Community Conservation Assessment

for

Great Lakes Beachgrass Dune Community

USDA Forest Service Eastern Region
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This document is undergoing peerreview, comments welcome

This Conservation Assessment was prepared to compile the published and unpublished information on the subject taxon or community; or this document was prepared by another organization and provides information to serve as a Conservation Assessment for the Eastern Region of the Forest Service. It does not represent a management decision by the U.S. Forest Service. Though the best scientific information available was used and subject experts were consulted in preparation of this document, it is expected that new information will arise. In the spirit of continuous learning and adaptive management, if you have information that will assist in conserving the subject taxon, please contact the Eastern Region of the Forest Service Threatened and Endangered Species Program at 310 Wisconsin Avenue, Suite 580 Milwaukee, Wisconsin 53203.

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EXECUTIVE SUMMARY

This is a draft conservation assessment providing a summary of readily available information on the community ecology, rare species, distribution and abundance, and potential threats and monitoring needs for the Great Lakes Beachgrass Dune community type (*Ammophila brevigulata* – [*Schizachyrium scoparium*] Herbaceous Vegetation).

The Great Lakes Beachgrass Dune (GLBD) community occurs along the Great Lakes shoreline region of the United States and Canada on stabilized foredunes. Plant communities range from active dunes with little vegetation to communities dominated by grasses, shrubs, and trees. The movement of sand by wind and water is the primary determinant of the successional state of the vegetation.

Wind has been the primary form of natural disturbance within the dunes but lightening ignited wildfire probably also occurred. Both oaks and pines were common on the dunes, indicating fire was a natural disturbance factor.

An important associate of the GLBD community is the coastal wetlands that are often associated with the dunes. Small ponds, often called interdunal swales, are common between the foredune and backdune in these dune systems. The water levels are frequently controlled by the Great Lake level. As a result of the fluxuating water level, the plant and animal communities can shift quite dramatically from year to year.

The status and occurrence of rare plants and animals that are known to occur in this habitat type in Region 9 of the Forest service are presented in Table 1. There are at least 10 Threatened, Endangered or Regional Forester Sensitive (TES) plants and animals that are known to occur in this habitat type including: piping plover *(Charadrius melodus)*; prairie warbler *(Dendroica discolor);* Common tern *(Sterna hirundo),* Caspian tern *(Sterna caspia);* Lake Huron locust *(Trimerotropis huroniana);* Pitcher's thistle *(Cirsium pitcheri)*; Houghton's goldenrod *(Solidago houghtonii)*; Lake Huron tansy *(Tanacetum huronense)*; prairie moonwort *(Botrychium campestre)*; and fascicled broom-rape *(Orobanche fasciculate)*. In addition to the above, the dune cutworm *(Euxoa aurulenta)* is a State of Michigan Special Concern species of the GLBD community. An executive summary of the individual Conservation Assessments, for each of the six Region 9 Sensitive Species found in this community, are presented in Appendix B-F. The entire individual Conservation Assessments for these 6 species may be found at the Forest Service's Region 9 TES website; www.fs.fed.us/r9/wildlife/tes.

The Great Lakes Beachgrass Dune community occurs in the United States and Canada. It likely occurs only on two National Forests, both in Michigan: Hiawatha and Huron-Manistee.

The primary threats to the Great Lakes Beachgrass Dune community type include: exotic plants and animals such as spotted knapweed (*Centuaurea maculosa*), Baby's breath (*Gypsophila paniculata*), scots pine (*Pinus sylvestris*), white poplar (*Populus alba*) and

zebra mussels among others; off-road vehicles (ORVs); pedestrian recreational overuse; residential development; and, sand mining and other industrial development.

Primary management activities to protect this community type have been: the development of specific regulations in Michigan, placing areas in public land management and constructing boardwalks where pedestrian traffic warrants. Research and monitoring needs include: development of a community map; monitoring of exotic plants and effectiveness of exotic plant management effort; evaluation of the long-term effectiveness of sand dune regulations on dune processes; and monitoring of endangered and threatened species populations associated with open dunes and wetlands.

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COMMUNITY CLASSIFICATION AND SYNONYMS

Scientific Name:	*Ammophila brevigulata* – (*Schizachyrium scoparium*) Herbaceous Vegetation
Translated Scientific Name:	American Beachgrass – (Little Bluestem) Herbaceous Vegetation
Common Name:	Great Lakes Beachgrass Dune.
Synonyms:	Great Lakes open dune, lake dune
Similar communities:	sand/gravel beach, wooded dune and swale complex, interdunal swale, Great Lakes barrens

DESCRIPTION OF COMMUNITY

Community Ecology/Environmental Conditions

The GLBD community occurs along the Great Lakes shoreline region of the United States and Canada on stabilized foredunes (Nature Serve, September 20, 2001). Plant communities range from active dunes with little vegetation to communities dominated by grasses, shrubs, and trees. The movement of sand by wind and water is the primary determinant of the successional state of the vegetation. In areas where sand is being deposited, American beachgrass (*Ammophila breviligulata)*, or in the eastern part of the range, *A. champlainensis* dominates. In areas of active erosion, blowouts and dune fields are dominated by dune grass (*Calamovilfa longifolia*). In stabilized areas, little bluestem

(*Schizachyrium scoparium*) dominates. On the most stable areas, especially around northern Lakes Michigan and Huron, low evergreen shrubs such as bearberry (*Arcostaphylos uva-ursi*) and juniper occur on the dune crests and along the savanna edge. In other areas, deciduous shrubs such as sand cherry (*Prunus pumila)*; heartleaf willow *(Salix cordata)*; broadleaf willow *(Salix myricoides*) dominate. These two shrubby phases are separated from the open grassland type but could be treated as successional phases of this type (Nature Serve, September 20, 2001).

The Great Lakes dunes are relatively young. The Great Lakes were occupied by ice until approximately 16,000 years ago. The dune sands are derived from glacial sediments including lacustrine and outwash sands and sandy tills (Dorr and Eschman, 1970). Most of the larger dune complexes are associated with the Nipissing stage of the Great Lakes. At that time the water levels were 25 to 30 feet higher than present day lake levels (Dorr and Eschman, 1970). The higher lake levels resulted in higher rates of erosion and dune formation. There are also numerous dune features associated with the glacial Lake Algonquin (12,000 years ago) water level but most of these dunes are completely forested and not considered part of the GLBD community (Michigan Natural Features Inventory, 1999).

The combined forces of water erosion and wind deposition resulted in the formation of the Great Lakes beachgrass dunes (Michigan Natural Features Inventory, 1999). Glacial sediment eroded by streams and by waves along sand bluffs provided the source of the sand. Near-shore currents moved the sediments along the shoreline and then waves deposited them along the shoreline. Strong winds (generally the prevailing winds) then carried the sands inland, creating dunes (Michigan Natural Features Inventory, 1999).

Open dunes include a variety of dune types including: foredunes, parallel dunes, perched dunes, blowouts, parabolic dunes, and barrier dunes. Foredune ridges are the first dunes to become established along a shore. They are parallel to the shore and relatively low (less than 30 feet above their base (Buckler, 1979). Parallel dunes are a series of dune and swale features along major Great Lakes embayments. The foredune of parallel dunes is generally the GLBD community type (Comer and Albert, 1991).

Perched dunes are wind-blown sand dunes perched on top of glacial moraines. Some of Michigan's most famous dunes are perched dunes, including Sleeping Bear Dunes National Lakeshore (Lake Michigan) and the Grand Sable Banks (Lake Superior) (Michigan Natural Features Inventory, 1999). Perched dunes have foredune, blowout, backdune forest, and interdunal wetlands; and share many common and rare plant and animal species with the other dune types. Dunewort (*Botrychium campestre*) and clustered broom rape (*Orobanche fasciculata*), both rare, western disjuncts are particularly common on perched dunes (Albert, 2000).

Blowouts are areas of open, destabilized dune. Parabolic dunes typically form when stable, forested dunes are destabilized. Parabolic dunes are U-shaped with the bottom part of the U inland. They are common along the eastern shore of Lake Michigan and

often occur as a series of overlapping dune ridges (Michigan Natural Features Inventory, 1999).

An important associate of the GLBD community is the coastal wetlands that are often associated with the dunes. Small elongate ponds, often called interdunal swales, are common between the foredune and backdune in these dune systems (Figure 1). The water levels are frequently controlled by the Great Lake level. As a result of the fluxuating water level, the plant and animal communities can shift quite dramatically from year to year. Federally threatened Houghton's goldenrod (*Solidago houghtonii*) is a rare species that grows primarily along the moist margins of the northern coastal Great Lakes wetlands (Albert, 2000).

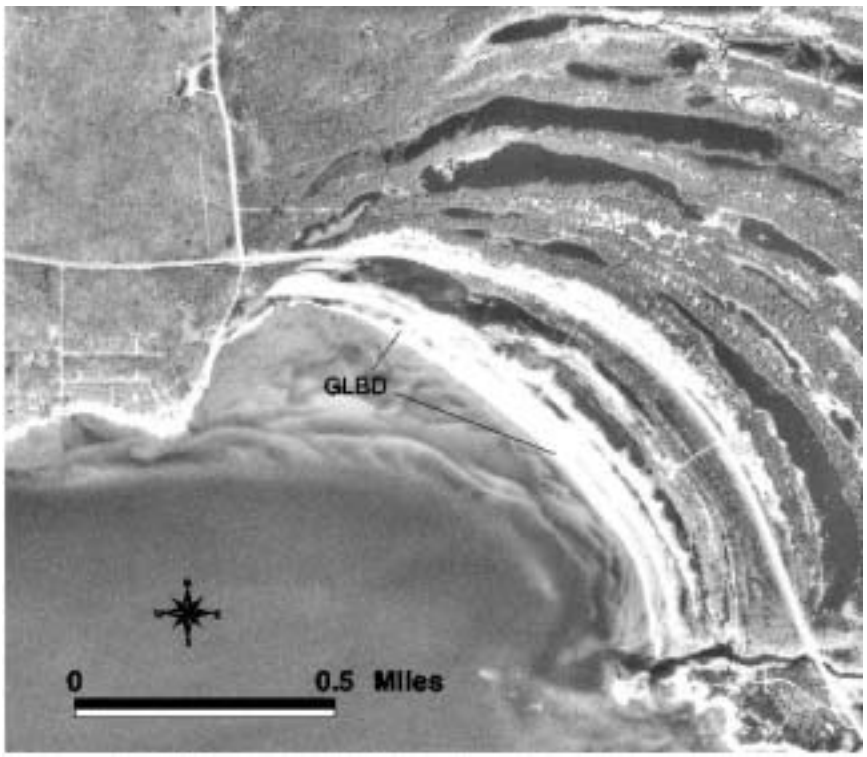


Figure 1. 1992 air photo of the GLBD community at Pt. Aux Chenes showing ponded water behind the fore dune. Note that the US-2 corridor runs between the open fore dune and the wooded dune and swale complex to the northeast.

American beach grass (*Ammophila breviligulata*) is a tough, coarse grass that grows to about knee height. It spreads by rhizomes which travel in a line parallel to the surface and send up new shoots called tillers about every foot. Beachgrass tillers form a barrier that slows down wind, especially at and just above the surface where most sand movement occurs. In this way, beach grass acts as a windbreak. It also thrives under burial by sand. When sand buries it, it grow up through the sand and starts new rhizomes. The layers of rhizomes and fine roots form a network that holds sand in place, allowing dunes to grow and stabilize (Bonanno and White, 1993).

Wind has been the primary form of natural disturbance within the dunes but lightening ignited wildfire probably also occurred. Both oaks and pines were common on the dunes, indicating fire was a natural disturbance factor (Comer et. al. 1995). Dynamic tension exists at the forest edge where trees invade dune fields, often creating wind-stressed savanna, typically oak-pine in the south, pine-conifer in the north. When lake levels go down and beach and dune area increases lake ward, wind speed and sand abrasion

decrease in the savanna edge, permitting forest development (Nature Serve, September 20, 2001).

In June 2001 a point count survey of all breeding birds was conducted at the Pt aux Chenes GLBD community (appendix H) giving an indication of the variety of breeding birds occupying this community type.

Pre-European Settlement: Community Distribution and Conditions

No comprehensive, range wide study has been found which describes the community distribution and conditions prior to European settlement. The nature of the GLBD community has led to much of the community type being developed into residential or recreational areas.

Regional Forester Sensitive Species Assessment Table

A complete table of all the TES species that occur in this type in each Forest of Region 9 is found in Table 1. Some of these species occur in other community types in addition to GLBD.

Draft recovery plans are available for the piping plover, Pitcher's thistle, and Houghton's goldenrod. Critical habitat for the piping plover has been identified by the US Fish and Wildlife Service for GLBD communities at Nordhouse Dunes near Manistee and Point Aux Chenes near St. Ignace. Conservation assessments prepared by the USDA Forest Service are available for the prairie warbler, common tern, Caspian tern, Lake Huron locust, Lake Huron tansy, and prairie moonwort and the executive summaries are provided with this assessment (Appendix B-F).

Table 1: Federal and State of Michigan Endangered and Threatened, and Regional Forester Sensitive Species of the Great Lakes Beachgrass Dune Community

Scientific Name	Common Name	Federal Rank	State of Mi Rank	ME	MT	SH	HO	WN	MO	AL	FL	GM	WM	HM	HI	OT	CN	SU	CP
Charadrius melodus	Piping plover	E	Endangered											EX	E			EX	M
Dendroica discolor	Prairie warbler	R9	Endangered		+	+	+	+	+					R	R				
Sterna hirundo	Common tern	R9	Threatened												R				R
Sterna caspia	Caspian tern	R9	Threatened												R				R
Trimerotropis huroniana	Lake Huron locust	R9	Threatened											R	R				
Cirsium pitcheri	Pitcher's thistle	T	Threatened											T	T				
Solidago houghtonii	Houghton's goldenrod	T	Threatened												T				
Tanacetum huronense	Lake Huron tansy	R9	Threatened												R				
Botrychium campestre	Prairie moonwort	R9	Threatened												R				
Orobanche fasciculata	Fascicled broomrape	R9	Threatened											R					

E= Federally endangered, species present within proclamation boundary and offered protection under Endangered Species Act (ESA)
T= Federally threatened, species present within proclamation boundary and offered protection under ESA
R9= designated as Regional Forester Sensitive within Region 9
R= species is designated as Regional Forester Sensitive on this Forest
+= species is present within proclamation boundaries but not designated as Regional Forester Sensitive
EX= species is extirpated from the forest
M= species uses forest habitat during migration and offered protection under ESA
(ME=Medewin NF; MT=Mark Twain NF; SH= Shawnee NF; HO= Hoosier NF; WN= Wayne NF; MO=Monongahela NF; AL= Allegany NF; FL= Finger Lakes NF; GM= Green Mountain NF; WM= White Mountain NF; HM= Huron-Manistee NF; HI= Hiawatha NF; OT= Ottawa NF; CN= Chequamegon-Nicolet NF; SU= Superior NF; CP= Chippewa NF

Current Community Condition, Distribution, and Abundance (rangewide/ regionwide)

Open dune occurs along the shorelines of many large inland lakes, oceans, and seas. The dunes that occur along the Laurentian Great Lakes are distinguished from other coastal dunes by a distinctive Great Lakes flora and fauna, although some plant species are shared with dunes of the Pacific Northwest (Michigan Natural Features Inventory, 1999).

This community occurs along the Great Lakes shores of the United States and Canada (Figure 2) on stabilized fore dunes, ranging from Wisconsin to Ontario and New York in the Great Lakes, and in isolated occurrences along the shores of Lake Champlain, Vermont (Nature Serve, September 20, 2001). The Chippewa National Forest lists Caspian and common terns as Region 9 sensitive species but the GLBD community type is not documented for Minnesota.

Figure 2. Potential range of GLBD community (Copyright © 2001 NatureServe)

Little comprehensive, range wide information is available. The following tables and appendix A provide a summary:

State	State Rank	Extent of dunes	Number of occurrences	Federal Ownership of open dune	Comments
Michigan/1	S5 (demonstrably secure)	275,000 acres (all dune types, including forested)	40 (all dune types)	Pictured Rocks NL, Sleeping Bear Dunes NL, Hiawatha NF, Huron-Manistee NF	GLBD community is a subset of the 275,000 ac total dune community
Indiana/2	None	25 miles	Unknown	Indiana Dunes NL	
Wisconsin/3	S2 (imperiled)	Unknown	8	Apostle Islands NL	
New York/4	S1S2 (critically imperiled/imperiled)	16.5 miles/ 728 acres **/7**		None	41% publicly owned (3 state wildlife areas, 1 state park)
Illinois/5	None	3235 acres (includes areas not open dune)			Fort Sheridan, Fed. Ownership is on a bluff (probably no open dune)
Vermont/6	S1 (critically imperiled)	Handful of sites	Unknown	None	

/1 Michigan Natural Features Inventory, 1999
/2 U.S. Park Service, website, 2001
/3 Merryfield et. al., 2000
/4 White, 1992
/5 Suloway, 1996
/6 Sorenson, 2001
/7 Conrad, Nicholas. Letter dated November 20, 2001. Occurrences of Great Lakes Dunes in New York State, NY Natural Heritage Program.

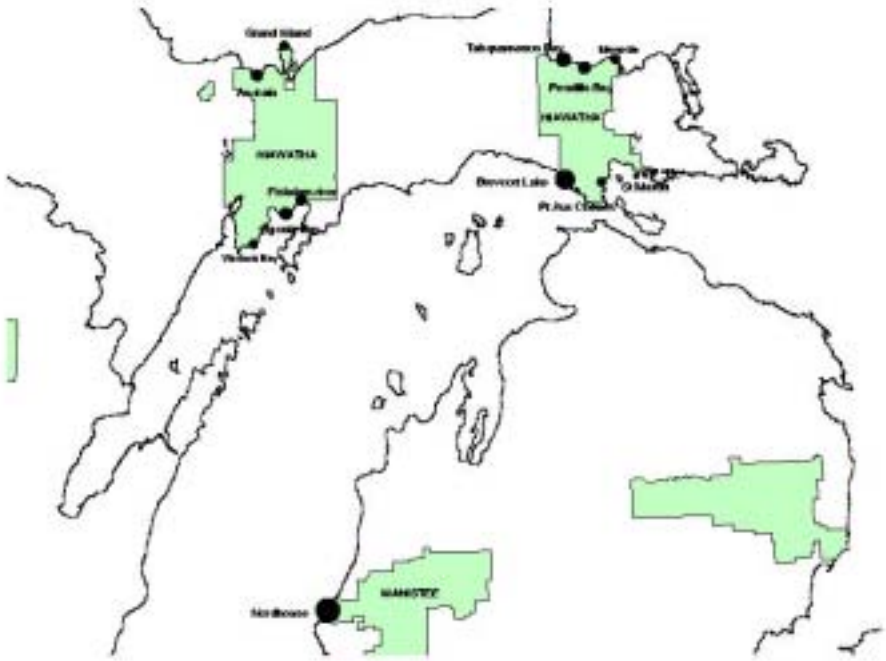
Great Lakes Beachgrass Dune community type occurs on two National Forests, both in Michigan: Hiawatha and Huron-Manistee.

Forest	Site Name/1	Type of Dune/1	Special Management
Huron-Manistee	Nordhouse Dunes	parabolic	Portion is Wilderness Area (including portion as Research Natural Area)/portion is Lake Michigan Recreation Area
Hiawatha	St. Martin Bay	Dune and swale complex*	Candidate research natural area
Hiawatha	Horseshoe Bay	Dune and swale complex*	Research natural area
Hiawatha	Pointe Aux Chenes	Parabolic dunes/ dune and swale complex*	Candidate research natural area
Hiawatha	Brevoort Lake	Dune and swale complex*	Developed campground
Hiawatha	Fishdam River	Dune and swale complex*	
Hiawatha	Ogontz Bay	Dune and swale complex*	
Hiawatha	Wedens Bay	Dune and swale complex*	
Hiawatha	Monocle Lake	Perched dune/dune and swale complex*	
Hiawatha	Pendills Bay	Dune and swale complex*	
Hiawatha	Tahquamenon Bay	Dune and swale complex*	
Hiawatha	Grand Island	Dune and swale complex*	National Recreation Area
Hiawatha	Au Train Bay	Dune and swale complex*	Michigan State Roadside Park

*The foredune of these dune and swale systems **may** contain the Great Lakes Beachgrass Dune community type. No surveys have yet taken place to determine presence or absence.
/1 Source: Albert, 2000.

The general location of the potential dune systems on Forest Service land is displayed (Figure 3). As noted in the above table, many of these sites are known to be wooded dune and swale systems that may or may not contain GLBD community. If they do contain GLBD community, the area may be very small. For example, on the east unit of the Hiawatha it is possible that only Pt. Aux Chenes contains GLBD community. The other east unit dune systems may be wooded or roaded, and lack fore dune development or the characteristic flora and fauna that define the GLBD community. Additional community survey and mapping is needed to delineate the extent of the GLBD community.

Figure 3; National Forest locations with potential GLBG community occurrence (as listed in the Table above)



POPULATION BIOLOGY AND VIABILITY

Not applicable. Individual conservation assessments for species that occur in this community have a section on population biology and viability. (See References section.)

POTENTIAL THREATS AND MONITORING

Present or Threatened Risks to Habitat or Range

The primary threats to the Great Lakes Beachgrass Dune community type include: exotic plants and animals; off-road vehicles (ORVs); pedestrian recreational overuse; residential development; and, sand mining and other industrial development (Albert, 2000). A review of the individual conservation assessments for species which occur in this community indicate that the primary threats for these species and their habitat include; habitat loss primarily through development, human disturbance (ORVs, recreation, dogs, etc) and exotic species introduction (Table 2).

Table 2; Summary of threats to individual species gleaned from the individual species Conservation assessments (see appendix A-F).

Threats/Species	Prairie warbler	Common tern	Caspian tern	L.H. locust	L.H. Tansy	Prairie moonwort	Fascicled broomrape	Houghton's goldenrod	Pitcher's thistle	Piping plover
Habitat loss (breeding)	√		√	√	√		√	√	√	√
Habitat loss (winter)	√									
Competition (ring-billed gulls)		√	√	√						
Contaminants		√	√							√
Sand movement		√	√						√	
Vegetation Succession		√				√			√	√
Predation	√	√	√							√
Human disturbance (ORV's, Dogs, recreation) and exotics		√	√	√	√	√	√	√	√	√
Lake level changes				√	√			√		
Small population size			√							√

Commercial, Recreational, Scientific, or Educational Over-utilization

Recreation and development impacts have the potential to significantly impact the GLBD community.

The effects of ORVs and heavy pedestrian use have been documented for the dune systems (Albert, 2000). Examination of aerial photos taken over a fifty year period have been used to show the effects of off-road vehicles at Sleeping Bear Dunes and Pictured Rocks National Lakeshores, Michigan. The Great Sleeping Bear Dune lost over half its height from heavy vehicle use (Albert, 2000). The amount of unvegetated sand has increased dramatically at the Grand Sable Dunes (Pictured Rocks National Lakeshore) as a result of vehicle and pedestrian use (Albert, 2000).

Human impacts beyond direct compaction, erosion, and vegetation removal also occur with increased human use. Garbage and debris are frequently left behind by recreational GLBD community users. This can impact wildlife directly (entangling shorebirds) or indirectly (increasing predation). Dogs, gulls, and raccoons in particular are attracted to litter left by humans.

Residential development is another threat to the dune systems. Although state and local authorities may be in place to restrict residential development, existing development and violations of existing ordinances (Albert, 2000) have an impact. Driveways provide corridors for exotic species to invade. The establishment of lawns seeks to stabilize the shifting sands. Habitat for threatened, endemic species is destroyed or degraded by the alteration of the habitat or the introduction of exotic species (Albert, 2000).

Disease, Predation and Exotic Species

Exotic plants and animals have the potential to change the communities of the open dunes and change the ecological processes that maintain the dunes. Some widespread exotic plant species that are invading dune systems include spotted knapweed and baby's breath. These plants colonize on the open sand and begin stabilizing it which reduces the habitat for native species such as Pitcher's thistle (*Cirsium pitcheri*) which requires open, moving sand for its establishment (Albert, 2000). Other common herbaceous invaders include bouncing bet (*Sapornaria officinalis*), bladder campion (*Silene vulgare*), Canada bluegrass (*Poa compressa*), and smooth brome grass (*Bromus inermus*). Other exotic plants have been planted by humans over the years with the express intent of stabilizing the shifting sands. Species that have been used for this purpose include: Scots pine, black (Austrian) pine, Lombardy poplar (*Populus nigra var. italica*), and white poplar (Albert, 2000).

So far, there are fewer exotic animals than plants that are adversely affecting the dune systems (Albert, 2000). Zebra mussels have invaded the sandy shorelines. In Great Lakes bays, the zebra mussel has reportedly caused chemical changes resulting in increased levels of blue-green algae. The effects on the sand beach have not been determined yet but the large number of shells likely alters some aspects of the dune ecosystem (Albert, 2000). There are also indications that an exotic beetle which has been introduced to control an exotic species of thistle may also feed on federally-threatened Pitcher's thistle (Albert, 2000).

Competition is also a factor in population dynamics of the GLBD community. For example, in the Great Lakes Region, the major threat to common tern is nest-site competition from expanding ring-billed gull populations (NatureServe 2001). Increasing populations of ring-billed gulls (*Larus delawarensis*) in the Great Lakes region and early arrival of gulls at breeding sites results in a loss of common tern colony sites. Competition becomes increasingly important as gradual habitat loss reduces the availability of suitable habitat for all the listed species found in this community.

Inadequacy of Existing Regulatory Mechanisms

Other Natural or Human Factors Affecting Continued Existence of Species

SUMMARY OF LAND OWNERSHIP AND EXISTING COMMUNITY PROTECTION

There is no comprehensive reference that summarizes landownership and existing community protection across all Great Lakes Beach grass Dune sites.

SUMMARY OF EXISTING MANAGEMENT ACTIVITIES

The density of development in many dune areas has been very high, resulting in a loss of many ecological values (Albert, 2000). Current regulations provide some protection for the dunes in some areas; and have resulted in a reduction of the further degradation of sand dunes in Michigan (Albert, 2000).

Placing land under the management of federal agencies (U.S. Park Service, U.S. Forest Service), state agencies (state parks in all six states) and non-profit organizations is likely a reflection of the fragility of these systems and recognition of their uniqueness and value. Most of these agencies and organizations provide public access or recreational opportunities so although these areas may be protected from commercial or residential development many of the areas are being impacted by human use.

Extreme pedestrian use has led to the development of boardwalks at some of the most heavily used public dune systems. Boardwalks have successfully reduced recreational erosion at several Michigan parks, including Hoffmaster and Warren Dunes State Parks (Albert, 2000).

There are 13 known Great lakes beaches on Forest Service land with potential for GLBD community. Of these 13 parcels, seven have some type of special management. The special management includes; designated wilderness area, Lake Michigan Recreation Area, Research Natural Area, Candidate Natural Research area, developed campground/US-2 corridor, National Recreation Area and Michigan State Roadside Park. In addition, all Forest Service lands are covered under a Forest Plan for the individual Forest. Due to the wide variation in special management area emphasis and Forest Plans goals, there are no existing community-wide goals, standards or guidelines. In general, documents that guide special management areas and Forest Planning do not address the specific ecological needs of the GLBD community.

PAST AND CURRENT CONSERVATION ACTIVITIES

In Michigan, the Michigan DNR identified sand dune areas within the state that are subject to development restrictions (Atlas of Critical Dunes, 1989). The Sand Dune Protection and Management Act (Part 353 of Act 451) regulates most commercial and residential development in dunes. It was enacted to protect dunes from indiscriminate development (Albert, 2000). The Act protects 70,000 acres of the Dune community along the shorelines of Lakes Michigan and Superior and likely includes portions of the GLBD community discussed in this assessment. Unless a special exception is granted, the Act prohibits: any use on a slope excess of 1:3; any structure on a slope between 1:3 and 1:4 unless

accompanied by a professional site plan which provides for the disposal of storm water without erosion or sedimentation; removal of vegetation that will increase erosion or decrease stability; and a use not in the public interest.

RESEARCH AND MONITORING

Existing Surveys, Monitoring and Research

No comprehensive, range wide survey has been conducted. A suggested survey form is attached (appendix I) which could be used to survey potential sites for GLBD community. The two states (MI, WI) with the most extensive shoreline of GLBD have identified areas with this community type (Albert, 2000; Merryfield et. al. 2000).

Little monitoring information was found for the Great Lakes Beachgrass Dune community type. There is undoubtedly some research and monitoring occurring for some of the individual species' of concern. Multiple agencies across Michigan intensively monitor and protect the 30 known pairs of Great Lakes population of piping plovers each year. Volunteers and paid personnel patrol plover beaches and erect temporary beach closure fences to exclude dogs and people from the vicinity of known nests. The State of Michigan, through its development of the Atlas of Critical Dunes (1989), has valuable, carefully mapped dune information that may be useful in monitoring change in land area and land use of this community type.

Survey Protocol

No survey protocol has been developed for the Great Lakes Beachgrass Dune community type. For TES species, individual species' conservation assessments or recovery plans provide survey protocol (when known).

Research Priorities

There is a need to conduct a range-wide community mapping effort to map the location and global extent of the GLBD community.

The Michigan Natural Feature Inventory (1999) has identified the following research needs:

- Monitoring exotic plants, and the effectiveness of exotic plant management efforts.
- Evaluating the long-term effectiveness of sand dune regulations on the dune processes.
- Monitoring of endangered and threatened species populations associated with open dunes and wetlands.

REFERENCES

Albert, Dennis A. 2000. Borne of the Wind: An Introduction to the Ecology of Michigan Sand Dunes. Michigan Natural Features Inventory. 63 pp.

Bonanno, S.E. and D.G. White. 1993. Our Lake Ontario Sand Dunes: An Overview of Their Flora. New York Sea Grant, SUNY College, Oswego, NY. 4pp.

Buckler, W.R. 1979. Dune type inventory and barrier dune classification study of Michigan's Lake Michigan shore. Report of Investigation 23. Mitch DNR-Geological Survey Division. 32.pp.

Chadde, S. and G. Kudray. 2001. Draft Conservation Assessment for *Botrychium campestre* (prairie or Iowa moonwort). Prepared for Ottawa National Forest, USDA Forest Service. Ironwood, MI. 44pp.

Comer, P.J. and D. A. Albert. 1991. A survey of wooded dune and swale complexes in the northern lower and eastern upper peninsulas of Michigan. A report by Michigan Natural Features Inventory to Mich. DNR- Coastal Management Program. 99 pp.

Comer, P.J., D.A. Albert, H.A. Wells, B. L. Hart, J.B. Raab, D.L. Price, D.M. Kashian, R.A. Corner, and D.W. Schuen. 1995. Michigan's resettlement vegetation, as interpreted from the General Land Office Surveys 1816-1856. Michigan Natural Features Inventory, Lansing, MI. Report and digital map.

Conrad, Nicholas. Letter dated November 20, 2001. Occurrences of Great Lakes Dunes in New York State, NY Natural Heritage Program.

Cuthrell, D.L. 1999. Special animal abstract for *Euxoa aurulenta* (dune cutworm). Michigan Natural Features Inventory, Lansing, MI. 2pp.

Dorr, J.A. and D.F. Eschmann. 1970. Geology of Michigan. Univ. of Mich. Press, Ann Arbor, MI. 476 pp.

Ekstrum, J.K. 2001. Draft Conservation Assessment for *Sterna hirundo* (Common tern). Prepared for Hiawatha National Forest, USDA Forest Service. Escanaba, MI. 22pp.

Ekstrum, J.K. 2001b. Draft Conservation Assessment for *Sterna caspia*(Caspian tern). Prepared for Hiawatha National Forest, USDA Forest Service. Escanaba, MI. 22pp.

Hiawatha National Forest, USDA Forest Service, Eastern Region. October 2001. Draft Conservation Assessment for *Tanacetum huronense* Nutt. (Lake Huron Tansy) 16pp.

Higman, P.J. and M.R. Penskar. 1996. Special plant abstract for *Orobanche fasciculata* (fascicled broom-rape). Michigan Natural Features Inventory, Lansing, MI 2pp.

Merryfield, N., E. Epstein, A. Galvin, E. Judziewicz and W. Smith. 2000. A Data Compilation and Assessment of Coastal Wetlands of Wisconsin's Great Lakes. Natural Heritage Inventory Program, Bureau of Endangered Resources, Wisconsin Department of Natural Resources. Madison, Wisconsin. PUBL-ER-002 00. 139pp.

Michigan DNR. 1989. Atlas of Critical Dunes. Land and Water Management Div. 72 pp.

Michigan Natural Features Inventory. 1999. Natural community abstract for open dunes. Lansing, MI. 5 pp. Compiler: D.A. Albert.

NatureServe Explorer: An online encyclopedia of life [web application]. 2001. Version 1.5. Arlington, Virginia, USA: Association for Biodiversity Information. Available: http://ww.natureserve.org/. (Accessed: Feb 15, 2002).

Pavlovic, N.B., M. Bowles, S.R. Crispin, T.C. Gibson, K.D. Herman, R.T. Kavetsky, A.K. McEachern, M.R. Penskar. 1991. Technical/Agency Draft Recovery Plan for Pitcher's Thistle, *Cirsium pitcheri*. Prepared for Region 3, US Fish and Wildlife Service. Fort Snelling, MN. 111pp.

Penskar, M.R. 1989. Technical Draft Recovery Plan for Houghton's Goldenrod (*Solidago houghtonii*). Michigan Natural Features Inventory, Natural Resource Heritage Program, Wildlife Division, Department of Natural Resources. Lansing, MI. 64pp.

Schlangen, Jamelle. Letter dated November 30, 2001. Element occurrences for Great Lakes Dunes in Wisconsin from Bureau of Endangered Resources, State of Wisconsin DNR.

Sjogren, M.L. 2001. Draft Conservation Assessment for *Trimerotropis huroniana* (Lake Huron locust). Prepared for Hiawatha National Forest, USDA Forest Service. Escanaba, MI. 10pp.

Sorenson, Eric. 2001. Personal communication. Community Ecologist, Vermont Fish and Wildlife Department.

Southwell, D.K. 2001. Conservation Assessment for *Dendroica discolor* (Prairie Warbler). Prepared for Hiawatha National Forest, USDA Forest Service. Escanaba, MI. 17pp.

Suloway, L., M. Joselyn, and P.W. Brown. 1996. Critical Trends Assessment Phase II. Inventory of Resource Rich Areas in Illinois: An Evaluation of Ecological Resources. Center for Wildlife Ecology, Illinois Natural History Survey, Illinois Department of Natural Resources.

Wemmer L.C. and F.J. Cuthbert. 2001. Draft Revised Recovery Plan for the Piping Plover *Charadrius melodus* Great Lakes Population. Prepared for Region 3, US Fish and Wildlife Service. Fort Snelling, MN. 108pp.

White, D.G. 1992. Our Lake Ontario Sand Dunes: An Overview. New York Sea Grant, SUNY College, Oswego, NY. 3 pp.

LIST OF CONTACTS

Information Requests

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Jan Schultz, Plant Ecologist, Hiawatha National Forest, USFS
Steve Sjogren, Wildlife Biologist, Hiawatha National Forest, USFS
Eric Sorenson, Community Ecologist, Vermont Fish and Wildlife Department

Review Request

APPENDIX A - OCCURRENCES OF GLBD COMMUNITY BY COUNTY, STATE, AND YEAR

State	County of Occurrence (number of occurrences)	Number of Occurrences and Year
Michigan	Not provided as of 2/26/02	
Indiana	Not provided as of 2/26/02	
Wisconsin/1	Ashland (4) Bayfield (1) Door (6) Douglas (1) Kenosha (1) Manitowoc (1) Sheboygan (1)	1996/1996/1987/1980 1996 2001/2001/2001/1998/1998/1988 1996 1991 1987 2001
New York/2	Clinton (1) Erie (2) Jefferson (3) Oswego (3)	1998 1991/1999 1991/1993/1995 1991/1996
Illinois	Not provided as of 2/26/02	
Vermont	Not provided as of 2/26/02	

1/ Schlangen, Jamelle. Letter dated November 30, 2001. Element occurrences for Great Lakes Dunes in Wisconsin from Bureau of Endangered Resources, State of Wisconsin DNR.
2/ Conrad, Nicholas. Letter dated November 20, 2001. Occurrences of Great Lakes Dunes in New York State, NY Natural Heritage Program.

APPENDIX B – COMMON TERN CONSERVATION ASSESSMENT

Prepared by: Janet Kudell-Ekstrum 10/01

COMMOM TERN

Executive Summary

This is a draft Conservation Assessment providing a summary of readily available information on the distribution, ecology, habitat, and population biology of common tern (*Sterna hirundo*) in the Great Lake States. This document was compiled to assist in writing of the Conservation Assessment for the Beach Dune Community.

In the early 1900s, common terns were almost extirpated by plume hunters (Evers 1997, NYSDEC 1998). Protective legislation under the Migratory Bird Treaty of 1916 allowed this species to make a comeback in the 1920s and 1930s (NYSDEC 1998, Hyde 1997).

Declining populations were again seen in the mid-1980s in Michigan, the cause was attributed to declining quality of their nesting habitat (Hyde 1997). There has been a steady decline of common terns in local areas. On Leech Lake, from 1,000 pairs to 250 pairs down to 60 pairs, there is a decline of 2-4% of the total population every year (Mortensen, pers. comm. 2001). Niemi et al. 1998 In Russ 1999 estimates an 8 percent decline per year in the Lake States based on data from the eastern U.S. The common tern has been listed as a "rare and declining" species in the Lake States by the US Fish and Wildlife Service in their Region 3 Fish and Wildlife Resource Conservation Priorities January 1999 (Russ, 1999).

A combination of natural and human-related factors is impacting the common tern populations. Regularly fluctuating water levels of the Great Lakes, erosion, and succession of vegetation reduce or eliminate suitable nesting sites (Hyde 1997, Evers 1997). Competition (especially from ring-billed gulls *Larus delawarensis* and herring gulls *Larus argentatus*) for nest sites and predation are significant limiting factors (Hyde, 1997). In Minnesota the decline is mainly predator caused and the older birds that are successful breeders are beginning to die off (Mortensen, pers. comm. 2001). In the state of New York, many colonies are being forced to breed in salt water marsh habitats as a result of the increased human use of beaches and competition with herring and great black-backed gulls (NYSDEC 1998).

In the Great Lakes Region, the major threat to common tern of nest-site competition is from expanding and increasing ring-billed gull populations (NatureServe 2001, van Frankenhuyzen In McPeek & Adams 1994, Maxson et al 1996). Other threats in the Great Lakes Region include flooding and rising water levels (NatureServe 2001), predation by other bird or animals, and possibly biocide contamination (Buckley and Buckley 1984 In NatureServe 2001). The common tern is susceptible (especially females just prior to egg laying) to poisoning from dinoflagellate toxin accumulated in fishes (Nisbet 1983 In NatureServe 2001). There are some threats due to contaminants (Spendelow, pers. comm. 2001). Erosion of sand from rock beaches or rocky islands also is a threat to loss of nesting habitat for the common tern (Mortensen, pers. comm. 2001, Evers 1997). Soil deposition is connecting nest islands to shores in some areas allowing

predators to access nest areas (Russ 1999). Fishing territories are subject to increasing human development and activities. A suspected reduction in water quality may be affecting fish production (Russ 1999). Nesting terns have reduced nesting success from prolonged inclement weather and human displacement (WIDNR 2000). Currently dependent on nesting habitat in the Great Lakes, the common tern is regularly affected by fluctuating water levels, which sometimes vary several feet (Evers 1997). Vegetation succession reduces the number of potential nesting sites (Evers 1997).

The common tern needs to be studied on a regional scale and immigration/emigration of colonies needs to be addressed as being part of the population dynamics of this species (Spendelow, pers. comm. 2001).

The complete text of this CA is available at;

http://www.fs.fed.us/r9/wildlife/tes/ca-overview/docs/

APPENDIX C – CASPIAN TERN CONSERVATION ASSESSMENT

Prepared by:

Janet Kudell-Ekstrum
10/01

CASPIAN TERN

Executive Summary

This is a draft conservation assessment providing a summary of readily available information on the distribution, ecology, habitat, and population biology of Caspian tern in the Great Lake States. This document was compiled to assist in writing of the Conservation Assessment for the Beach Dune Community.

The Great Lakes Region harbors approximately one third of the North American continent's population of Caspian terns. Historically the Caspian tern was restricted to Northern Lake Michigan (Evers 1992). Populations had fluctuated naturally until the invasion of the alewife in the mid-1950s, allowing this species to increase due to increased food availability (Evers 1992). The Caspian tern population has nearly tripled since 1963, greatest on Lake Ontario (Cuthbert and Wires 1999). This increase in population of Caspian terns continued into the early 1990s (Evers 1992). The North American Breeding Bird Survey shows a significant increasing trend for this species in the survey-wide and United States region (Sauer et al. 2000). Despite increasing numbers in the Great Lakes, the Caspian tern has special status in Michigan (threatened), and Wisconsin (Endangered) (Cuthbert and Wires 1999) due to the low number of nesting sites and human-related pressures (Evers 1997).

Colony instability, poor reproduction, and the low number of nesting pairs have contributed to its endangered status in Wisconsin (WIDNR 1999). Chemical contaminants (especially PCBs) (Ludwig and Kurita 1988 In Ludwig 1991), human disturbance at colony sites, competition with ring-billed gulls, and predation by Great-horned owls and other predators may be the cause of declining nesting success and colony abandonment (WIDNR 1999). Gulls and Cormorants exert heavy competition for nesting space especially during periods of high water (Ludwig 1991). A correlation was found between PCB consumption from Caspian terns feeding on contaminated fish to rising rates of chick deformities and depressed hatching rates (Ludwig 1991). The mean fledge rate of 1.46 chicks per nest in 1962-1967 period plummeted to 0.61 in the 1986-1989 period (Ludwig et al 1990 In Ludwig 1991). Disturbance and development of nesting habitat have also been listed as major threats (NatureServe 2001). The primary factor limiting populations appears to be availability of high-quality nest sites protected from storms and free of mammalian and avian predators (Penland 1976, Shugart et al. 1978, Cuthbert 1981 In Cuthbert and Wires 1999).

Individual colonies characterized by lower-than-expected size or productivity should be carefully monitored to determine factors affecting the observed changes (Evers 1997). Clear conclusions about effects of toxic chemicals on reproduction and survival are needed (Cuthbert and Wires 1999). Other human-related impacts, such as mercury contamination of eggs (Vermeer 1973 In

Evers 1997) and adult mortality in nylon monofilament fishline (Dunstan 1969 In Evers 1997) should be monitored. Little information exists on migration especially stopover sites and habitats used, and threats to and the biology of all populations of the Caspian tern during winter remain largely unknown (Cuthbert and Wires 1999). More information is needed on population dynamics, especially factors that favor population expansion and increase. No information is available on the genetic structure of the North American population. More detail is needed on the plumage descriptions of young birds and on the molt cycle of North American birds. Additional topics that need to be researched include fossil history, control and physiology of migration, metabolism and temperature regulation, nutrition and energetics, nest microclimate, intraspecific brood parasitism, and home range (Cuthbert and Wires 1999).

The complete text of this CA is available at;

http://www.fs.fed.us/r9/wildlife/tes/ca-overview/docs/

APPENDIX D – PRAIRIE WARBLER CONSERVATION ASSESSMENT

Prepared by:

Darci Southwell
7/01

PRAIRIE WARBLER

Executive Summary

This is a draft Conservation Assessment providing a summary of readily available information on the distribution, ecology, habitat, and population biology of the prairie warbler (*Dendroica discolor*) in the Great Lakes Region.

This species is a neo-tropical migrant whose population appears to be stable globally, though the breeding populations in the Midwest are on an apparent decline. The North American Breeding Bird Survey (BBS) found, that between 1966 and 1993, there was a significant population decline of 44%, with the Midwest states (Iowa, Illinois, Indiana, Michigan, Minnesota, Missouri, Ohio, and Wisconsin) decreasing 1.4% each year. During this time, it was noted that 62% (47 of 76) of the routes used by the BBS were experiencing negative trends (NatureServe 2001).

The greatest threat to the prairie warbler results from habitat loss. This species depends upon early-succession shrub habitat, a habitat that is declining in abundance due to forest succession, fire suppression, and other changing land use patterns. Critical shrubby dunelands are also being lost to development, as is habitat within the prairie warbler's winter range in the Caribbean. Nest parasitism by the brown-headed cowbird and nest predation by snakes, chipmunks, and jays are also major threats to the prairie warbler as they decrease nest success.

There are several research needs for the prairie warbler: 1) determine the length of time the early-successional stage of habitat is suitable; 2) determine response to different burning or cutting regimes; 3) determine other habitat requirements; 4) determine proportion of males breeding in a population (for accurate breeding abundance estimates); and 5) further study on winter range habitat requirements and population trends.

The complete text of this CA is available at;

http://www.fs.fed.us/r9/wildlife/tes/ca-overview/docs/

APPENDIX E – LAKE HURON LOCUST CONSERVATION ASSESSMENT

Prepared by:

Martha Sjogren
11/01

LAKE HURON LOCUST

Executive Summary

The following is a draft conservation assessment providing a summary of readily available information regarding the distribution, ecology, and population biology of the Lake Huron locust (*Trimerotropis huroniana*). Where relevant information exists and was found, special attention was placed on issues pertinent to the conservation of this species in Region 9 of the USDA Forest Service.

The Lake Huron locust is listed by the USDA Forest Service as a Regional Forester Sensitive Species. It is known to occur in two states within Region 9 and is listed as threatened in Michigan and endangered in Wisconsin. Additional survey work in Wisconsin, Michigan, and Ontario, Canada is necessary to complete the distribution data for this endemic species.

The Lake Huron locust is a small, grasshopper like insect. Coloration is generally silvery to ash-gray with darker brown and white markings. In Michigan and Wisconsin its habitat is restricted to sparsely vegetated, high quality coastal dunes. Where the open dunes grade into heavily vegetated or disturbed areas, their numbers quickly decline.

The major threat to the Lake Huron locust is habitat loss. Its habitat and community type lends itself to development or recreation use. The precise level of disturbance which can be tolerated has not been determined. In some areas, large locust populations seem to be tolerating some human disturbance. In other areas where there is less extensive habitat or more dune-altering human disturbance, populations have been reduced or eliminated. Disturbance may also be related to the replacement of the Lake Huron locust by a similar grasshopper, *Spharagemon collare*, which appears to tolerate a higher level of disturbance.

There are many research needs for this species which has only been studied on a limited basis. Research needs include: surveys to verify the current ranges of the Lake Huron locust, the seaside locust (*T. maritima*), and *S. collare*; examination of the ecological relationships between these species; research on the life history and ecology of the Lake Huron locust to develop a stronger base for management and conservation efforts; determination of the microhabitat requirements of the species over the course of its lifespan; information about normal movement and dispersal patterns to better understand the species' recolonization capabilities; and long-term monitoring of populations including a range of geographic sites and human disturbance in order to make management recommendations.

The complete text of this CA is available at;
http://www.fs.fed.us/r9/wildlife/tes/ca-overview/docs/

APPENDIX F – LAKE HURON TANSY CONSERVATION ASSESSMENT

Prepared by:

Patty Beyer
10/01

LAKE HURON TANSY

Executive Summary

Tanacetum huronense is a flowering plant broadly dispersed from Maine and the Maritimes, through the Great Lakes region and much of Canada, to Alaska.

Lake Huron tansy is listed as Threatened in the State of Michigan with a G4G5 ranking (secure globally, though it may be quite local in parts of its range). Assigning a meaningful global ranking for this species has always been difficult since there is considerable disagreement as to what constitutes *T. huronense* and what are related species. *Tanacetum huronense* is also found in Maine with an S2 ranking (very rare), Wisconsin (historically in Door county) with an S1 ranking (extremely rare), Alaska, and much of Canada.

Primary threats to the survival of Lake Huron tansy include the disturbance or destruction of natural habitat via residential development, damming of rivers, and construction of marinas. Recreational threats on public lands include foot traffic, all terrain vehicles (ATVs), along with collection of flower heads for dried arrangements.

The complete text of this CA is available at;

http://www.fs.fed.us/r9/wildlife/tes/ca-overview/docs/

APPENDIX G – PRAIRIE MOONWORT CONSERVATION ASSESSMENT

PRAIRIE MOONWORT

CONSERVATION ASSESSMENT
Botrychium campestre
(Iowa Moonwort)
Prepared by Steve Chadde & Greg Kudray
For USDA Forest Service, Region 9
Requisition no. 43-54A7-0-0036 / Project no. Ottawa-00-06

I. EXECUTIVE SUMMARY
Botrychium campestre is a small moonwort that was first described as a unique species in 1986. The species ranges across the northern Great Plains, from Iowa and Minnesota on the east, to Alberta and Montana on the west. Populations are also known from Michigan and Wisconsin (mostly near Lakes Michigan and Superior) and in Ontario (near Lake Superior). *B. campestre* habitat is typically sandy prairies, railroad right-of-ways, grassy roadsides, sand dunes near the Great Lakes, and disturbed areas such as tailings piles or old fields. The largest threat to the species may be natural succession toward shaded, forest environments. In addition, populations on sandy sites near Great Lakes shorelines may be threatened by recreational. Much of the plant's life-cycle occurs underground; populations of aboveground sporophytes fluctuate from year-to-year, and individual plants may not appear every year. Like other moonworts, *B. campestre* is dependent on a mycorrhizal relationship and species conservation efforts should consider this relationship. Since the species is small and populations fluctuate, continued inventory efforts are necessary to better refine population demographics, species range, and habitat preferences.

The complete text of this CA is available at;

http://www.fs.fed.us/r9/wildlife/tes/ca-overview/docs/B_campestre_CA.pdf

APPENDIX H – BREEDING BIRDS AT POINT AUX CHENES IN JUNE 2001

Alder Flycatcher	Killdeer
American Crow	Lesser Yellowlegs
American Goldfinch	Loggerhead (Northern?) Shrike*
American Redstart	Mallard
Bald Eagle	Merlin*
Baltimore Oriole	Mourning Dove
Bank Swallow	Mute Swan
Belted Kingfisher	Northern Flicker
Black-throated Green Warbler	Northern Mockingbird
Blue-winged Teal	Osprey
Brown Thrasher	Pileated Woodpecker
Broad-winged Hawk*	Red-breasted Merganser
Canada Goose	Red-winged Blackbird
Caspian Tern	Ring-billed Gull
Cedar Waxwing	Ruby-throated Hummingbird
Chipping Sparrow	Sandhill Crane
Common Loon	Savannah Sparrow
Common Merganser	Semipalmated Plover
Common Raven	Semipalmated (Least?) Sandpiper*
Common Tern	Sharp-shinned Hawk*
Common Yellowthroat	Snow Goose*
Cooper's Hawk*	Song Sparrow
Double-crested Cormorant	Spotted Sandpiper
Dunlin*	Swamp Sparrow
Eastern Kingbird	Tree Swallow
Gadwall*	Turkey Vulture
Great Blue Heron	Vesper's Sparrow
Gray Catbird	Whimbrel (Long-billed Curlew?)*
Greater Yellowlegs	White Pelican
Herring Gull	White-throated Sparrow
Horned Lark	Yellow-rumped Warbler
	Yellow Warbler

*These species questionable in identification. Species in parentheses only other possibility

APPENDIX I – SURVEY FORM FOR ASSESSING POTENTIAL GLBD COMMUNITIES

Location_____Date_____

County_____Surveyor(s)_____

Approximate size of area surveyed (in acres)_____

Dominant Habitat Type (See attached aerial photo for type and extent)

☐ Sand/gravel beach ☐ Interdunal swale ☐ Open dunes (type?)

☐ Wooded dune/swale complex ☐ Great Lakes barrens

Dominant Vegetation

☐ American beachgrass (*Ammophila breviligulata* or *A. champlainensis*) ☐ Little bluestem (*Schizachyrium scoparium*)

☐ Dune grass (*Calamovilfa longifolia*) ☐ Other (describe)

TES species for Hiawatha and Huron-Manistee National Forests (check if present)

___Caspian Tern (*Sterna caspia*)
___Common Tern (*Sterna hirundo*)
___Prairie Warbler (*Dendroica discolor*)
___Lake Huron Locust (*Trimerotropis huroniana*)
___Prairie Moonwort or Dunewort (*Botrychium campestre*)
___Clustered (or fascicled) broomrape (*Orobanche fasciculata*)
___Dune Cutworm (*Euxoa aurulenta*)
___Pitcher's Thistle (*Cirsium pitcheri*)
___Houghton's goldenrod (*Solidago houghtonii*)
___Lake Huron Tansy (*Tanacetum huronense*)

Exotic Species (check if present)

___Spotted knapweed (*Centauria maculosa*)
___Baby's breath (*Gypsophila sp.*)
___Bouncing bet or Soapwort (*Saponaria officinalis*)
___Bladder campion (*Silene vulgaris* or *S. cucubalus*)
___Canada bluegrass (*Poa compressa*)
___Zebra mussel shells (*Dreissena polymorpha*)
___Smooth bromegrass (*Bromus inermis*)
___Other (name) _____
_____
_____

Any management or protection in place:

Additional comments about area surveyed: