swale Ecological Reference Area (ERA) Plan



## Administrative Information:

- This plan is for two ERAs that are part of the same Great Lakes Marsh Element Occurrence, Epoufette & Kenyon Bay ERAs and one adjacent Wooded Dune and Swale Complex.
- The development of this plan was funded through a United States Environmental Protection Agency (USEPA) Great Lakes Restoration Initiative (GLRI) grant. Because this grant focused on collaborative development of management plans to address coastal wetland goals of multiple agencies, this plan was developed cooperatively between representatives from the Michigan Department of Natural Resources (MDNR), Michigan Department of Environmental Quality (MDEQ), and Central Michigan University (CMU). This plan includes a broader focus than other MDNR ERA management plans, and includes more detailed information and actions to address Great Lakes coastal wetland protection. Funding for some management actions was also provided through this grant.
- The ERAs are within the Sault Ste. Marie FMU, Lake Michigan Shoreline MA, Compartment 142 stand 30, YOE 2012, EO ID 2797- 29.25 acres; EO ID 12046 – 10 acres (Kenyon bay) stand 19, which occur in Mackinac County, Hendricks Township, T42N, R07W, S 4-5.
- Primary plan author: Sherry MacKinnon- MDNR Wildlife Ecologist. Contributors and reviewers include Dave Jentoft- MDNR Wildlife Biologist, Kristen Matson- Forest Resources Division Inventory and Planning specialist MDNR, Keith Kintigh- Forest Certification and Conservation Specialist, Barb Avers- MDNR Wetland & Waterfowl specialist, Anne Garwood- MDEQ Coastal Ecologist, Dr. Don Uzarski- Central Michigan

University, Andrew Bacon- Michigan Nature Association (MNA), and Eric Clark-Biologist, Sault Tribe of Chippewa Indians.

- The two Great Lakes Marsh Element Occurrences (EOs) are 285 acres combined, of which the state owns approximately 40 acres. There are a few large private owner-ships (30-115 acres) with most of the private ownership being in small tracts. Hendricks Township owns 30 acres on the bay, Michigan Nature Association (MNA) owns a preserve of over 250 acres along the shoreline of Kenyon Bay, and the Sault Tribe of Chippewa Indians owns approximately 70 acres. The wooded dune and swale EO is 203 acres, of which the state owns 168 acres; MNA owns the balance.
- Existing infrastructure/facilities include a campground and picnic area that occurs on the Hendricks Township ownership along the bay, and a boat launch belonging to the Sault Tribe of Chippewa Indians which is used for commercial fishing purposes. Most of the ownership is personal residences on small tracts of land.
- Other planning documents related to this ERA include the DEQ Environmental Area Management Plan for Environmental Area 04-04b (1981), USFWS Recovery Plan for the Pitcher's Thistle (*Cirsium pitcheri*), USFWS Michigan Monkey-flower (*Mimulus glabratus* var. *michiganensis*) Recovery Plan, Mackinac County Shoreline Site Conservation Plan (MNFI Report Number 2008-09), and A Statewide Assessment of *Mimulus michiganensis*, by Michael R. Penskar MNFI, USFWS Report Number 2012-20
- ERA boundaries are derived from the underlying Natural Community EO boundary which are mapped using NatureServe standards. EO Boundaries are informed by vegetation and other site characteristics including soils, landform, and/or historic aerial imagery. As a result, it is not uncommon for EO/ERA boundaries to differ from forest inventory stand boundaries. If these difference result in potential conflicts with proposed forest activities, consult with the Forest Conservation and Certification Specialist.

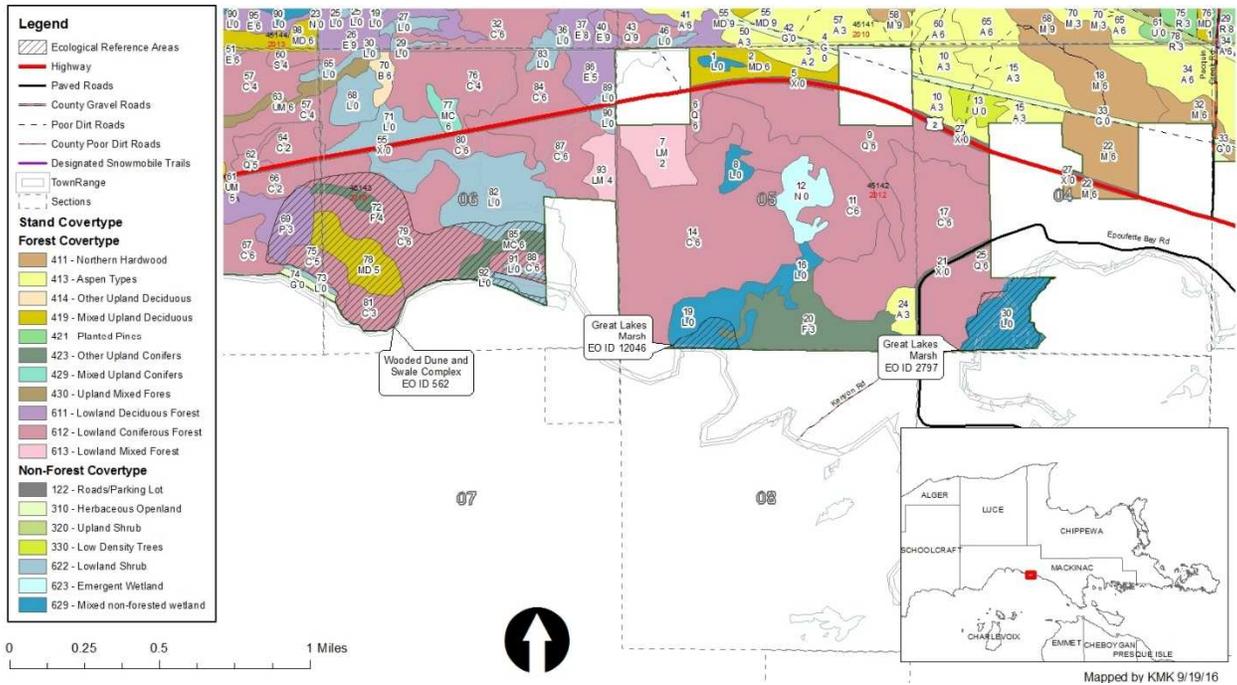


Figure 1. Locator Map (inset) and ERAs on State Forest Land ownership

### Conservation Values

This landscape has many of the characteristic and significant features of northern Great Lakes shores: Great Lakes Marsh, open dunes, Wooded dune and swale, interdunal wetland, Great Lakes Endemic plants, and rare shorebirds.

This ERA complex is recognized for four natural communities; Great Lakes marsh, wooded dune and swale, interdunal wetland, and rich conifer swamp. It is recognized for both having natural communities that are rare as well as those representative examples being of high quality.

- Great Lakes Marsh communities include the following Element Occurrences:
  1. EO\_ID 2797, BC rank, Last Observed 2007-06-18
  2. EO\_ID 12046, B rank, Last Observed 2007-06-18
- Wooded Dune and Swale Complex Element Occurrence:
  1. EO ID 562, B Rank, Last Observed 2007-06-17

Great Lakes marsh is a multi-seral non-forested wetland that is directly influenced by and connected to a large freshwater lake. Associated coastal features are principally freshwater deltas, riverine estuaries, coastal marshes protected by offshore bars or a barrier dune (forming a lagoon), and shallow bays on lee shores. Great Lakes marsh is an herbaceous wetland

community occurring statewide along the shorelines of the Great Lakes and their major connecting rivers. Vegetational patterns are strongly influenced by water level fluctuations and type of coastal feature, but generally include the following: a deep marsh with submerged plants; an emergent marsh of mostly narrow-leaved species; and a sedge-dominated wet meadow that is inundated by storms. Seiches, storms, and water level cycles strikingly change vegetation over short periods by destroying some vegetation zones, creating others, and forcing all zones to shift lakeward or landward to accommodate water levels. Great Lakes marsh provides important habitat for migrating and breeding waterfowl, shore-birds, spawning fish, and medium sized mammals (Kost et al. 2007).

Fisheries access to the marshes is often dependent on prevailing water levels. Fish species known to use the Great Lakes coastal marshes of Mackinac County include banded killifish (*Fundulus diaphanous*), nine-spine stickleback (*Pungitius pungitius*), johnny darter (*Etheostoma nigrum*), northern pike (*Esox luciosus*), yellow perch (*Persa flavescens*), bass (*Micropterus spp.*) rock bass (*Ambloplites rupestris*), walleye (*Sander vitreus*), white sucker (*Catostomus commersonii*), common carp (*Cyprinus carpio*), bullhead (*Ameiurus spp.*), bluegill (*Lepomis macrochirus*, and crappie (*Pomoxis spp.*). Several of the forage fish species may spend their entire life cycle in or adjacent to the coastal marsh. Some of the game fish (pike and bass) that spend only a small portion of their life within a wetland, may frequent these marshes to prey on the fish and invertebrates that spend a greater proportion of their life cycles within the marsh. When small, game fish such as bluegill and bullhead also serve as forage fish. Other predators of forage fish within these coastal marshes include great blue heron (*Ardea herodias*), belted kingfisher (*Ceryle alcyon*), mergansers (*Mergus spp.*), terns (*Sterna spp.*), gull (*Larus spp.*), raccoon (*Procyon lotor*), and muskrat (*Ondatra zibethicus*). The designated areas provide many of these coastally dependent species of fish with their special habitat requirements for spawning and nursery. For example, northern pike spawn in flooded sedge and grass, depositing their eggs in water only inches deep. After hatching, the young pike use the protected, food-rich waters of the marsh until of sufficient size to move out into deeper water.

As a final note on the importance of the designated marshes to coastally dependent species of fish and wildlife, it is important to realize that these areas are among the first to warm in spring. This ability to warm rapidly on sunny spring days is due to warm upland runoff, shallow waters, heat absorbing qualities of the marsh vegetation and sediments, and to the physical characteristics which reduce water exchange between lake and marsh. The warmer aquatic climate enhances basic productivity for invertebrates, fish and wildlife.

Great lakes marsh is ranked G2 S3, globally imperiled and rare or uncommon in the state.

Wooded dune and swale natural community 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. 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). Vegetative succession creates a distinct pattern of communities or zones across this landscape complex. The flow of surface streams and groundwater is critical for maintaining saturated to inundated conditions in swales. Because of the close proximity to the shoreline, windthrow is common, especially on the loose organic soils of swales where anaerobic conditions limit the rooting depth of trees. Along-shore currents, waves, and wind create and continuously re-work foredunes along the shoreline. Additional important components of the natural disturbance regime include fire, beaver flooding, and insect epidemics.

Wooded dune and swale is ranked G3 S3, globally very rare locally in a restricted range and rare or uncommon in the state.

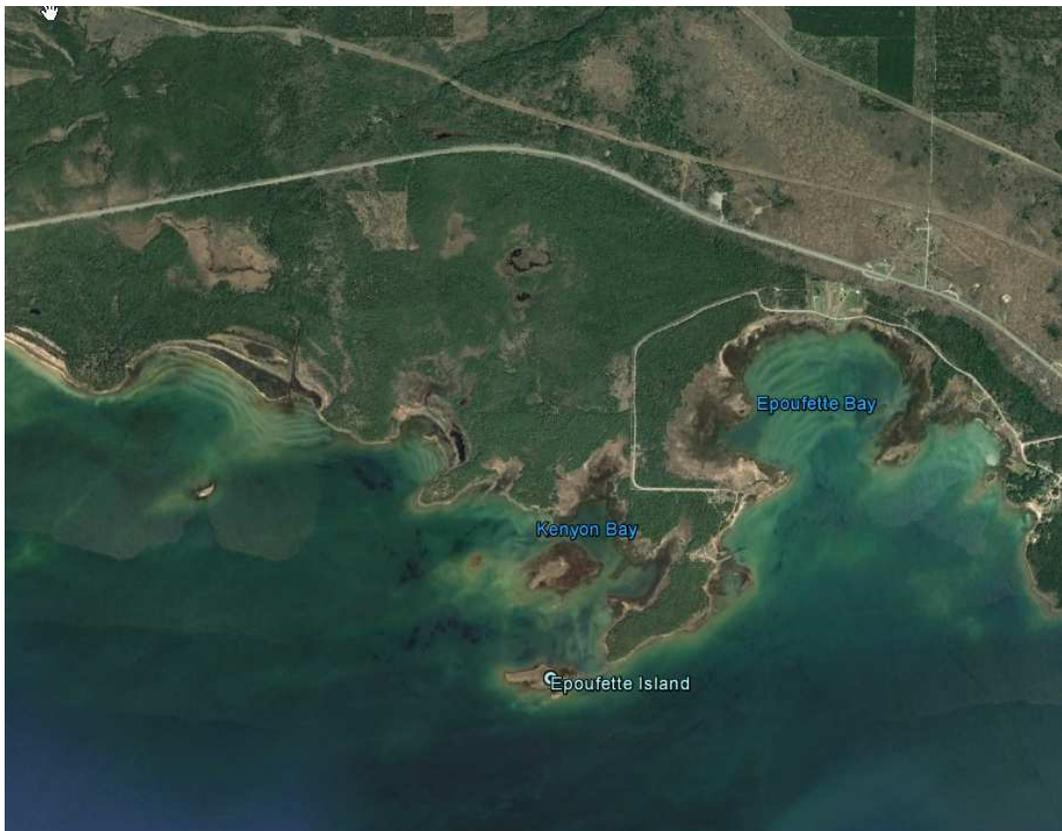


Figure 3- Landscape view of Lake Michigan shoreline associated with ERAs

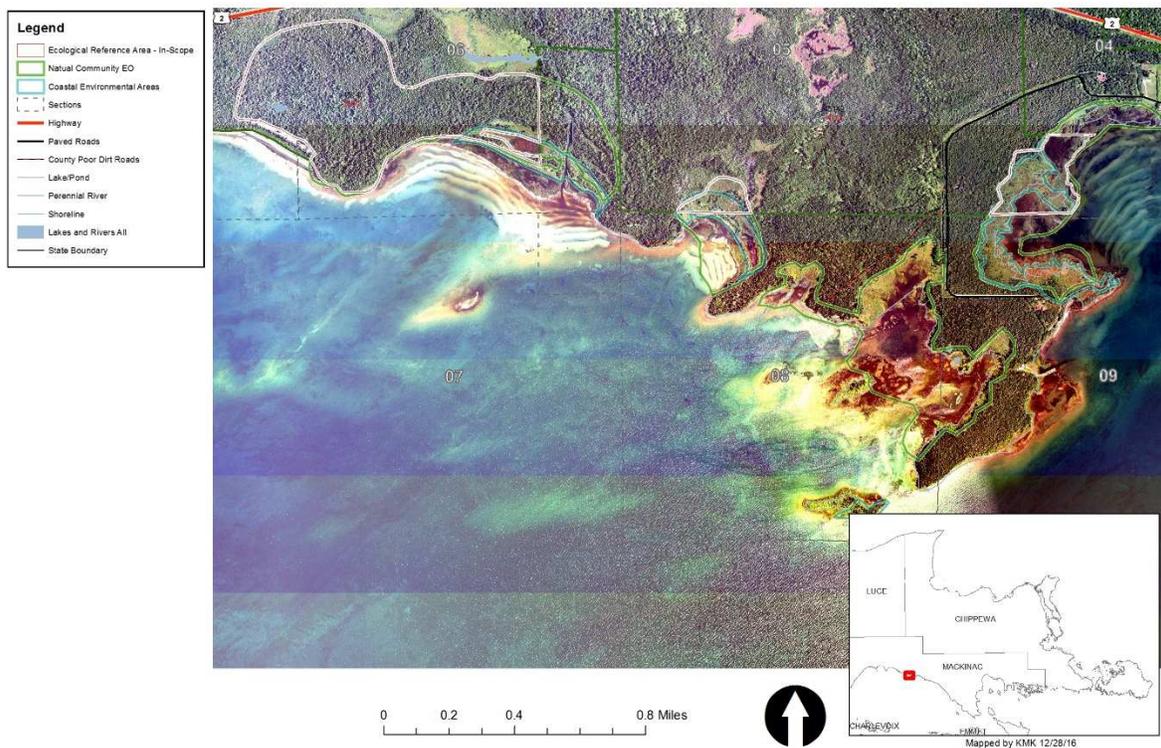


Figure 4. ERAs, Natural Community Element Occurrences, and Coastal Environmental Areas.

**Epoufette Bay Great Lakes Coastal Marsh**- EO\_ID 2797, BC rank, Last Observed 2007-06-18.

This Element occurrence is 130 acres in size; the state ERA portion is 29 acres.

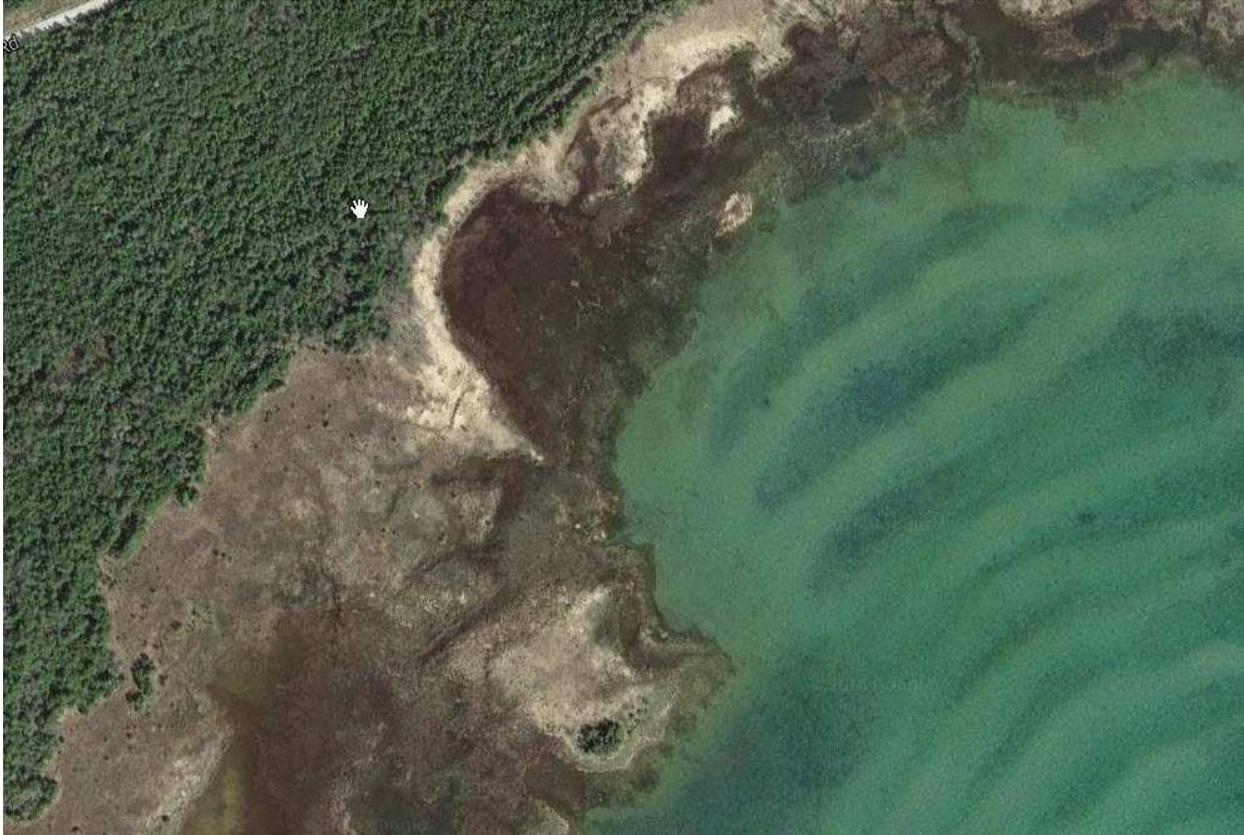


Figure 4. Epoufette Bay Great Lakes Coastal Marsh ERA

This ERA is recognized as a rare natural community as well as being a representative example of the Great Lakes Marsh natural community with good or fair estimated viability.

This Great Lakes marsh occurs along the active lakeplain of Epoufette Bay, which is situated along the northern shore of Lake Michigan. The marsh complex is found on eroded clay substrate. The marsh is buffered in part by boreal forest with northern white-cedar (*Thuja occidentalis*), white spruce (*Picea glauca*), and balsam fir (*Abies balsamea*) but is also adjacent to residential development. Small islands and sand bars in the bay modify wave action and allow for the development of the marsh along the shoreline. Sand and gravel beach and limestone cobble shore occur along portions of the shoreline.

The marsh is characterized by several ecological zones including emergent marsh, northern wet meadow, northern shrub thicket, and a small amount of rich conifer swamp. Broad areas of northern wet meadow are dominated by bluejoint grass (*Calamagrostis canadensis*) and tussock sedge (*Carex stricta*). Reed canary grass (*Phalaris arundinacea*) occurs within this zone. The northern wet meadow is backed by a narrow band of northern shrub thicket dominated by sweet gale (*Myrica gale*), shrubby cinquefoil (*Potentilla fruticosa*), and meadowsweet (*Spiraea alba*). Areas of emergent marsh bordering the bay are dominated by hardstem bulrush

(*Schoenoplectus acutus*), three-square (*Schoenoplectus pungens*), path rush (*Juncus tenuis*), and smartweeds (*Polygonum* spp.). Small colonies of Michigan monkey flower (*Mimulus glabratus* var. *michiganensis*, federal and state endangered) occur in seepage areas adjacent to the bay.



Figure 5. Epoufette Bay coastal marsh vegetation

Portions of the marsh are locally dominated by non-native species (i.e., reed canary grass). In addition, ditching and dredging has occurred in the southern end of the marsh on private land.

**Kenyon Bay and West Great Lakes Marsh-** EO\_ID 12046, B rank, Last Observed 2007-06-18

The Element occurrence is 155 acres in size, the state-owned ERA is 10 acres. Michigan Natura Association owns the rest of the Element occurrence.



Figure 6. Great Lakes Coastal Marsh Kenyon Bay

This Great Lakes marsh occurs in a protected embayment along the northern shore of Lake Michigan. The marsh complex occurs on eroded clay substrate of an active lakeplain. The soils range from calcareous beach sand to exposed limestone cobble to organic matter over sand and are slightly acidic to circumneutral (pH 6.5-7.5). Sand and gravel bars occur near the shore and help protect the wetland from direct wave action. In high water years, the marsh is highly eroded by wave action. A small island off the shore is home to a gull colony.

This element occurrence is considered a representative example of Great Lakes Marsh with good estimated viability.

The marsh is characterized by several ecological zones that are patterned by the interaction of substrate, hydrology, and elevation. Vegetative zones include submergent marsh, emergent marsh, northern wet meadow, northern shrub thicket, and limestone cobble shore. Areas of submergent marsh are dominated by yellow pond-lily (*Nuphar variegata*), water milfoil (*Myriophyllum verticillatum*), and grass-leaved arrowhead (*Sagittaria graminea*). Areas of emergent marsh occurring along beach flats are dominated by sedges (*Carex* spp.), spikerushes (*Eleocharis* spp.), bulrushes (*Juncus* spp.), smartweeds (*Polygonum* spp.), twig-rush (*Cladium mariscoides*), and hardstem bulrush (*Schoenoplectus acutus*). Areas of northern wet meadow are dominated by tussock sedge (*Carex stricta*) and bluejoint grass (*Calamagrostis canadensis*). Reed (*Phragmites australis*) and reed canary grass (*Phalaris arundinacea*) are locally important.

The northern wet meadow zone is backed along the margins by northern shrub thicket dominated by shrubby cinquefoil (*Potentilla fruticosa*) and sweet gale (*Myrica gale*). In addition, areas of limestone cobble shore occur sporadically along the lakeshore and are dominated by calciphiles. Characteristic species of the limestone cobble shore include shrubby cinquefoil, silverweed (*Potentilla anserina*), dwarf Canadian primrose (*Primula mistassinica*), Indian paintbrush (*Castilleja coccinea*), bastard toadflax (*Comandra umbellata*), tickseed (*Coreopsis lanceolata*), wild columbine (*Aquilegia canadensis*), starry false Solomon's seal (*Smilacina stellata*), and northern white-cedar (*Thuja occidentalis*)

There is a small stream flowing into the Kenyon Bay wetland, and a small ditch connects Kenyon Bay to Epoufette Bay. Large quantities of upland runoff, common in spring months, temporarily raises stream levels, causing an inundation of the adjacent wetlands. This seasonal fluctuation in stream levels is critical to the spawning needs of northern pike, yellow perch, and white sucker which migrate upstream to spawn. Wading birds, waterfowl, mammals, reptiles and amphibians use this stream to access the coastal marsh.

**Epoufette Wooded Dune and Swale Complex** EO ID 562, B Rank, Last Observed 2007-06-17

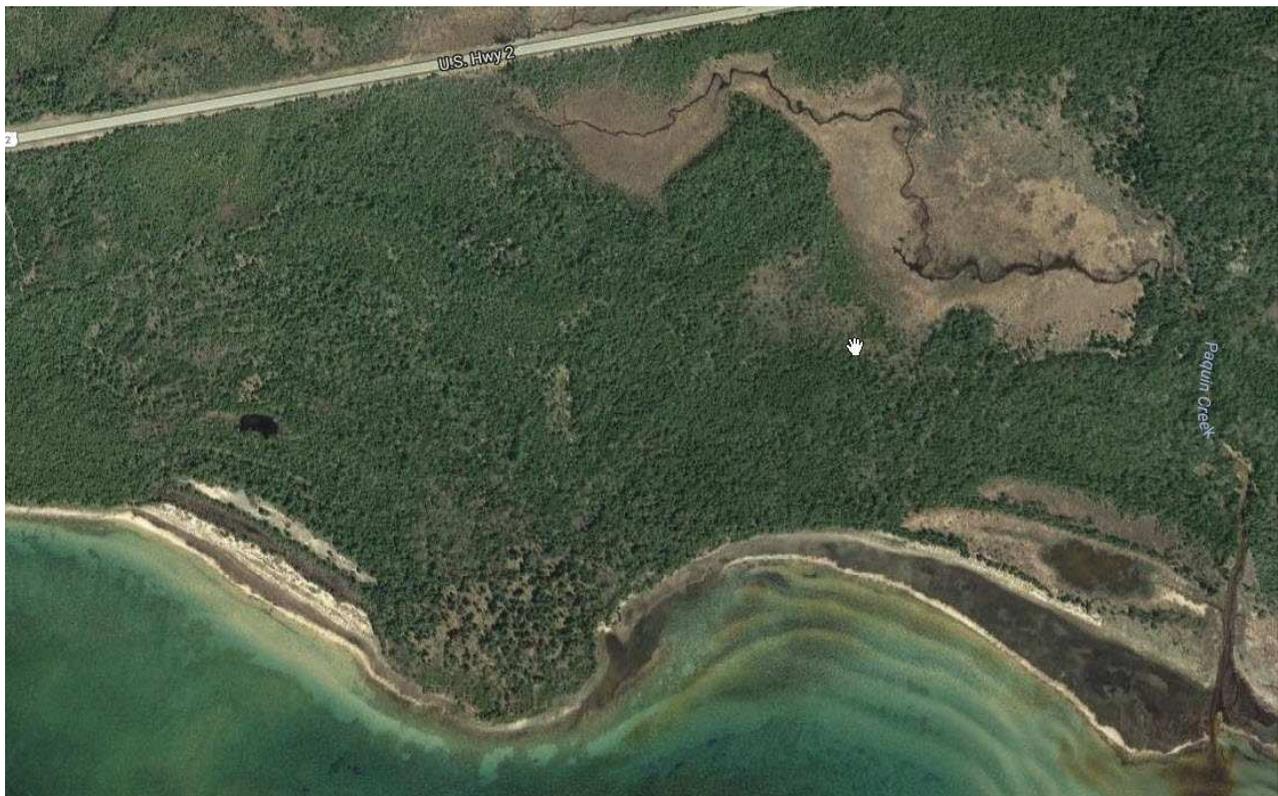


Figure 7. Wooded Dune and Swale Complex

This small 203 acre wooded dune and swale complex is just west of Epoufette and Kenyon Bay along US 2. Thousands of years of lake processes have developed the complex patterning of low dune ridges and swales of variable depth and width. Over much of the complex there are subtle transitions from dunes to swales, which often support the same dominant species due to the lack of significant relief. Balsam fir (*Abies balsamia*), red maple (*Acer rubrum*), and white pine (*Pinus alba*) dominate the ridges; while cedar (*Thuja occidentalis*), black spruce (*Picea nigra*), a variety of sedges (*Carex spp.*), shrubby cinquefoil (*Potentilla fruticose*) and Labrador tea (*Ledum groenlandicum*) are the dominant plants in the swales. The most diverse area is the open dunes and wetland swales closest to Lake Michigan upon which willow (*Salix spp.*), sand cherry (*Prunus pumila*), dune beach grass (*Ammophila breviligulata*), Lake Huron tansy (*Tanacetum huronense*) and pitcher's thistle (*Cirsium pitcheri*) grow; to the North, rich conifer swamp, primarily composed of white cedar (*Thuja occidentalis*), on rather shallow organic substrate dominates much of the occurrence, at least in the western portion. Many of the subtle upland ridges support a dense canopy of young balsam fir, due in part to logging but also due to frequent blowdowns. This ERA is functionally intact.

The wooded dune and swale element occurrence continues onto Michigan Nature Association property to the east.

#### High Conservation Value (HCV) Attributes:

The Epoufette Bay landscape, in general, is largely an intact and functional landscape. It is part of a large landscape level forest with minimal road density and timber management activity. The landscape is characterized by complex ecological patterning, which results in high species and community diversity despite anthropogenic impacts.

The interdunal wetlands are important feeding areas for migrating shorebirds, waterfowl, and songbirds in the spring and important foraging areas for waterfowl in the fall. Open dunes provide habitat for rare animal species such as the Lake Huron Locust (Federal/State endangered) and Great Lakes endemic plants. Wooded dune and swale complexes provide habitat for more than twenty rare plant and animal species. Great Lakes marsh provide important habitat for insects, fish, waterfowl, water birds, and mammals. Fish utilize coastal wetlands in all parts of their life cycle, including egg, larval, immature, and adult stages. A broad range of invertebrates occupy this habitat, providing food for fish, birds, herptiles, and small mammals. Coastal wetlands have long been recognized as critical habitat for the migration, feeding, and nesting of waterfowl and shorebirds. During spring migration, when few alternative sources of nutrients are available, terrestrial migratory songbirds feed on midges from the Great Lakes marshes.

There are many recreational, cultural, and intrinsic values associated with this landscape, as well. Although much of the shoreline receives little recreation use, the township park is popular with residents and visitors for swimming and picnicking, and camping. Within this area are traditional fishing areas, and areas of pre-historic, historic and current Native American use. In the pre-settlement period of history, the shoreline was important to early French trappers and the fur trade. This area has very high scenic quality; along US-2 there is a Michigan Department of Transportation viewing site that overlooks the bay.

Other high Conservation Value Areas (HCVAs) within the ERAs include the designated DEQ Environmental Area 04-04, which extends along the shoreline and includes the Great Lakes coastal marsh areas in Epoufette Bay and Kenyon Bay. DEQ Environmental Areas are coastal habitat areas which were identified and designated primarily in the 1970's and 1980's. These areas are regulated under Part 323, Shoreland's Management and Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, in order to protect habitat necessary for the preservation and maintenance of fish and wildlife. Many environmental areas, including this area, contain coastal wetlands as well as other important associated habitats, such as upland ridges and islands. The ERAs are managed to preserve biodiversity attributes, threatened and endangered species and habitats, and natural communities.

### Threats Assessment

#### Great Lakes Coastal Marsh

Continued residential development along the private shoreline is a threat to the site. Off-road vehicle damage was noted along portions of the shoreline). The recreational use of airboats is an emerging threat the natural community and nesting birds within Great Lakes marsh ecosystem; use at this site is unknown.

Some property owners along the northern side of Epoufette Bay have encroached into the natural wetland communities by cutting and removing native vegetation, grading, placing fill, maintaining lawn and several camp sites in this area. In addition, in the southeastern portion of the Epoufette Bay marsh, there is an old dredged channel with a boat well, an old access road, and an old boat house that were constructed in the wetland. There are plans underway to restore and improve this infrastructure to facilitate fishing access for the Sault Tribe of Chippewa Indians; the DNR and DEQ will work with the tribe to mitigate any potential detrimental impacts.

Invasive plants threaten the diversity and community structure of Great Lakes marsh and are known to have degraded similar coastal wetlands throughout the Great Lakes basin. For all management actions taken at this site, an invasive species

decontamination procedure should be followed to ensure that any gear and equipment entering the site is free of invasive species, and any gear and equipment leaving the site is free of invasive species. The current primary stewardship need is to remove the existing population of reed canary grass and to continue efforts to control non-native Phragmites. This control effort will be monitored post-treatment, and bi-annually at a minimum thenceforth, as resources allow, for re-emergence of the invasive plant. In addition, there is a newly discovered occurrence of oriental bittersweet on an upland site adjacent to the east on private land which will necessitate monitoring in the ERA buffer to ensure early discovery and a rapid response. The site should continue to be monitored for early detection and response to any new infestations of invasive species. Education and outreach efforts to the adjacent landowners about the importance of these wetlands, as well as the impacts of encroachment and introduction of invasive species should be undertaken, as well as general information on decontamination procedures for invasive species. Portions of the wetland occurring on private lands could be acquired or protected through conservation easements. Signage identifying the ERA and DEQ Environmental Area, including values provided and importance of preventing invasive species introduction should be placed at public access areas.

#### Wooded Dune & Swale Complex

Several non-native species were noted during recent surveys including reed canary grass (*Phalaris arundinacea*) within the interdunal wetlands. The primary stewardship need is to determine the scope and severity of invasive species, establish some control efforts, and monitor efforts. Housing development in the vicinity could further fragment the shoreline habitat and increase the potential for off-road vehicle damage. Portions of the complex occurring on private lands could be acquired or protected through conservation easements.

#### General Management of ERAs

- ERAs will generally not be managed for timber harvest on state forest land. 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:
  - i. 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.

ii. 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.

iii. 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.

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

v. 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.

vi. 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.

vii. Applicable regulations over these activities under Public Act 451 of 1994 (Natural Resources and Environmental Protection Act include: Part 301- Inland Lakes

and Streams, Part 303-Wetlands Protection, Part 325- Great Lakes Submerged Lands, Part 323- Shorelands Protection and Management, and Part 365- Endangered Species Protection.

### Management Goals

- Invasive Species: Overall goal is to eliminate invasive species (or maintain an absence of invasive species), but in some areas, that may not be possible. Use monitoring information and onsite conditions to identify those areas, and establish a target goal to maintain a minimal abundance of total invasive species, or specific invasive species.
- Restore and maintain Great lakes marsh and wooded dune and swale communities through protection, buffer management, and education/outreach at public access locations.
- Reduce other Threats (ORVs, airboats, altered hydrology, encroachment by private property owners etc.).
- The ERA has representation of native plants, indicator species, and rare species.

### Management Objectives

The following Management Objectives describe the measures necessary to ensure the maintenance and/or enhancement of the ERA site or sites. Objectives and associated management actions will be prioritized and implemented based upon available resources.

- Identify and reduce illegal ORV access points
- Identify and prioritize critical areas within the ERA to treat for invasive species, implement adaptive management for invasive species control efforts
- Assess EO quality every 10-20 years
- Allow blowdown/windthrow to occur without salvage harvest
- Work with fire specialists to determine if this area is suitable for minimal suppression
- Work with adaptation specialist to determine threats associated with climate change
- Work with local landowners, The Sault Tribe, Hendricks Township, and Mackinac County Road commission to determine how best to balance road and property maintenance issues with ERA quality

## Management Actions

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

The following management actions will be accomplished using GLRI funds:

- Develop signage identifying the ERAs and DEQ Environmental Area, including values provided and importance of preventing invasive species introduction to be placed at public access areas.
- Work with MNFI, CMU and other experts to update EO inventory (M, R)
  - Update natural community element occurrences- Surveys will assess the current condition of high-quality natural communities, delineate their boundaries and detail the vegetative structure and composition, landscape and abiotic context, threats, management needs, and restoration opportunities.
  - survey for secretive marsh birds
  - survey for Wildlife Action Plan (WAP) focal species
- Partner with UP RC&D and the Three Shores CISMA to map and treat priority invasive species using the best methodology for the species; develop Forest Treatment Proposals (FTP) and Pesticide Application Plans (PAP); reed canary grass should be a focus along with invasive non-native phragmites

Additional Management Actions:

- 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)
- Close illegal roads and trails where feasible. Consult with PRD Trails Specialist when roads and access points need to be closed. (M, R)
- Work with Hendricks Township, the Mackinac County Road Commission, the Sault Tribe, Michigan Nature Association, and local landowners to protect rare species within and adjacent to the ERA (M, R); in particular, maintaining a consistent bottom level of road culverts as they are replaced to ensure that hydrology is not impacted to maintain habitat for Michigan Monkey Flower. (M, R)
- Retain intact forest adjacent to the ERAs to reduce the threat of negative hydrologic impacts and to maintain the functions and integrity of the wetland community. The buffer zone extends to highway US-2. (M, R)

- Minimal Impact Suppression Tactic (MIST) practices should be used for wildfire response in this area if possible. (M, R)
- Where recreational use of airboats is a threat to the ERA consider closing the marsh to that activity. (M, R)
- Work with LED to increase patrols for illegal ORV activity and enforce state land use rules. (M, R)
- Update plan with additional knowledge as it becomes available. (M)

Monitoring

Monitoring approaches and indicators appropriate for the natural community and in line with the objectives and management actions suggested, including appropriate frequency and timing considerations. (Unless otherwise specified, monitoring is expected to occur once every 10-year inventory cycle.)

Metric	Current Status	Desired future status	Assessment
Populations of Invasive Species- number and scope of spread by species	Severity unknown (with the exception of non-native Phragmites); treatments should be monitored appropriately; detection monitoring opportunistically or every five years' maximum	Eliminated/fewer occurrences	
Representative and rare species- species occurrences	Baseline EO Records; updated when EO's are updated every 10-20 years or opportunistically; annual CMU monitoring data	No decreases	
Regeneration of tree species appropriate to natural community	Baseline inventory data taken every decade	Native species regenerating as appropriate to natural community	
Presence/Absence of trees >120 years old in Wooded dune and swale complex	Baseline inventory data taken every decade	Increasing in age	

Appendix A- Species found at CMU Monitoring Site 1586,  
Epoufette Bay Wetland #1 (2011, 2012, 2016)

**Amphibian**

American Toad  
Chorus Frog (Western/Boreal)  
Gray Treefrog  
Green Frog  
Northern Leopard Frog  
Spring Peeper

**Bird**

Alder Flycatcher  
American Bittern  
American Crow  
American Goldfinch  
American Redstart  
American Robin  
Bald Eagle  
Belted Kingfisher  
Black-and-white Warbler  
Black-capped Chickadee  
Black-throated Green Warbler  
Blue Jay  
Brown Thrasher  
Canada Goose  
Cedar Waxwing  
Common Grackle  
Common Merganser  
Common Tern  
Common Yellowthroat  
Double-crested Cormorant  
Downy Woodpecker  
Eastern Bluebird  
Eastern Phoebe  
European Starling  
Gray Catbird  
Great Crested Flycatcher  
Hairy Woodpecker  
Herring Gull  
Mallard  
Mute Swan  
Myrtle Warbler  
Nashville Warbler  
Northern Flicker  
Northern Parula  
Pied-billed Grebe  
Red-breasted Nuthatch  
Red-eyed Vireo  
Red-winged Blackbird  
Ring-billed Gull  
Ruby-throated Hummingbird  
Savannah Sparrow

Sedge Wren  
Song Sparrow  
Sora  
Swamp Sparrow  
Unidentified duck  
Unidentified gull  
Unidentified passerine  
Unidentified shorebird  
Veery  
Virginia Rail  
White-throated Sparrow  
Willow Flycatcher  
Wilson's Snipe  
Wood Duck  
Yellow Warbler

### **Fish**

Alewife  
Banded Killifish  
Bluntnose Minnow  
Brook Stickleback  
Brown Bullhead  
Central Mudminnow  
Longnose Gar  
Native Crayfish  
Ninespine Stickleback  
Northern Rock Bass  
Round Goby  
Sand Shiner  
Smallmouth Bass  
Spottail Shiner

### **Invertebrate**

Acari  
Anax  
Belostoma  
Bezzia  
Bithynia  
Bithynia tentaculata  
Caecidotea  
Caenidae  
Caenis  
Chironomidae  
Chironominae  
Coenagrion/Enallagma  
Coenagrionidae  
Collembola  
Corixidae  
Erpobdellidae  
Fossaria  
Gammarus  
Glossiphoniidae  
Gyraulid  
Gyrinus  
Halipus  
Hemerodromia

Hyalella azteca  
Ischnura  
Menetus  
Neoporus  
Oligochaeta  
Orconectes  
Orthoclaadiinae  
Peltodytes  
Physa/Physella  
Pisidium  
Placobdella  
Promenetus  
Pseudosuccinea  
Sigara  
Stenonema  
Tanypodinae  
Tanytarsini  
Trichocorixa

### **Vegetation**

Acer rubrum  
Agalinis purpurea  
Agrostis hyemalis  
Algae  
Anemone canadensis  
Aster laevis  
Aster lateriflorus  
Aster novae-angliae  
Aster sp.  
Aster umbellatus  
Betula papyrifera  
Bromus ciliatus  
Calamagrostis canadensis  
Campanula aparinoides  
Carex aquatilis  
Carex aurea  
Carex buxbaumii  
Carex crawei  
Carex flava  
Carex lasiocarpa  
Carex stricta  
Carex utriculata (C. rostrata)  
Carex viridula  
Castilleja coccinea  
Chara sp.  
Cicuta bulbifera  
Cirsium arvense  
Cirsium muticum  
Cladium mariscoides  
Echinochloa walteri  
Eleocharis acicularis  
Eleocharis elliptica  
Eleocharis quinqueflora (E. pauciflora)  
Eleocharis smallii  
Equisetum arvense  
Equisetum palustre

Equisetum variegatum  
Eupatorium maculatum (Eupatoriadelphus m.)  
Eupatorium perfoliatum  
Euthamia graminifolia (Solidago g.)  
Fragaria virginiana  
Fraxinus americana  
Hypericum kalmianum  
Hypericum majus  
Iris versicolor  
Juncus alpinoarticulatus (J. alpinus)  
Juncus balticus (J. arcticus var. littoralis)  
Juncus canadensis  
Juncus nodosus  
Juncus sp.  
Larix laricina  
Lathyrus palustris  
Lobelia kalmii  
Lycopus americanus  
Lycopus uniflorus  
Lysimachia thyrsoflora  
Mentha arvensis  
Mentha piperita (hybrid)  
Moss  
Najas flexilis  
Panicum lindheimeri  
Panicum sp.  
Parnassia glauca  
Phalaris arundinacea  
Phragmites australis  
Poa sp.  
Polygonum amphibium  
Polygonum hydropiperoides  
Populus balsamifera  
Potamogeton obtusifolius  
Potamogeton pectinatus  
Potamogeton strictifolius  
Potentilla anserina  
Potentilla fruticosa  
Primula mistassinica  
Prunella vulgaris  
Rhynchospora capillacea  
Rubus strigosus  
Rudbeckia fulgida var. speciosa (R. sullivantii)  
Sagittaria cuneata  
Sagittaria graminea  
Sagittaria latifolia  
Salix candida  
Salix eriocephala (S. rigida)  
Salix sp.  
Sarracenia purpurea  
Schoenoplectus tabernaemontani  
Scirpus acutus (Schoenoplectus a.)  
Scirpus americanus (Schoenoplectus pungens)  
Scirpus subterminalis (Schoenoplectus s.)  
Selaginella sp.  
Senecio pauperculus  
Solidago canadensis  
Solidago gigantea

Solidago graminifolia (Euthamia g.)  
Solidago ohioensis  
Solidago rugosa  
Solidago sp.  
Spiraea alba  
Taraxacum officinale  
Thelypteris palustris (T. thelypteroides)  
Thuja occidentalis  
Triadenum fraseri  
Utricularia cornuta  
Veronica anagallis-aquatica