

10. Isle Royale

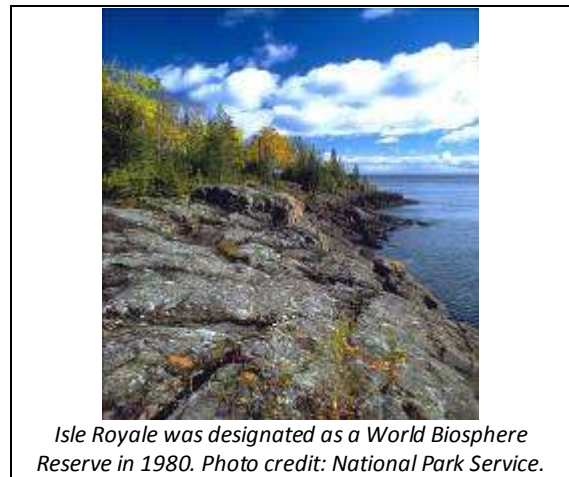
HEALTHY WATERS REPORT CARD

OFFSHORE	NA	ISLANDS	A
NEARSHORE	B	COASTAL WETLANDS	A-
EMBAYMENTS & INSHORE	B	COASTAL TERRESTRIAL	A+
TRIBUTARIES & WATERSHEDS	A	OVERALL A	

Report card denotes general condition/health of each biodiversity target in the region based on condition/stress indices. See introduction to the regional summaries.



A Very Good	<i>Ecologically desirable status; requires little intervention for maintenance</i>
B Good	<i>Within acceptable range of variation; may require some intervention for maintenance.</i>
C Fair	<i>Outside of the range of acceptable variation and requires management. If unchecked, the biodiversity target may be vulnerable to serious degradation.</i>
D Poor	<i>Allowing the biodiversity target to remain in this condition for an extended period will make restoration or preventing extirpation practically impossible.</i>
Unknown	<i>Insufficient information.</i>



Isle Royale was designated as a World Biosphere Reserve in 1980. Photo credit: National Park Service.

Summary/ Description

Isle Royale is located in the northwestern part of Lake Superior, the closest mainland is approximately 14 miles (22.5 kilometres) away (NPS 2013c). The island of Isle Royale is a national park, along with the more than 450 smaller islands located around it (NPS 2013c). This regional unit is 950.37 km² in size, including the associated nearshore waters. The Isle Royale regional unit is part of the territory ceded in the Treaty of 1842. The signatory tribes retain rights to hunt, fish, and gather within the regional unit (A. McCammon Soltis, pers. comm., January 5 2015). The waters of Isle Royale are said to contain the most productive native fishery in Lake Superior, as well as the most genetically diverse Lake Trout populations in the entire lake (NPS 2013c). Recently, evidence of the “redfin” Lake Trout morph has been found in the Isle Royale waters (Muir et al 2014). Only about half of the mammal species found on the mainland are found in the park, and for some of these species long-term research has been studying ecological interactions (NPS 2013c, UNESCO 2005). A number of other research projects are carried out in the park, due to its remote and relatively undisturbed ecosystem; research topics include vegetation studies and acid rain (UNESCO 2005). Several western disjunct plant species are found in the Isle Royale regional unit (NPS 2013c). The Isle Royale regional unit is composed solely of islands and island complexes. There are no tertiary (HUC 8) or quaternary (HUC 10) watersheds identified for this regional unit. The watersheds are completely forested, and are some of the most intact in the Lake Superior basin. The coasts are dominated by exposed rocky shores and cliffs. Wetlands are common within the coastal area.

TABLE 10.1: Isle Royale BY THE NUMBERS

Land and Water Cover	Region (km²)	Region %	Lake Superior Total (km²)	Notes
Agriculture	0.0	0.0	1,441.07	
Developed	0.08	0.01	389.55	
Forest	492.38	46.41	107,747.13	
Associated Nearshore Waters	488.78	46.07	17,868.03	
Other	27.74	2.61	8,227.57	
Water (inland)	52.04	4.90	9,473.05	
Total Area	1,061.02	100	145,146.40	
Coastal Features	Region	Region %	% of Lake Superior Total for Coastal Feature	
Coastline (km)	477.98	NA	8.20	Based on SOLEC shoreline
Sand Beaches (km)	0.00	0.00	0.00*	*% of Lake Superior Total Sand Beaches
Coastal Wetlands (km ²)	105.02	28.92*	9.52 **	*% of Regional Coastal Area ** % of Lake Superior Total Coastal Wetlands
Natural Cover in Coastal Zone	324.68	89.42*	5.26**	*% of Regional Coastal Area ** % of Lake Superior Total Natural Cover in Coastal Area
Number of Islands	433	NA	16.3	
Condition	Region	Region %	% of Lake Superior Total	
Population Density (persons/km ²)	0.00	NA		
Road Density (km/km ²)	0	NA		
Number of Dams and Barriers	0	NA	0	
Artificial Shoreline (km)	0.89	0.19	0.39	
Land Ownership & Protection	Region (km²)	Region %	Regional Area (km²)	
Private	0.14	0.02	572.24	Regional area based on landmass
Public/Crown		0.00	572.24	
Tribes/ First Nations		0.00	572.24	
Parks & Protected Areas (total)	572.11	99.98	572.24	
Parks & Protected Areas (coast)	362.94	99.96*	363.08**	*% of Regional Coastal Area **Regional Coastal Area (km ²)

Important Biodiversity Features

Nearshore and Inshore Waters

- Important habitat for both Lake Whitefish and Lake Trout is found in many areas of Isle Royale (Lake Superior Binational Program Habitat Committee 2006) (Figure 10.1).
- The fisheries around Isle Royale may contain unique morphotypes of Lake Trout (NPS 2013a). Recent work by Muir et al. (2014) has demonstrated quantitative evidence of a Lake Trout morph, the “redfin”, in the waters off Isle Royale.

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- Sampling of the nearshore and inshore fish community over approximately 300 kilometres of Isle Royale shoreline in and around major embayments resulted in 17 fish species sampled. Twelve of these species were common in the Lake Superior fish community (Gorman et al. 2008).

Coastal Zone and Islands

- The coastal zone of Isle Royal is one of the most intact in the entire Great Lakes
- The entire Isle Royale regional unit is identified as an Important Habitat Area by the Lake Superior Binational Program Habitat Committee (2006). Several Important Habitat Sites are also located on the island (Table 10.3, Figure 10.3).
- Isle Royale National Park is noted as a State Important Bird Area (National Audubon Society 2013, 2012).
- The islands of Isle Royale National Park are home to 18 species of mammal, in comparison to the 40 or more mammal species found on the mainland (NPS 2013c). The isolation of the island makes colonisation by new species more difficult and some species which were previously present (e.g. caribou and coyote) are no longer part of the Isle Royale ecosystem (NPS 2013c).
- The shoreline of Isle Royale is described as heavily forested (NPS 2013c).

Tributaries and Watersheds

- Several of the streams support coaster Brook Trout
- As with the coastal areas, the watersheds of the island are some of the last undisturbed watersheds in the Great Lakes. Many types of wetlands are supported on Isle Royale (NPS 2013c).
- Some inland lakes support high abundances of clams, while other inland lakes contain no clams at all (NPS 2013c).

Figure 10.1: Isle Royale - Coastal and Watershed Features

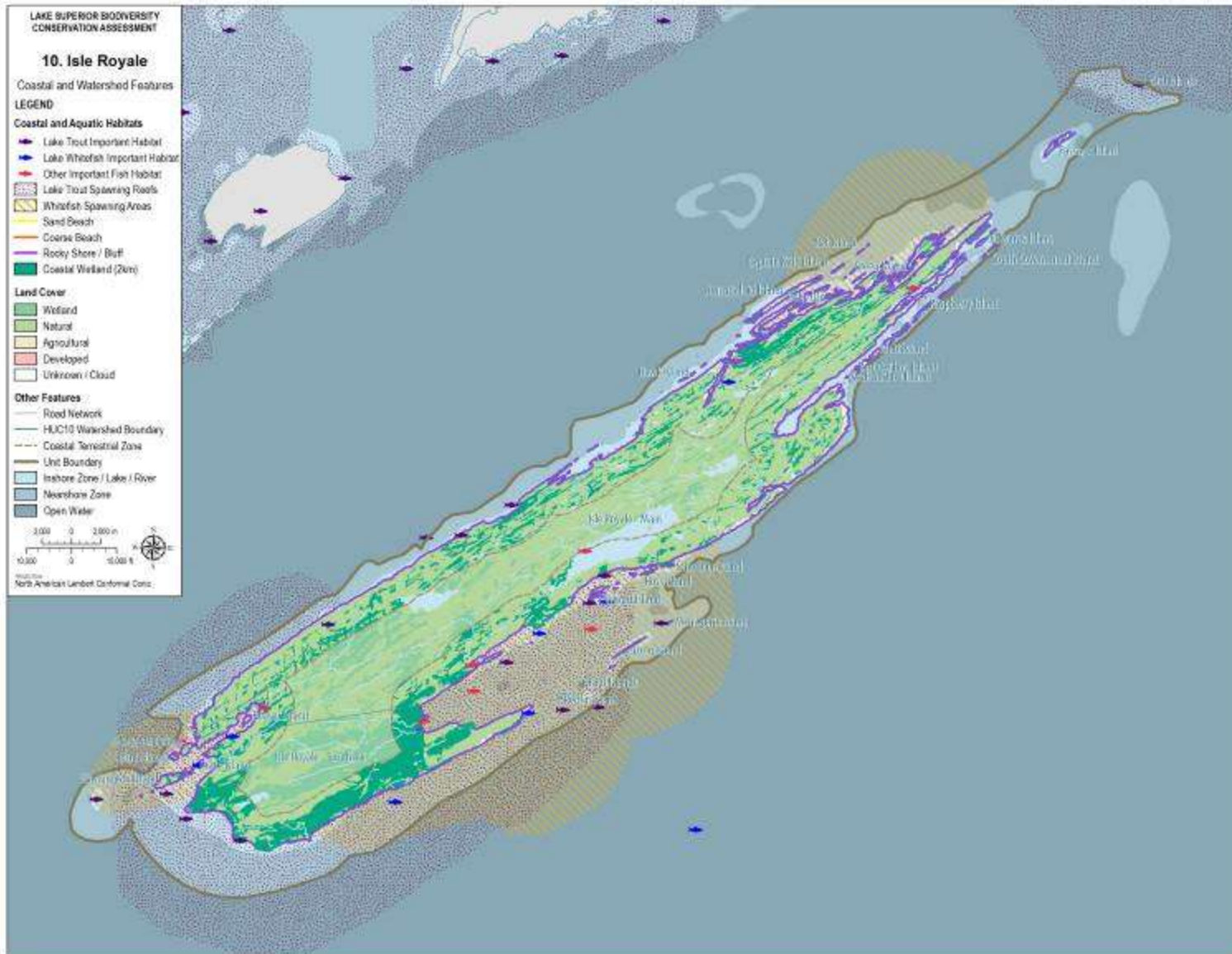


TABLE 10.2: Isle Royale CONDITION AND TRENDS

Target (Data Source)	Condition	Trends
Offshore ¹	NA	
Nearshore ¹	B (0.61)	
Embayments and Inshore ^{1,2}	B (0.76)	
Coastal Wetlands ^{2,3}	A- (0.837)	
Islands ⁴	A	
Coastal Terrestrial ³	A+ (1.000)	
Tributaries and Watersheds ²	A (0.90)	

A: Very Good	<i>Ecologically desirable status; requires little intervention for maintenance</i>
B: Good	<i>Within acceptable range of variation; may require some intervention for maintenance.</i>
C: Fair	<i>Outside of the range of acceptable variation and requires management. If unchecked, the biodiversity target may be vulnerable to serious degradation.</i>
D: Poor	<i>Allowing the biodiversity target to remain in this condition for an extended period will make restoration or preventing extirpation practically impossible.</i>
Unknown	<i>Insufficient information.</i>

1: Great Lakes Cumulative Stress (GLEAM 2012, Allan et al. 2013)

2: Watershed Stress Index (GLEI 2013)

3: Coastal Condition Index (developed for this report)

4 : Island Condition Score (Henson et al. 2010)

Figure 10.2: Isle Royale - Condition



Important Issues & Threats

- An Emergency Prevention and Response Plan for Viral Hemorrhagic Septicemia has been developed for Isle Royale National Park, Pictured Rocks National Lakeshore, Apostle Islands National Lakeshore and the Grand Portage Band of the Lake Superior Chippewa Reservation (within which is the Grand Portage National Monument) (NPS 2013a).
- The presence of Emerald Ash Borer (EAB) has not yet been detected on Isle Royale; however, the island is now under Federal EAB quarantine and Michigan state quarantine (Cooperative Emerald Ash Borer Project 2013).
- Some harvesting of white pine for timber has occurred in the past (UNESCO 2005).
- Acid rain has been studied in Isle Royale (UNESCO 2005).
- High levels of PCBs are noted in the lakes of Isle Royale (UNSECO 2005).
- Invasive gypsy moths (*Lymantria dispar*) have been trapped on Isle Royale since 2000, but no reproducing populations are known to exist on the island (NPS 2013c).
- Invasive spiny water fleas (*Bythotrephes cederstroemi*) have been found in the Lake Superior waters of Isle Royale, but they have not yet been discovered in the inland lakes (NPS 2013c).

Conservation In Action

Parks & Protected Areas

- Isle Royale National Park
- Isle Royale Biosphere Reserve

Existing Programs & Projects

- Few wild populations of Brook Trout are both sufficiently large to serve as a source population for brood stock, and exhibit the migratory or lake-dwelling life history. In 2002 three strains in the Lake Superior basin met both of these criteria. Two of these strains were from the Isle Royale area, including the Tobin Harbor and Siskiwit Bay strains (Newman et al. 2003). The Siskiwit Bay strain comes from a migratory population which spawns in the Big Siskiwit River and the Little Siskiwit River (Newman et al. 2003). The gametes that contribute to the captive stock were collected in 1995 and 1999 (Newman et al. 2003).
- Captive brood stock and production fish from the Tobin Harbor and Siskiwit Bay strains of Brook Trout are reared at the U.S. Fish and Wildlife Service Iron River National Fish Hatchery (in the Nemadji to Fish Creek region) (Newman et al. 2003).
- Zebra mussels are present in Isle Royale National Park, but an eradication program has been in place since 2009. The park is now one of the few areas worldwide where zebra mussel numbers are declining (P. Brown, pers. comm., June 24 2014).
- Under the Michigan Water Quality Standards (WQS), all waterbodies within the designated boundary of Isle Royale National Park have been designated as Outstanding State Resource Waters. Under the above designation, additional anti-degradation controls are applied for new or increased pollutant loadings (Michigan DEQ 2013a).
- The ongoing ecological study of wolves on Isle Royale has been underway for 55 years (Vucetich and Peterson 2013); it is the longest continuous predator/prey study in the world (Vucetich 2012, Vucetich and Peterson 2013). The predator/prey interaction study between wolves and Moose is part of the ongoing research in Isle Royale National Park (UNESCO 2005). The Wolf population in January 2013 was 8 individuals, the lowest the population has ever been during the history of the

study (Vucetich and Peterson 2013). This is also the first year in the history of the project that no reproduction was documented (Vucetich and Peterson 2013).

- A 13 year breeding bird survey conducted on Isle Royale revealed significant increases in abundance for ten species, and significant decreases in abundance for eight species; these trends were consistent with studies from other areas (Egan 2009). 85 species were detected over the 13 years, with an average of 57 species detected each year (Egan 2009).
- The Isle Royale & Keweenaw Parks Association is a non-profit educational organization that works with the National Park Service to promote public understanding of Isle Royale National Park and Keweenaw National Historical Park. The group also works to fund research projects (Isle Royale & Keweenaw Parks Association 2010).

TABLE 10.3: Isle Royale IMPORTANT HABITAT SITES AND AREAS

<i>Code</i>	<i>Site/ Area</i>	<i>Important Habitat Site/Area Name</i>	<i>Key Features</i>
MI-008	Site	Caribou Island	Rare plant habitat
MI-011	Site	Davidson Island	Rare plant and animal habitat
MI-012	Site	Edwards Island	Rare plant habitat
MI-015	Site	Hat Island	Rare plant and animal habitats
MI-043	Area	Isle Royale	Rare plant and animal habitat, fish spawning habitat, colonial waterbird habitats

Figure 10.3: Isle Royale - Important Habitat Sites and Areas

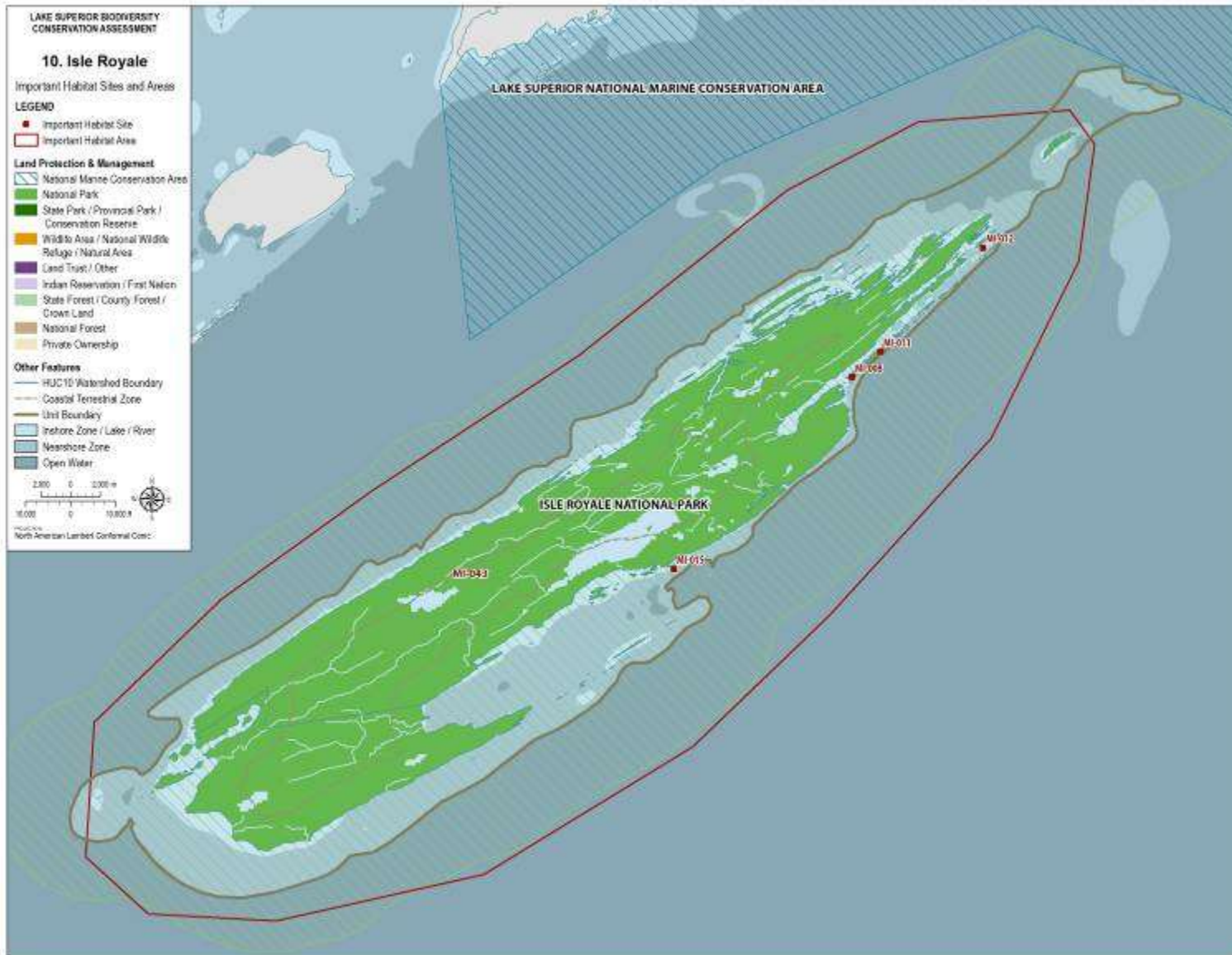


TABLE 10.4: Isle Royale LIST OF SPECIES AND COMMUNITIES OF CONSERVATION CONCERN

At least 88 species and communities of conservation concern have been documented in the regional unit. 61 of these have viability rankings which indicate the species or community is currently present, or was at the date of last sampling. The viability rankings of these species varies from A to E (A – Excellent predicted viability, B – Good predicted viability, C – Fair predicted viability, D – Probably not viable, E – Verified extant). 26 species and communities were once known to occur here, but have current conservation ranks of H (Historical). One additional species or community of conservation concern is known to occur in this regional unit, but is currently not ranked for viability.¹¹

<i>Present Records (Viability Rankings of A to E)</i>	
Scientific Name	Common Name
<i>Allium schoenoprasum</i>	Chives
<i>Amerorchis rotundifolia</i>	Small round-leaved orchis
<i>Arnica lonchophylla</i>	Longleaf arnica
<i>Aster modestus</i>	Great northern aster
<i>Beckmannia syzigachne</i>	Slough grass
<i>Calypso bulbosa</i>	Calypso or fairy-slipper
<i>Canis lupus</i>	Gray Wolf
<i>Carex atratiformis</i>	Sedge
<i>Carex media</i>	Sedge
<i>Castilleja septentrionalis</i>	Pale Indian paintbrush
<i>Clematis occidentalis</i>	Purple clematis
<i>Collinsia parviflora</i>	Small blue-eyed Mary
<i>Coregonus artedi</i>	Lake herring or Cisco
<i>Coregonus kiyi</i>	Kiyi
<i>Coregonus zenithicus</i>	Shortjaw cisco
<i>Crataegus douglasii</i>	Douglas's hawthorn
<i>Cryptogramma acrostichoides</i>	American rock-brake
<i>Cypripedium arietinum</i>	Ram's head lady's-slipper
<i>Draba arabisans</i>	Rock whitlow grass
<i>Draba glabella</i>	Smooth whitlow grass
<i>Draba incana</i>	Twisted whitlow grass
<i>Drosera anglica</i>	English sundew
<i>Dryopteris fragrans</i>	Fragrant cliff woodfern
<i>Empetrum nigrum</i>	Black crowberry
<i>Euphrasia hudsoniana</i>	Eyebright
<i>Euphrasia nemorosa</i>	Eyebright
<i>Gavia immer</i>	Common loon
<i>Haliaeetus leucocephalus</i>	Bald eagle
<i>Huperzia appalachiana</i>	Mountain fir-moss
<i>Huperzia selago</i>	Fir clubmoss
<i>Listera auriculata</i>	Auricled twayblade
<i>Lonicera involucrata</i>	Black twinberry
<i>Luzula parviflora</i>	Small-flowered wood rush
<i>Myriophyllum alterniflorum</i>	Alternate-leaved water-milfoil
<i>Nymphaea leibergii</i>	Pygmy water lily
<i>Oplopanax horridus</i>	Devil's club
<i>Pandion haliaetus</i>	Osprey
<i>Parnassia palustris</i>	Marsh grass-of-parnassus

¹¹ Data included here were provided by the Michigan Natural Features Inventory of Michigan State University, and were current as of August 1 2014. These data are not based on an exhaustive inventory of the state. The lack of data for any geographic area shall not be construed to mean that no significant features are present.

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Phacelia franklinii	Franklin's phacelia
Pinguicula vulgaris	Butterwort
Poa alpina	Alpine bluegrass
Poa canbyi	Canby's bluegrass
Polygonum viviparum	Alpine bistort
Potentilla pensylvanica	Prairie cinquefoil
Prosartes trachycarpa	Northern fairy bells
Ranunculus macounii	Macoun's buttercup
Ranunculus rhomboideus	Prairie buttercup
Ribes oxycanthoides	Northern gooseberry
Sagina nodosa	Pearlwort
Salix pellita	Satiny willow
Salix planifolia	Tea-leaved willow
Saxifraga paniculata	Encrusted saxifrage
Saxifraga tricuspidata	Prickly saxifrage
Senecio indecorus	Northern ragwort
Tofieldia pusilla	False asphodel
Trisetum spicatum	Downy oat-grass
Vaccinium cespitosum	Dwarf bilberry
Vaccinium uliginosum	Alpine blueberry
Vaccinium vitis-idaea	Mountain cranberry
Viburnum edule	Squashberry or mooseberry
Woodsia alpina	Northern woodsia
Historical Records	
Scientific Name	Common Name
Alces americanus	Moose
Antennaria rosea	Rosy pussytoes
Bryoria lanestris	Lichen
Calamagrostis lacustris	Northern reedgrass
Callitriche hermaphroditica	Autumnal water-starwort
Coregonus bartlettii	Siskiwit lake cisco
Dermatocarpon reticulatum	Lichen
Erigeron acris	Fleabane
Euchloe ausonides	Large marble
Great Blue Heron Rookery	Great Blue Heron Rookery
Hypotrachyna revoluta	Lichen
Lactuca pulchella	Blue lettuce
Lobaria scrobiculata	Lichen
Lycaeides idas nabokovi	Northern blue
Lynx canadensis	Lynx
Melanelia substygia	Lichen
Moehringia macrophylla	Big-leaf sandwort
Oeneis macounii	Macoun's arctic
Osmorhiza depauperata	Sweet Cicely
Parmelia stictica	Lichen
Pisidium idahoense	Giant northern pea clam
Placynthium aspratile	Lichen
Pseudacris triseriata maculata	Boreal chorus frog
Ramalina farinacea	Lichen
Sticta fuliginosa	Lichen
Subularia aquatica	Awlwort
Unranked Records	
Scientific Name	Common Name
Dermatocarpon moulinii	Lichen