

Munuscong Bay Great Lakes Marsh Ecological Reference Area (ERA) Plan

Administrative Information:

- This plan is for four ERAs that are separate Element Occurrences; Kemp's Point and Munuscong and Little Munuscong Rivers and Pickford Point which are Great Lakes Marsh Natural Communities, Northern Munuscong shrub thicket, and a poor fen natural community at Munuscong River.
- 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 Forest Management Unit, Munuscong Bay MA, Compartment 55 stands 11, 13, 18, 21, 23, 32, 33, 36, 37,43, 44, 46, 48, and 49 YOE 2015, EO ID 11784- 2171.5 acres; EO ID 9877 – 117 acres (Kemp's Point) stand 55, which occur in Chippewa County, Pickford and Soo Townships: Compartment 45 Stand 18, T44N, R01E, S 11-14; T44N R02E S 4-8, 17-18; T45N, R02E, S 32; EO ID 13552- 94 acres (Munuscong River poor fen) T44N, R01E, S 1 and 12; Compartment 52 Stands 11m 6m 15 & 20, T45N, R01E, S 32 (Little Munuscong Northern shrub thicket). All ERAs are a part of the Munuscong Bay State Wildlife Management Area (SWMA).
- 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 MDNR, Barb Avers- MDNR Wetland & Waterfowl specialist, Anne Garwood- MDEQ Coastal Ecologist, Dr. Don Uzarski- Central Michigan University, Nick Cassel- Outreach and CISMA Coordinator, of the Chippewa/Luce/Mackinac Conservation District, and Eric Clark-Biologist, Sault Tribe of Chippewa Indians.
- The two Great Lakes Marsh Element Occurrences(EOs) are 2,288 acres combined, of which the ERA is approximately 1,059 acres. The ERA only includes State administered lands and not adjacent Great Lakes bottomlands. However, the Natural Community EO includes a significant amount of bottomlands and ephemeral islands which, since this a unique condition, should be managed as though they are part of the ERA. The Poor Fen EO is 94 acres in size, and the northern shrub thicket is ~ 41 acres. Along the north and eastern side of the bay, the largest landownership is in State forest land. There are a few large private owner-ships with most of the private ownership being in small tracts which are primarily located along the southern shore of the bay. Michigan Nature Association owns

the 763-acre Shafer Family Nature Sanctuary at Roach Point which is on the south side of Munuscong Bay.

- Infrastructure and facilities adjacent or within the ERAs include a boat launch at Kemp's Point into the St. Mary's River, a boat launch on the Munuscong River, a campground adjacent to the boat launch on the St. Mary's River, four miles of dikes impounding a portion of the Great lakes marsh, a parking and viewing area where visitors can view Munuscong Bay from various heights, and a small parking area where kayaks/canoes can put into the marsh and river along the dike.
- The Munuscong wildlife area is composed of gift land from heirs the Dodge Estate to be used for "Park Purposes". Kemp's point is a more recent North American Wetlands Conservation Act (NAWCA) acquisition.
- Other planning documents related to this ERA include DEQ Environmental Area Management Plans for Environmental Area 04-04b (1981), Kemp's Point EA 04-39, and Roach Point EA 04-36. Michigan DNR Wildlife Action Plan- Great Lakes Marsh & Inland Emergent Wetlands; Wildlife Action Plan- Fens. The Munuscong SWMA Management Plan of 2015 sets management direction for operational planning for the area.
- 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.

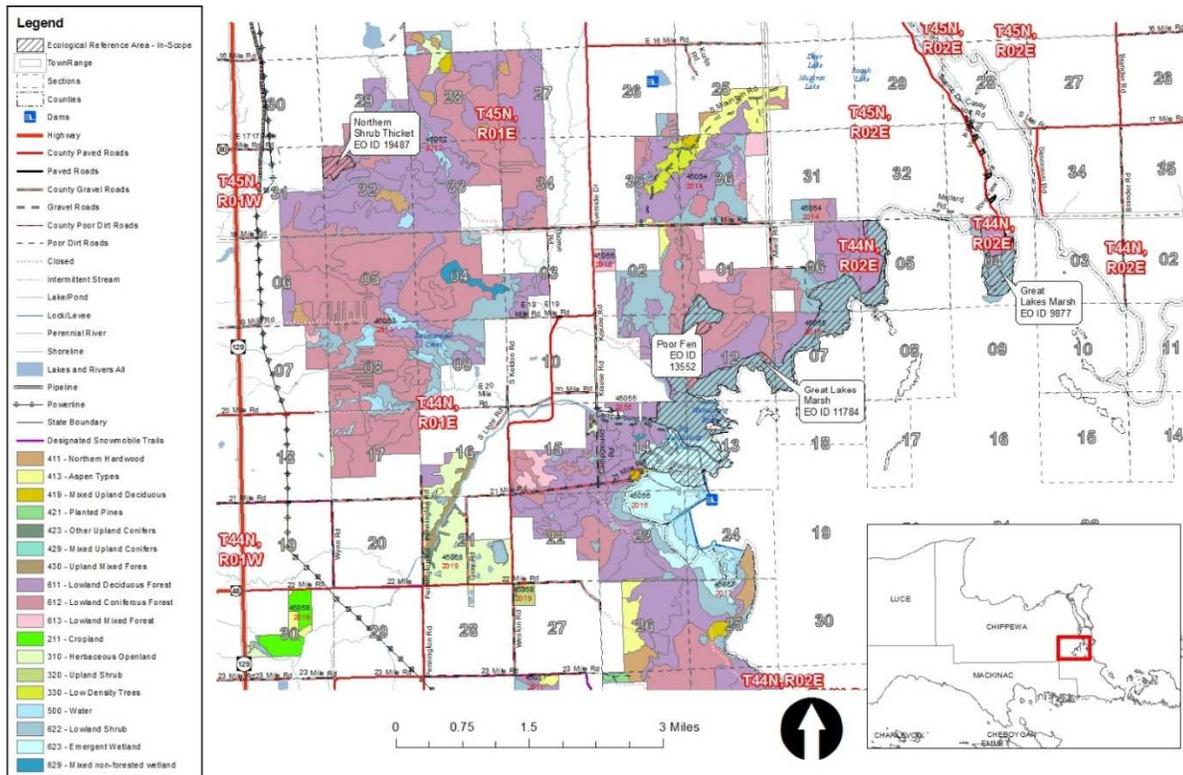


Figure 1. Ecological Reference Areas (ERAs) and State Forest Land in Munuscong Bay

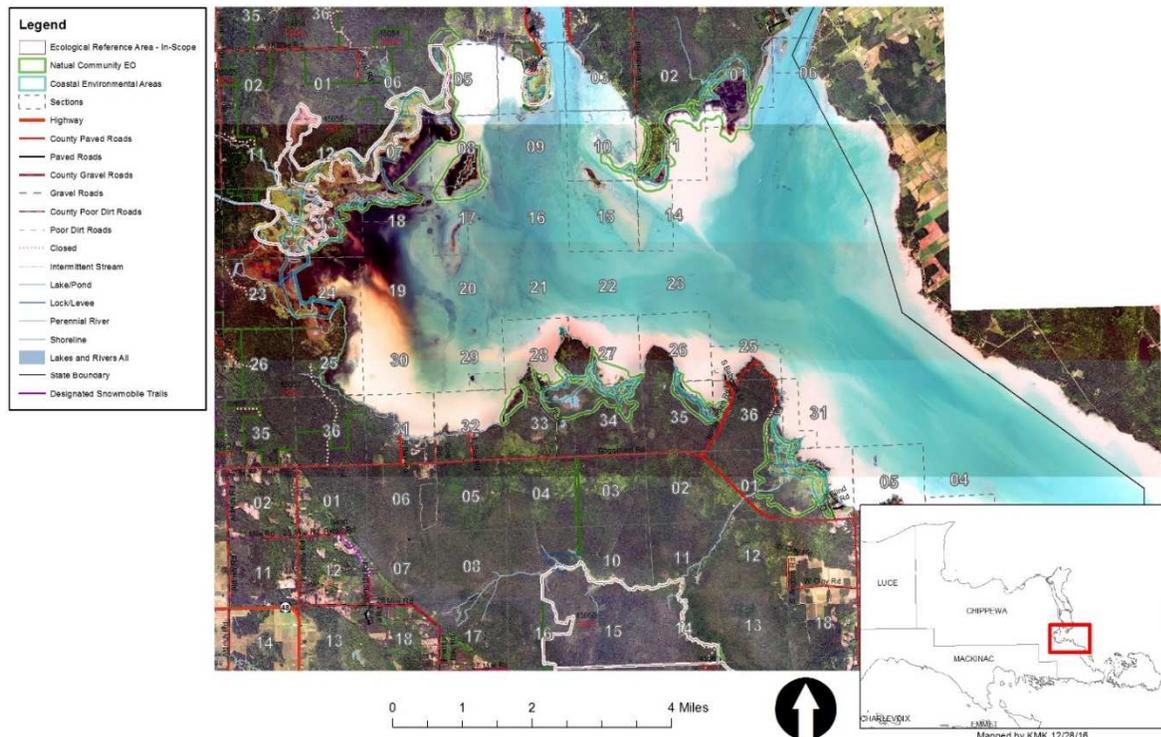


Figure 2. ERAs, Natural Community Element Occurrences, and Coastal Environmental Areas have a high degree of overlap.

Conservation Values

This landscape has many of the characteristic and significant features of northern Great Lakes shores: Great Lakes Marsh, poor fen, Great Lakes Endemic plants, and rare shorebirds and secretive marsh birds.

This ERA complex is a large landscape level example of Great Lakes Marsh. It is recognized for being a high quality rare natural community and for also having a portion that is of fair estimated viability that could benefit from restoration work.

- Great Lakes Marsh communities include the following Element Occurrences:
 1. EO_ID 11784, A rank, Last Observed 2007-07-13
 2. EO_ID 9877, C rank, Last Observed 2005-04-11
- Poor Fen community includes the following Element Occurrence:
 1. EO_ID 13552, A-B rank, Last Observed 2007-8-16
- Northern Shrub Thicket community includes the following Element Occurrence:
 1. EO_ID 19487, B rank, Last Observed 2017-07-23

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 Chippewa County include banded killifish (*Fundulus diaphanous*), brook stickleback (*Culaea inconstans*), johnny darter (*Etheostoma nigrum*), northern pike (*Esox luciosus*), yellow perch (*Persa flavescens*), pumpkinseed (*Lepomis gibbosus*) northern 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*), American bittern (*Botaurus lentiginosus*), 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.



Figure 3- Landscape view of Munuscong Bay (2016 NAIP imagery)

Munuscong River, Little Munuscong River and Pickford Point- EO_ID 11784, A rank, Last Observed 2007-07-13.

This Element occurrence is 2,171 acres in size; the state ERA portion is 957 acres. There is a discrepancy in acreage as the ERA only includes State administered lands and not adjacent Great Lakes bottomlands. However, the Natural Community EO includes significant acres of bottomlands and ephemeral islands which,

since this a unique condition, should be managed as though they are part of the ERA. There is a small amount of private ownership in this EO.

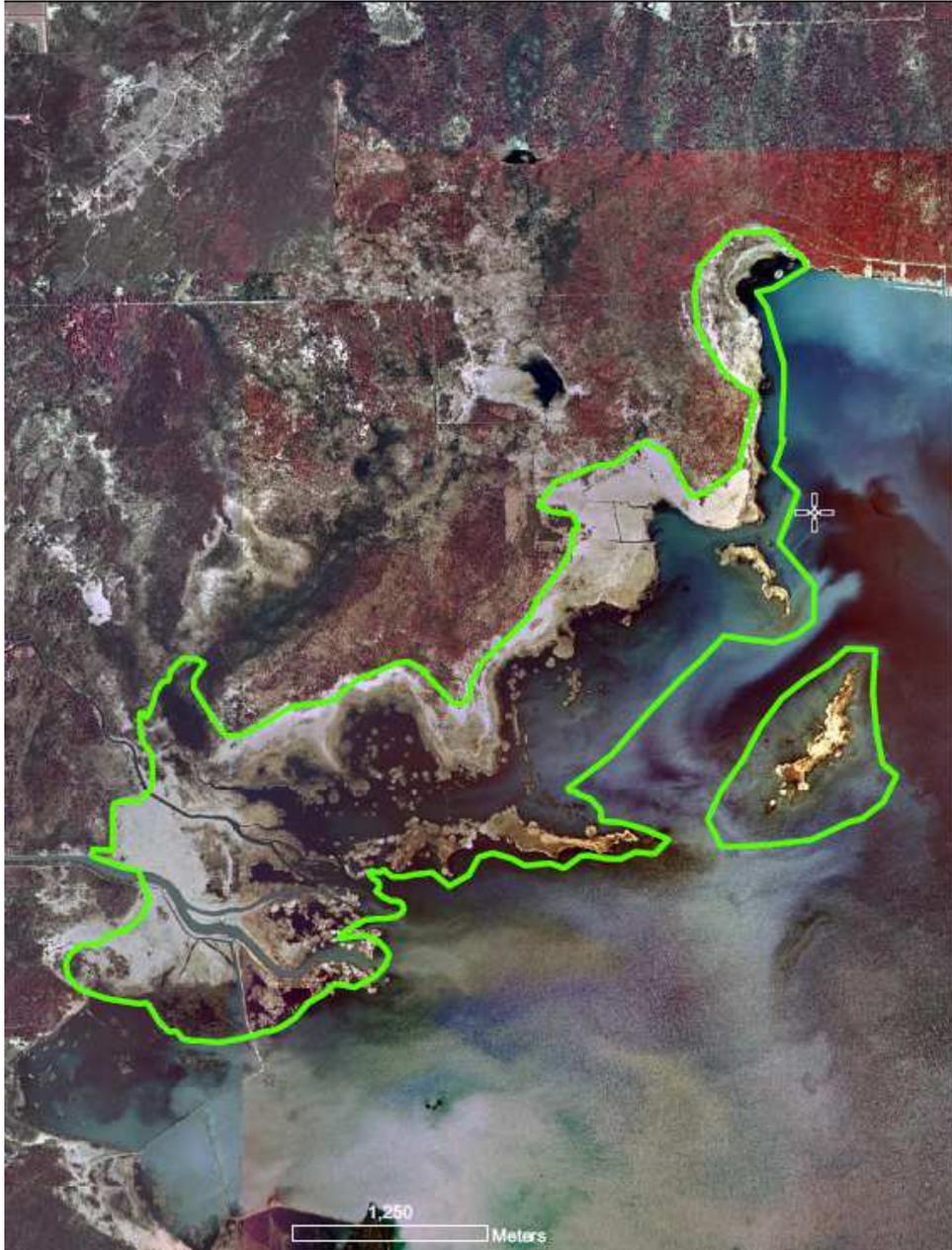


Figure 4. 1998 aerial photograph of the Munuscong and Little Munuscong Rivers and Pickford Point Great Lakes Marsh. (MNFI, Report Number 2009-21)



Figure 5. The extensive Great Lakes marsh associated with Munuscong River and Bay is characterized by complex ecological zonation and high native plant species diversity. Photo by Bradford S. Slaughter.

This ERA is recognized as a rare natural community as well as being a representative example of the Great Lakes Marsh natural community with excellent estimated viability at the time of its last survey in 2007.

This element occurrence represents two adjacent Great Lakes marsh sites that were combined into one: Pickford Point and Munuscong and Little Munuscong Rivers. This extensive complex includes over 2,000 acres of contiguous Great Lakes wetlands in Munuscong Bay with estuary, river mouth, and bay marsh present. The marsh complex occurs on active lakeplain and the underlying soils are predominantly circumneutral to alkaline sandy clays, with organic accumulation increasing with distance from the shore.

The marsh is characterized by complex ecological zonation and high native plant species diversity. The marsh includes broad, well-developed zones of emergent marsh, northern wet meadow, and northern shrub thicket. Northern shrub thicket typically occurs along the inland periphery of the marsh with broad zones of northern wet meadow and emergent marsh along the shoreline. The emergent marsh zone has increased significantly since the previous survey in the mid-1980s due to the lowering of the Great Lakes water levels. The lower lake levels have also resulted in the exposure of large expanses of wet, sparsely vegetated flats. The marsh also includes scattered pockets of submergent marsh, interdunal swales, and treed swamp. Areas of northern shrub thickets are dominated by tag alder (*Alnus rugosa*), sweet gale (*Myrica gale*), and slender willow (*Salix*

petiolaris). Broad zones of northern wet meadow are dominated by tussock sedge (*Carex stricta*) and bluejoint grass (*Calamagrostis canadensis*) with wetter portions dominated by tussock sedge and lake sedge (*Carex lacustris*). Wet, recently exposed flats are dominated by rushes (*Juncus spp.*), spike-rushes (*Eleocharis spp.*), and hardstem bulrush (*Schoenoplectus acutus*). These flat areas are often separated from the wet meadow zone by stands of reed (*Phragmites australis*) and narrow-leaved cat-tail (*Typha angustifolia*). Open pools are scattered throughout the site and support submergent marsh with yellow pond-lily (*Nuphar variegata*), common arrowhead (*Sagittaria latifolia*), pickerel weed (*Pontederia cordata*), and pondweeds (*Potamogeton spp.*).



Figure 6. Great Lakes Marsh associated with Munuscong River. Photo by Bradford S. Slaughter.

This extensive marsh complex provides excellent shorebird habitat. In addition, bald eagle (*Haliaeetus leucocephalus*) and osprey (*Pandion haliaetus*, state threatened) were documented utilizing the wetland.

Plant composition has been altered south of the Munuscong River by diking and pothole creation for waterfowl management. The majority of the marsh is relatively undisturbed with some scattered patches of non-native plants. Fluctuating water levels appear to be the primary disturbance affecting this site. The primary stewardship need is to allow water level fluctuations to drive changes in species composition and structure.

Very little current data exists for this EO. The last field visit to the site was in 1987 and conditions have changed significantly. MNFI is paying a site visit in 2017 and will be updating this record in August, upon which time this plan will be updated to reflect the new information.

Poor fen is a sedge-dominated wetland found on very strongly to strongly acidic, saturated peat that is moderately influenced by groundwater. The community occurs north of the climatic tension zone in kettle depressions and in flat areas or mild depressions on glacial outwash and glacial lakeplain. High-quality poor fens are undisturbed and associated with high quality wetlands and upland communities. Native plant diversity is characteristic of species documented in baseline surveys (Cohen et al. 2008) and MNFI community descriptions and exhibit the full range of vegetative zonation appropriate for the landscape. Invasive species populations are minimal. Hydrology is unimpeded by ditching, diking, or damming, and there should be no evidence of past plowing. The upland area that feeds groundwater into the fen is protected and maintains the quality of groundwater (chemicals, nutrient levels, etc.). Periodic fire disturbance is maintained.



Figure 7. 1998 aerial photograph of Munuscong River poor fen.

Munuscong River Poor Fen- EO_ID 13552, A-B rank, Last Observed 2007-8-16

At 94 acres, this poor fen is the largest in the state. It occurs within a poorly drained sand and clay lakeplain northeast of Munuscong River and northwest and west of Munuscong Bay. The site grades to an extensive high-quality Great Lakes marsh, which occurs to the southwest, south, and southeast. The poor fen is characterized by two primary ecological zones with shrub fen along the margins and twig-rush (*Cladium mariscoides*) flats in the center of the peatland. Groundwater seepage generates weakly minerotrophic conditions, especially along the peatland margin, while the underlying clay pan maintains the high water-table and resulting inundated to saturated peats. Sapric mucks range in depth from 50 to 80 cm and are slightly acidic (pH 6.5) to circumneutral (pH 7.0). Species diversity is increased by fine-scale gradients of soil moisture and soil chemistry generated by sphagnum hummock and hollow microtopography along the peatland margins and along the margins of tree and ericaceous shrub mounds or islands (hummocks being slightly more acidic than hollows). Clay and sandy clay underlie the organic soils, with sandy clay being more prevalent closer to the Great Lakes marsh in the southern portion of the fen.

Stunted and scattered canopy trees range in age from 30 to 73 years and are 2 to 10 cm in DBH and 5 to 15 ft tall. The canopy is dominated by tamarack (*Larix laricina*) with black spruce (*Picea mariana*) and northern white-cedar (*Thuja occidentalis*), with the latter concentrated along the margins in more minerotrophic areas. Tamarack and northern white-cedar are also prevalent in the tall shrub layer and in the low shrub layer, especially along the peatland margins. The shrub and conifer islands and margins of the peatlands support a dense low shrub layer with sweet gale (*Myrica gale*), leatherleaf (*Chamaedaphne calyculata*), bog rosemary (*Andromeda glaucophylla*), and black chokeberry (*Aronia prunifolia*). Treeless areas or twig-rush flats are dominated by twig-rush, wiregrass sedge (*Carex lasiocarpa*), and beak-rushes (*Rhynchospora* spp.) with marsh St. John's-wort (*Triadenum fraseri*), marsh wild timothy (*Muhlenbergia glomerata*), rush aster (*Aster borealis*), long-leaved aster (*A. longifolius*), small cranberry (*Vaccinium oxycoccos*), bog buckbean (*Menyanthes trifoliata*), pitcher-plant (*Sarracenia purpurea*), livid sedge (*Carex livida*), and bog goldenrod (*Solidago uliginosa*). Ground cover in shrub-dominated areas includes wiregrass sedge, bluejoint grass (*Calamagrostis canadensis*), long-leaved aster, marsh St. John's-wort, water horsetail (*Equisetum fluviatile*), marsh fern (*Thelypteris palustris*), bog aster (*Aster nemoralis*), and wild blue flag (*Iris versicolor*). The southern portion of the wetland grades to a northern wet meadow zone of Great Lakes marsh. In addition, the occurrence contains inclusions of some poor conifer swamp islands and northern shrub thicket. Scattered tall shrubs include tag alder (*Alnus rugosa*), winterberry (*Ilex verticillata*), sweet gale, and black chokeberry.



Figure 8. Munuscong Poor Fen. Photo by Joshua G. Cohen

Following the 2007 survey, this site, which was previously classified as a bog, was re-classified as a poor fen.

Northern Shrub Thicket is a shrub-dominated wetland located north of the climatic tension zone, typically occurring along streams, but also adjacent to lakes and beaver floodings. The saturated, nutrient-rich, organic soils are composed of sapric peat or less frequently mineral soil, typically with medium acid to neutral pH. Succession to closed-canopy swamp forest is slowed by fluctuating water tables, beaver flooding, and windthrow. Northern shrub thickets are characterized by an overwhelming dominance of tag alder (*Alnus rugosa*), which forms dense, often monotypic thickets with canopy coverage ranging between 40 and 95% and stand height typically ranging from one to three meters. The community exhibits a high degree of floristic homogeneity due to the dominance of alder. Floristic diversity is usually correlated with the degree of shrub canopy closure, with higher levels of diversity occurring in more open sites. The understory, which is comprised of species from both meadow and forest, is dominated by an array of short shrubs, forbs, grasses, sedges, and ferns.

Little Munuscong Northern Shrub Thicket EO_ID 19487, B Rank, Last Observed 2013-07-23

This EO is 41.46 acres in size and is dominated by dense (70-90% cover) alder (*Alnus rugosa*) with other tall shrubs including wild raisin (*Viburnum cassinoides*) and slender willow (*Salix petiolaris*). Scattered overstory species include balsam fir (*Abies balsamia*), tamarack (*Larix laricina*) and black spruce (*Picea mariana*). The low shrub layer is characterized by raspberry (*Rubus strigosus*), meadowsweet (*Spirea alba*) and alder. Ground cover species include sedges (*Carex* spp.), Goldenrods (*Solidago* spp.), flat-topped aster (*Aster umbellatus*), Joe-pye weed (*Eupatorium maculatum*) and blue-joint grass (*Calamagrostis canadensis*).



Figure 9. Northern shrub thicket is a shrub-dominated wetland located north of the climactic tension zone, frequently occurring along streams, and dominated by tag alder. Photo by Joshua G. Cohen.

The EO occurs in a large land-locked block of state forest land characterized by maturing rich conifer swamp and managed upland forest. This block is relatively unfragmented but is surrounded by private lands that have been managed for agriculture.

High Conservation Value (HCV) Attributes:

The Munuscong 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 some timber management activity. The landscape is characterized by complex ecological patterning, which results in high species and community diversity despite anthropogenic impacts.

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. Rare species in this landscape include yellow rail (*Coturnicops noveboracensis*), lake herring, American bittern, black tern (*Chlidonias niger*), common tern (*Sterna hirundo*), marsh wren (*Cistothorus palustris*), bald eagle (*Haliaeetus leucocephalus*), Osprey (*Pandion haliaetus*), Lapland buttercup (*Ranunculus lapponicus*) and Fairy slipper orchid (*Calypso bulbosa*). The poor fen and northern shrub thicket occurrences contribute to the landscape diversity with their unique flora and fauna.

There are many recreational, cultural, and intrinsic values associated with this landscape. Munuscong Bay receives a significant amount of recreational use from waterfowl hunters, fishing enthusiasts, and bird watchers. One of the earliest waterfowl hunting clubs in the state was established in this area in 1905; this land was donated in 1920 to the state and is the core parcel of the Munuscong SWMA. 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, and is one of Michigan's Wetland Wonders which is a campaign to promote Michigan's premier wetland areas that provide high quality wetland wildlife habitat and recreational opportunities. These coastal wetlands are also part of the extensive Lake Huron Birding Trail.

Other high Conservation Value Areas (HCVAs) within the ERAs include the designated DEQ Environmental Area 04-04b (1981), Kemp's Point EA 04-39, and Roach Point EA 04-36. 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

Four invasive species are of concern in the Munuscong bay at present: European frogbit (*Hydrocharis morsus-ranae*), narrow-leaf cattail (*Typha angustifolia*), invasive phragmites (*Phragmites australis*), and purple loosestrife (*Lythrum salicaria*). European frogbit was initially detected near the mouth of the Munuscong River in 2010, although wasn't reported to the DNR until 2013 at which time surveys for the species occurred. Experimental mechanical removal was conducted in the fall of 2013.

Subsequent surveys indicated that the species spread from the mouth of the river to much of the coastal marsh in the bay. There are ongoing projects to determine treatment methodology and effectiveness for both European frogbit and narrow-leaf cattail with Loyolla University. The Three Lakes CISMA is mapping frogbit in the bay to determine the extent of the occurrence. There is a small patch of European Phragmites that has been treated by the CISMA that will continue to be monitored. Control efforts should be monitored post-treatment, and bi-annually at a minimum thenceforth, as resources allow, for re-emergence of the invasive plant. 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.

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 recreational use of airboats is a potential emerging threat the natural community and nesting birds within Great Lakes marsh ecosystem; use at this site is unknown.

Poor Fen

The site is accessible only by foot which limits potential anthropogenic disturbance. Deer herbivory may limit northern white-cedar regeneration and alter species composition and structure.

Northern Shrub Thicket

Northern shrub thickets in the Upper Peninsula are threatened specifically by invasions of glossy buckthorn (*Ramnus frangula*), fortunately this species is not currently present. Management should strive to prevent the further spread of invasive species and implement control measures when possible. Restoration of degraded northern shrub thicket wetlands depends on the occurrence of water-saturated peat and muck soils, maintaining water levels very near the soil surface throughout the year, providing protection from invasive species, and the availability of appropriate seed stock.

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, poor fen and northern shrub thicket 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.
- 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.
- In Great Lakes Marsh occurrences, the primary stewardship need is to allow water level fluctuations to drive changes in species composition and structure.
- Allow natural processes to operate unhindered where possible.
- Provide public access opportunities to Great Lakes marsh while limiting negative impacts.

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 Areas, including values provided and importance of preventing invasive species introduction to be placed at public access areas

including the Munuscong WMA campground, Kemp's Point Boat launch, and Allard Road access area.

- 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.
 - survey for rare insects within open swales and peatlands.
- Partner with Three Shores CISMA, Loyolla University, MNA, the UP RC&D and other interested partners to survey, map and treat priority invasive species using the best methodology for the species; develop Forest Treatment Proposals (FTP) and Pesticide Application Plans (PAP); European frog-bit, and narrow leaf cattail should be a focus along with invasive non-native phragmites.
- Determine if phragmites at Roach Point is native or non-native; treat non-native in partnership with CISMA and MNA. (M)

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 Pickford, Bruce and Raber Townships, the Sault Tribe of Chippewa Indians, Michigan Nature Association, and local landowners to protect rare species within and adjacent to the ERAs. (M, R)
- Retain intact, mature forest adjacent to the ERAs to reduce the threat of negative hydrologic impacts and to maintain the functions and integrity of the wetland community. (M)
- Avoid any further ditching within Great Lakes marsh. (M)
- 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 where necessary and enforce state land use rules. (M, R)
- Portions of the Great Lakes marsh occurring on private lands could be considered for acquisition or protection through conservation easements, subject to Department priorities and strategies. (M)
- 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	CMU coastal wetland monitoring program information can be found at www.greatlakeswetlands.org
Regeneration of tree species appropriate to natural community	Baseline inventory data taken every decade	Native species regenerating as appropriate to natural community	