

Prioritization of Natural Community Surveys for Remote Islands: Isle Royale, North Fox Island, and South Fox Island



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Cover Photo: Open dunes, South Fox Island. Natural community surveys were last conducted on South Fox Island in 2001. Photo by Dennis A. Albert.

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The statements, findings, conclusions, and recommendations in this report are those of Michigan Natural Features Inventory and do not necessarily reflect the views of the Michigan Department of Environment, Great Lakes, and Energy.

Introduction

Islands within the Great Lakes provide critical habitat for an array of native species and contain benchmark examples of rare natural communities endemic to the Great Lakes region. Many islands within the Great Lakes are remote, difficult to access, and challenging to survey. Despite their remote location, many island ecosystems still face a variety of anthropogenic pressures including the establishment and spread of invasive plant and animal species and the impacts of climate change. Unfortunately, most of these unique geographies suffer from limited or outdated scientific data, which hinders effective management and decision-making.

Through this project, Michigan Natural Features Inventory (MNFI) has prioritized where to conduct future surveys for high-quality natural communities on three of Michigan's remote islands: Isle Royale in Lake Superior and North Fox Island and South Fox Island in Lake Michigan. These islands have been identified as high value sites in past and on-going island studies, and none have recent or systematic surveys by MNFI. Isle Royale and the Fox Islands have been identified as important targets for ecological evaluation. Despite its large size and the high likelihood of the occurrence of high-quality, rare, and endemic natural communities, Isle Royale has no natural community element occurrences. In addition, because of its size and heterogeneity, Isle Royale is likely vulnerable to many different invasive species. Minimal invasive species data has been gathered for Isle Royale. The Fox Islands also support rare and endemic natural communities and have not been recently surveyed: North Fox Island was last surveyed in 1986 and South Fox Island was last surveyed in 2001. Neither of the Fox Islands has been systematically surveyed for rare natural communities and neither island has invasive species data. In addition, the Fox Islands are part of the Beaver Island Archipelago, which is currently the subject of an on-going, multiple stakeholder planning effort. This planning effort would greatly benefit from current data to help informing decision making across the archipelago.

Methods

Prioritization of where to focus natural community surveys on these three targeted islands was facilitated by aerial photo interpretation, review of prior survey efforts, and review of published research on the islands. For North Fox and South Fox Islands we also used the state's vegetative mapping system (MiFI) to remotely develop wall-to-wall stand mapping of the state and private lands to help inform this prioritization process. In addition, we evaluated LIDAR for the Fox Islands. Following literature review, review of prior survey efforts, aerial photo interpretation, and delineation of vegetation on the Fox Islands, we delineated natural community survey targets for all three islands using GIS. For the Fox Islands, we also identified what existing natural community element occurrences merited updated surveys. A survey prioritization was

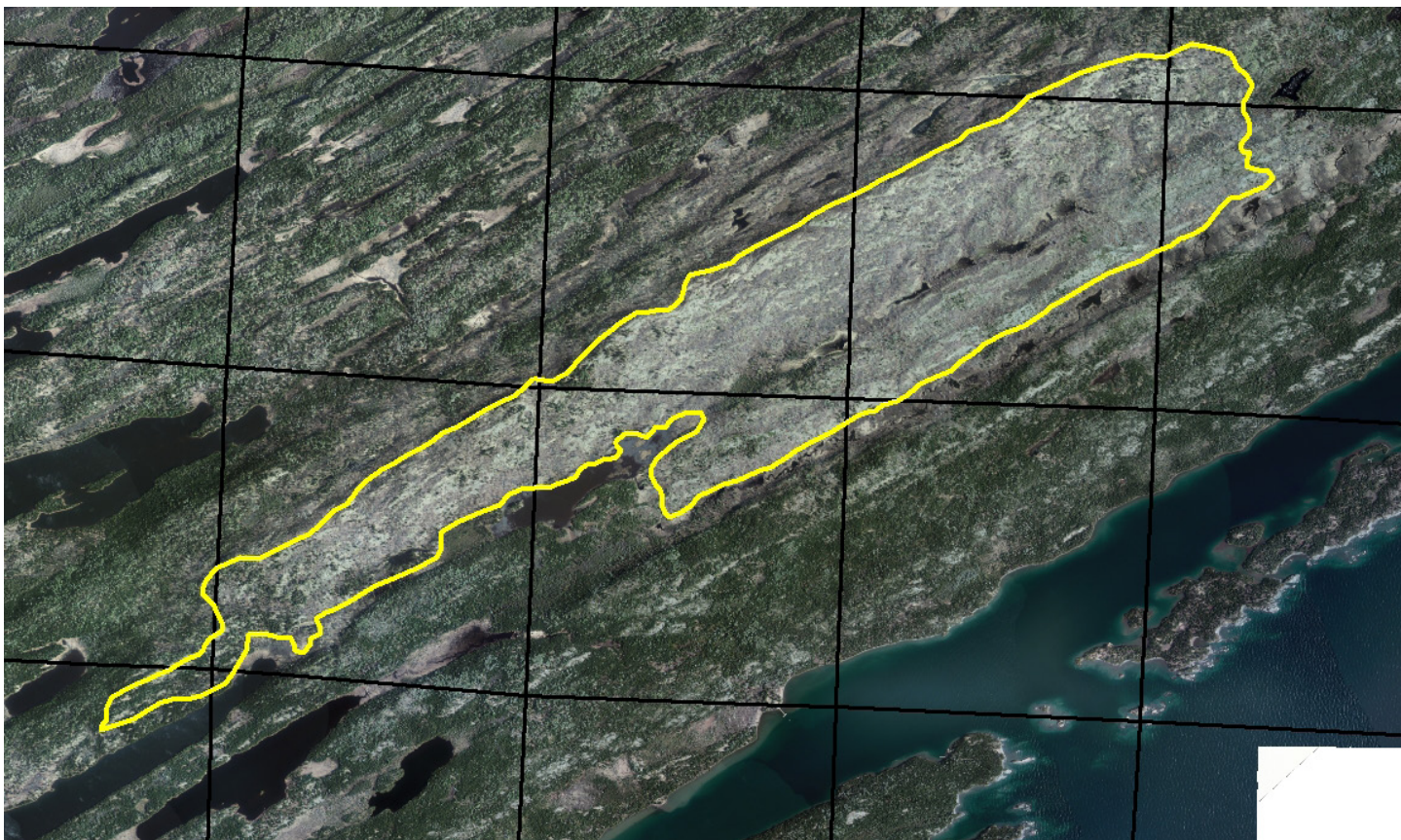
determined independently for each island with potential survey sites being scored for each island. Prioritization was informed by the rarity of the potential natural community, the inferred integrity of the natural community (based on literature review and aerial photo interpretation), and the date since the last survey. A prioritization score was calculated by summing scores for each potential site's rarity (higher scores for rare ecosystems), inferred integrity (higher scores for higher inferred integrity and larger sites), and date since last survey (with sites never surveyed receiving the highest score and sites observed more recently receiving lower scores).

Results

Isle Royale

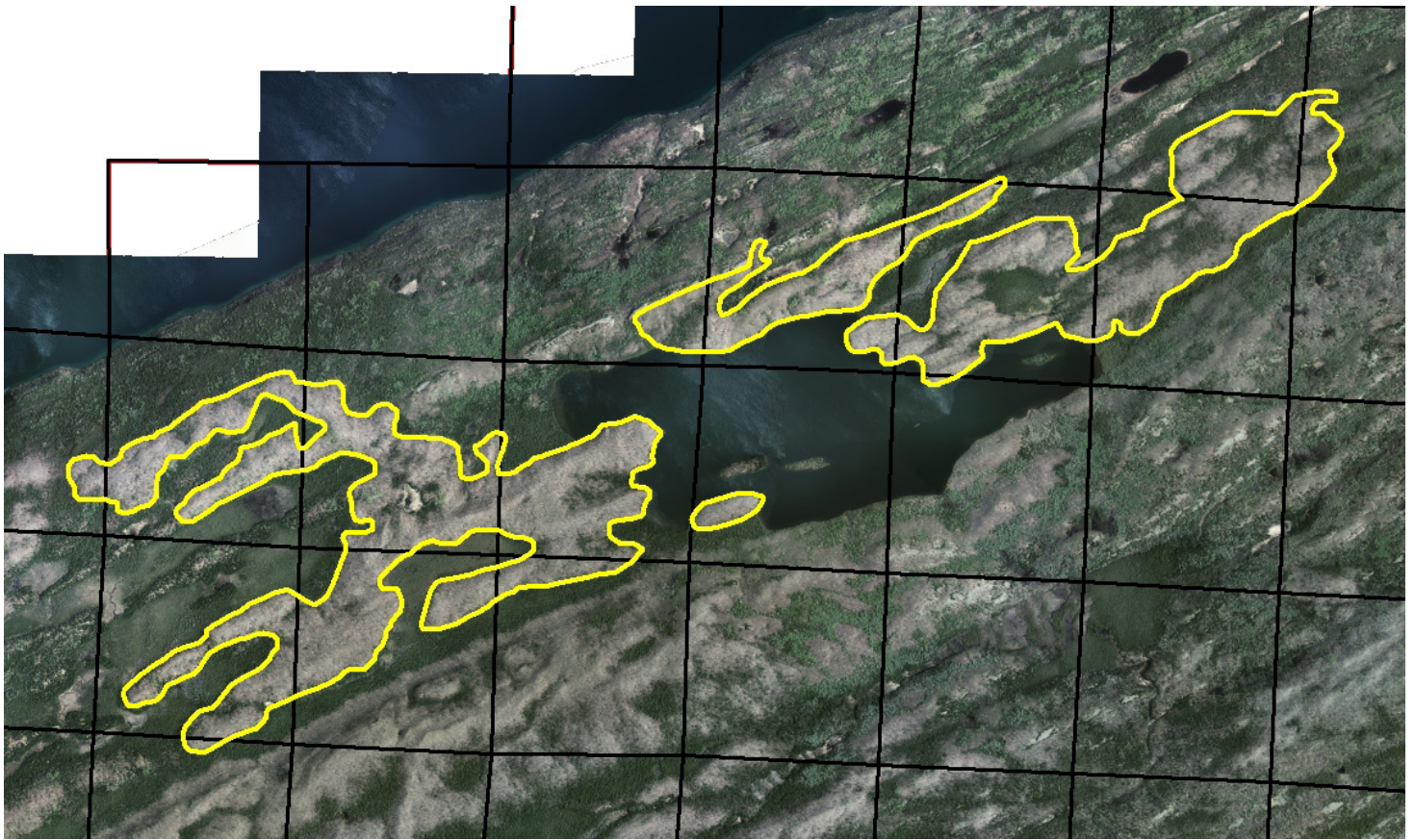
No natural community element occurrences have been documented on Isle Royale since no MNFI ecologists have ever surveyed the island for high-quality natural communities. Extensive research on ecosystems has been conducted on Isle Royale. These studies have focused on boreal forests, moose and wolf interactions, and coarse-scale vegetative mapping. However, there has never been a concerted effort to systematically evaluate the integrity of ecosystems on Isle Royale. This is likely due to the assumption that because Isle Royale is a National Park on a remote island isolated from direct anthropogenic disturbance, ecosystem integrity should be high across the island. Despite its remote location and protected status, Isle Royale is still subject to the impacts of climate change and it is unknown to what extent the island has already been impacted by the establishment and spread of invasive plant and animal species.

Natural communities identified through aerial photo interpretation and literature review as potentially occurring on Isle Royale include volcanic bedrock glade, volcanic bedrock lakeshore, northern bald, boreal forest, mesic northern forest, poor fen, northern fen, patterned fen, bog, Great Lakes marsh, northern shrub thicket, northern wet meadow, emergent marsh, rich conifer swamp, poor conifer swamp, and rich tamarack swamp. In total, 162 polygons of potential high-quality natural communities were identified on Isle Royale, totaling 14,334 acres. The top five highest survey priorities based on our scoring methods are new potential volcanic bedrock glade, volcanic bedrock lakeshore, patterned fen, mesic northern forest, and Great Lakes marsh. Several of these natural community types are rare globally and within Michigan but appear to be common on Isle Royale (i.e., volcanic bedrock glade and volcanic bedrock lakeshore). Despite being relatively common on Isle Royale, these natural community types remain a high priority for future survey because survey of these systems will increase our understanding of these natural communities and inform their management and conservation across their distribution.

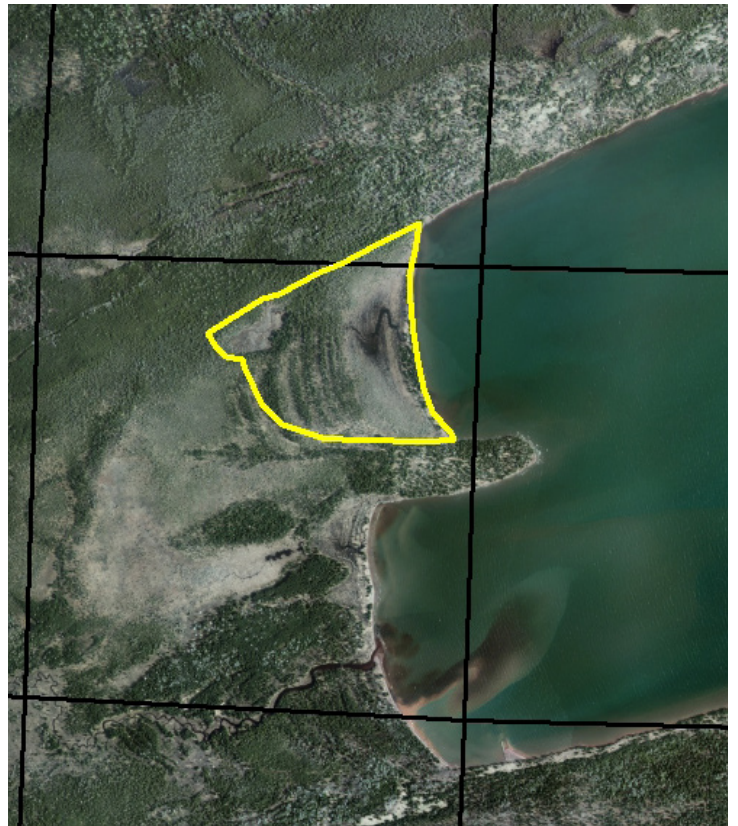
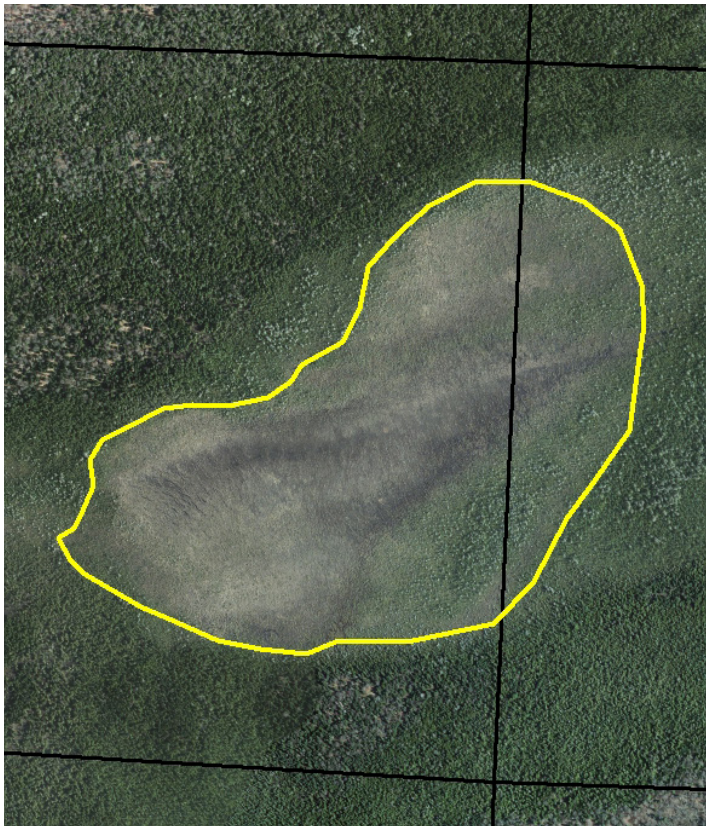


Priority survey targets for Isle Royale: volcanic bedrock glade (above) and volcanic bedrock lakeshore (below).





Priority survey targets for Isle Royale: mesic northern forest (above), patterned fen (below left) and Great Lakes marsh (below right).



North Fox Island

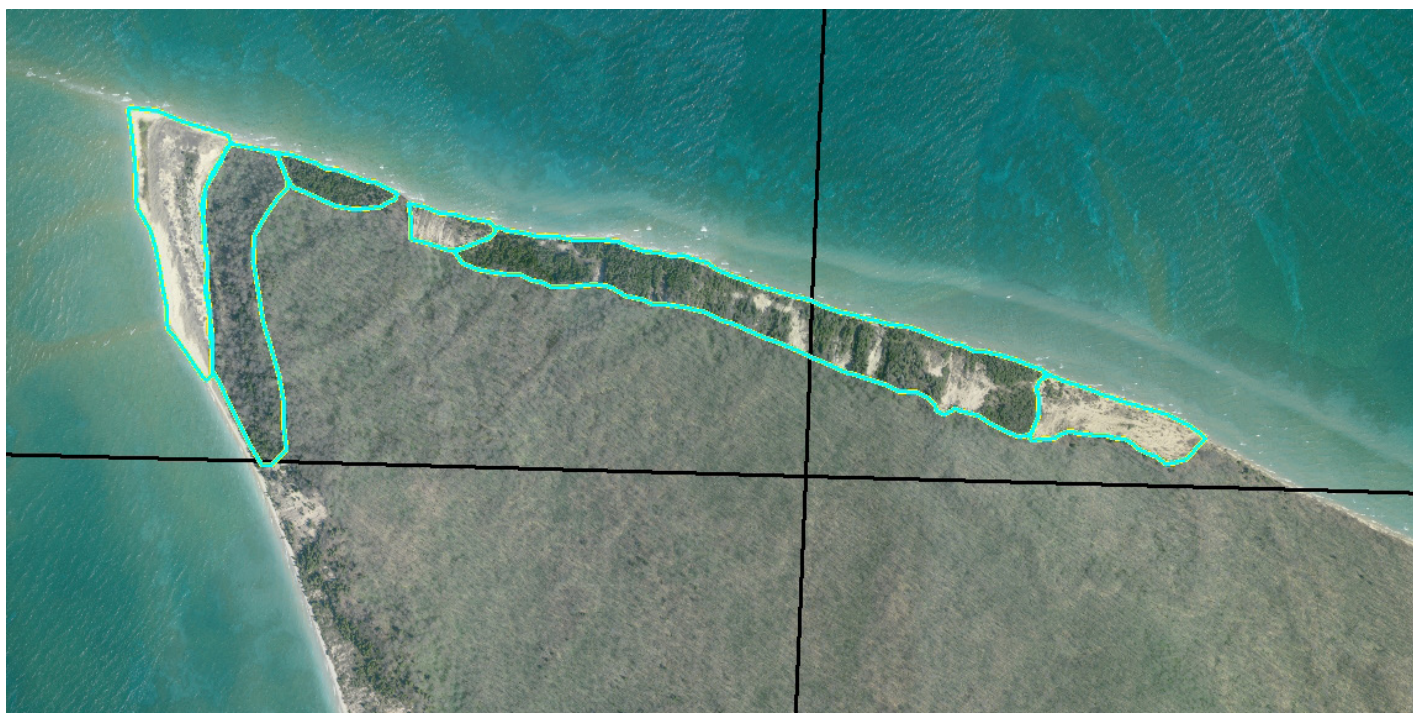
Three known natural community element occurrences are found on North Fox Island and include boreal forest, mesic northern forest, and northern hardwood swamp (Table 1). These sites have not been visited since 1986 and we recommend revisiting these occurrences to update their status and refine their mapping based on ground surveys and recent aerial imagery. In addition, we identified potential high-quality open dunes and sand and gravel beach. In total, 2 polygons of potential high-quality natural communities were identified on North Fox Island, totaling 20 acres. The top five highest survey priorities based on our scoring methods are the potential open dunes and sand and gravel beach and the existing element occurrences.

South Fox Island

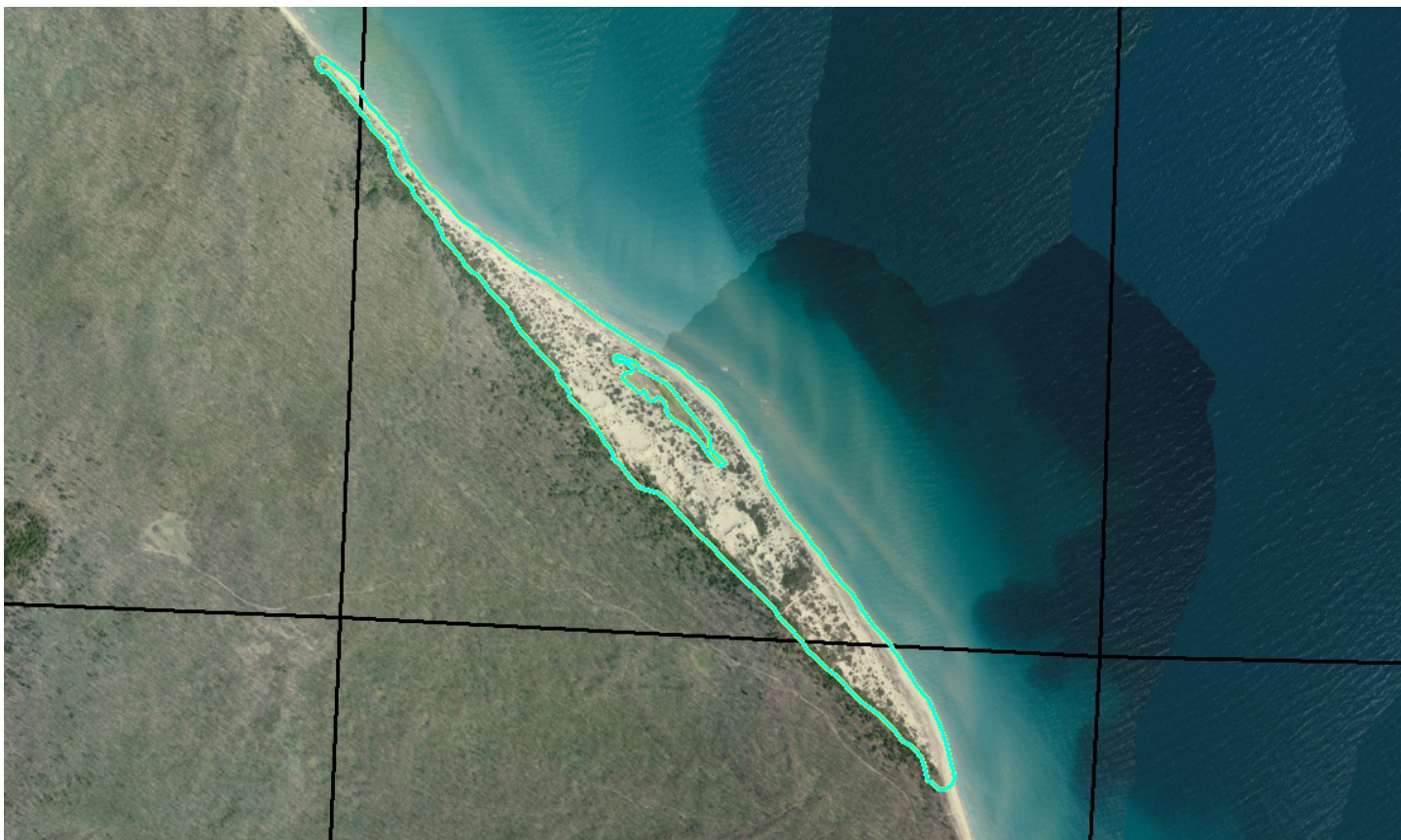
Four known natural community element occurrences are found on South Fox Island and include boreal forest, mesic northern forest, open dunes, and sand and gravel beach (Table 1). We recommend revisiting the boreal forest, mesic northern forest, and open dunes and conducting surveys for additional acreage of open dunes and boreal forest. In addition, we identified potential high-quality Great Lakes barrens and interdunal wetlands and there is potential for clay bluffs to occur within areas of open dunes. In total, 7 polygons of potential high-quality natural communities were identified on South Fox Island, totaling 112 acres. The top five highest survey priorities based on our scoring methods are the updates of the open dunes, mesic northern forest, and boreal forest element occurrences and the potential high-quality Great Lakes barrens and interdunal wetlands.

Table 1. Documented natural community element occurrences for North Fox Island and South Fox Island. EO rank abbreviations are as follows: A, excellent viability; AB excellent to good viability; and BC, good to fair viability. Detailed global and state ranking criteria are provided in the Appendix.

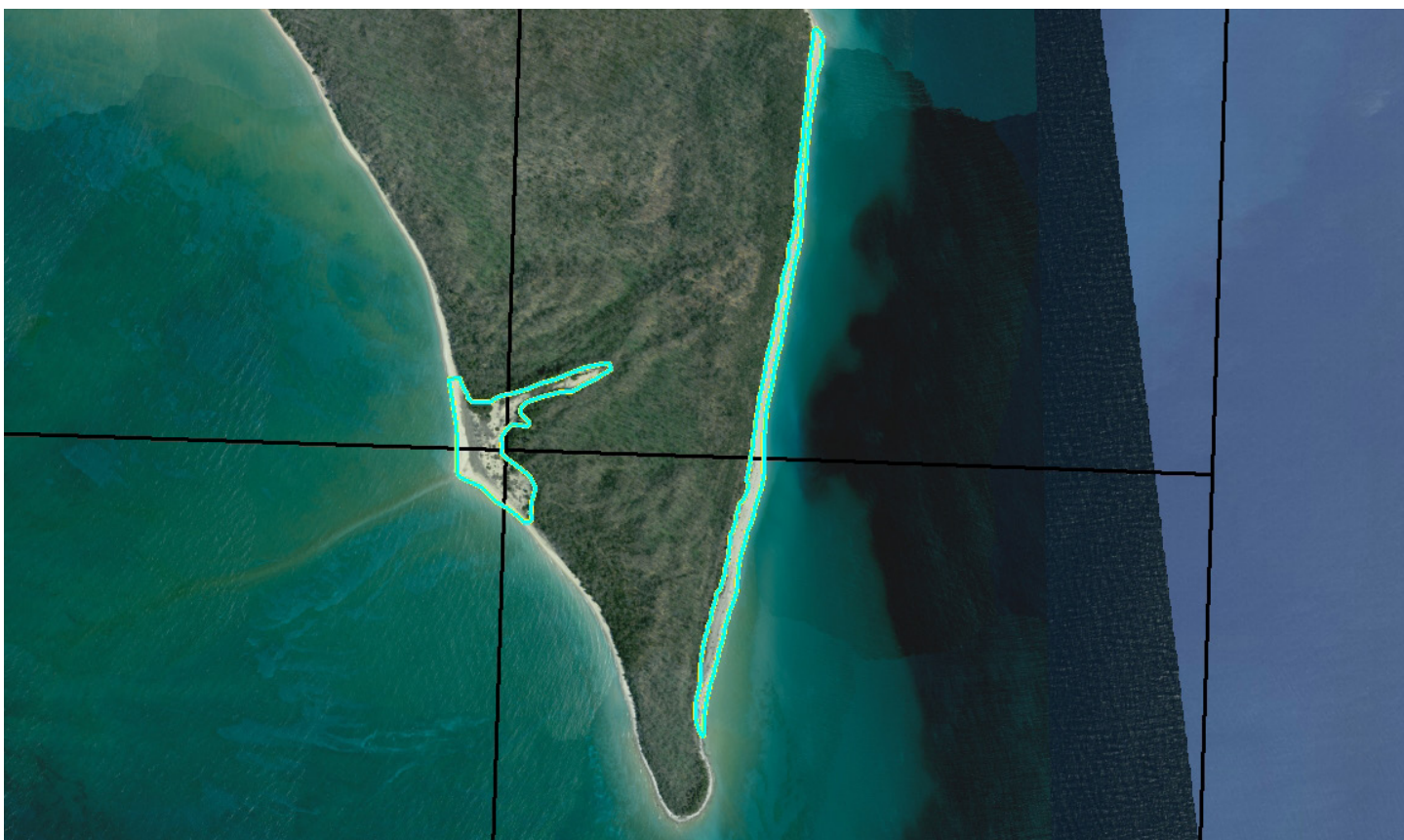
Natural Community Type	EO ID	EO RANK	Last Survey Date	Global Rank	State Rank	Island
Boreal Forest	788	BC	2001	GU	S3	South Fox Island
Boreal Forest	6073	AB	1986	GU	S3	North Fox Island
Mesic Northern Forest	359	BC	1986	G4	S3	South Fox Island
Mesic Northern Forest	10758	AB	1986	G4	S3	North Fox Island
Northern Hardwood Swamp	7947	A	1986	G4	S3	North Fox Island
Open Dunes	1963	A	2001	G3	S3	South Fox Island
Sand and Gravel Beach	1997	BC	1986	G3?	S3	South Fox Island



A priority for survey for South Fox Island includes expanding the mapped acreage of open dunes, mesic northern, and boreal forest.



Priority survey targets for South Fox Island: Great Lakes barrens (larger polygon) and interdunal wetlands (smaller polygon).



Priority survey targets for North Fox Island: open dunes (left) and sand and gravel beach (right).

Conclusions

We have identified priority natural community survey targets for three remote islands within the Great Lakes (i.e., Isle Royale, North Fox Island, and South Fox Island). For each island we have identified the five highest natural community survey priorities. Identifying natural community survey targets on these remote islands will increase the ability of federal and state agencies, MNFI, and other partners to rapidly and strategically respond to future funding opportunities. We recommend on-the-ground natural community surveys on Isle Royale, North Fox Island, and South Fox Island to determine the classification, delineation, and ecological integrity ranking of potential and known natural community element occurrences.

Natural community surveys are needed to detail each natural community occurrence's vegetative structure and composition, landscape and abiotic context, management needs, and restoration opportunities, and to define or refine ecological boundaries. The primary goal of this survey effort is to provide resource managers and planners with standardized, baseline information on documented natural community element occurrences. This baseline information is critical for site-level decisions about biodiversity stewardship, prioritizing protection, management, and restoration, monitoring the success of management and restoration, and informing landscape-level biodiversity planning efforts.

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APPENDIX

NatureServe Global Ranking Criteria²

- G1** = critically imperiled: at very high risk of extinction due to extreme rarity (often 5 or fewer occurrences), very steep declines, or other factors.
- G2** = imperiled: at high risk of extinction due to very restricted range, very few occurrences (often 20 or fewer), steep declines, or other factors.
- G3** = vulnerable: at moderate risk of extinction due to a restricted range, relatively few occurrences (often 80 or fewer), recent and widespread declines, or other factors.
- G4** = apparently secure: uncommon but not rare; some cause for long-term concern due to declines or other factors.
- G5** = secure: common; widespread.
- GU** = currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
- GX** = eliminated: eliminated throughout its range, with no restoration potential due to extinction of dominant or characteristic species.
- G?** = incomplete data.

NatureServe State Ranking Criteria³

- S1** = critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.
- S2** = imperiled in the state because of rarity due to very restricted range, very few occurrences (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.
- S3** = vulnerable in the state due to a restricted range, relatively few occurrences (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
- S4** = uncommon but not rare; some cause for long-term concern due to declines or other factors.
- S5** = common and widespread in the state.
- SX** = community is presumed to be extirpated from the state. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
- S?** = incomplete data.

²Global Ranks are determined by NatureServe.

³State Ranks are determined by Michigan Natural Features Inventory.