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Grand River Coastal Corridor

Ecological Assessment and Conservation Recommendations

Audubon | GREAT LAKES

Marsh Wren.
Photo: Craig Goettsch/Audubon

Contents

Ottawa County Parks & Recreation Commission

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Executive Summary

Human activity has severely degraded coastal wetland habitats within the Laurentian Great Lakes, causing significant declines in secretive marsh bird populations across the region and reducing the resiliency of Great Lakes communities to a changing environment. Within the Grand River Coastal Corridor (GRCC), a majority of historic wetlands have been lost, with the greatest losses in the municipalities of Ferrysburg (97%), North Muskegon (90%), Grand Haven (83%), City of Muskegon (72%), and Spring Lake (74%). Communities are experiencing flooding, high-lake levels, erosion, and have expressed concern about overall water quality. The remaining wetlands within the GRCC are therefore of high conservation value for both birds and people.

The corridor is ecologically significant; it falls within the Prairie Hardwood Transition zone or ecotone, which helps support a great diversity of habitats and wildlife. It also sits adjacent to a migratory route along the Lake Michigan coastline and acts as a migratory hotspot for migratory birds as they rest and refuel on their way to and from their wintering grounds. The corridor is recognized as one of the richest areas in the state for species of greatest conservation concern and biodiversity, is a focal area for Lake Michigan fisheries restoration, is above-average for climate resiliency, and lies along a globally recognized Important Bird Area.

Using Audubon's spatial prioritization of coastal wetlands for marsh bird conservation, natural features inventories, scientific literature, community science data, and stakeholder input, we have identified priority areas and recommendations for wetlands conservation, restoration and management within the GRCC that will benefit wildlife while addressing the climate resiliency and public health needs of local communities. This report will serve as a guiding document to 1) improve ecosystem integrity, 2) enhance quality of life, 3) increase the economic value of the protected resource, 4) provide a basis for seeking landscape-scale grant funding, and 5) help establish the area as a national ecotourism destination.

Introduction

Great Lakes Coastal Ecosystems

Lakes and adjacent wetlands provide critical habitat for birds, fish, amphibians, and other animals. In addition, they provide annual ecosystem services, including carbon sequestration, pollutant filtration, and protection against storm surges (Gedan et al. 2009; Meli et al. 2014). Despite their significance, coastal wetlands (i.e. wetlands within the coastal zones of large waterbodies) worldwide have declined by >60% during the twentieth century primarily due to land conversion (Wolter et al. 2006). Further, freshwater wetland biodiversity continues to be largely overlooked by efforts to prioritize global conservation actions, even with mounting evidence that coastal wetlands are now among the most endangered ecosystems in the world (Jenkins 2003, Nel et al. 2009). Wetlands face a myriad of challenges, such as human development, dredging, ditching, the disruption of natural processes, subsidence, and fluctuating water levels (Kennish 2001, Feagin et al. 2010). Maintaining healthy wetlands is central to the human communities that surround them, as they provide ecosystem services including water filtration, flood prevention, stormwater retention, and carbon sequestration. Additionally, wetland health is critical in supporting populations of wildlife species, such as marsh birds, that serve as environmental indicators and provide recreation value for birders and hunters alike.

In addition to coastal wetlands, the Great Lakes shorelines consist of sandy beaches, which are home to a diverse suite of flora and fauna, including federally listed species (i.e. Piping Plover [*Charadrius melodus*], and Pitcher's Thistle [*Cirsium pitcheri*]). Sandy beaches are threatened by shoreline armoring, intense recreational use, off-road vehicles, grooming, beach re-nourishment, pollution, direct human disturbance, and the 'coastal squeeze' that occurs when beaches erode but cannot migrate inland due to barriers such as urban development (Schlacher et al. 2007, Defeo et al. 2009). Similarly, mudflats along the Great Lakes shorelines are key stopover habitat for migrating shorebirds, but are threatened by fluctuating water levels and land conversion. Taken together, beaches, wetlands, and closely associated habitat (i.e. mudflats) provide critical resources and habitat for millions of shorebirds, waterfowl, and waterbirds that are breeding, migrating and overwintering along coastal flyways.

The Great Lakes region is currently experiencing numerous threats – ranging from toxic pollution to species invasions to climate change – that are degrading ecosystem integrity and function (Allan et al. 2013). Within the last half century, human activity surrounding the Great Lakes basin has increased exponentially, resulting in degraded wetlands and reduced water quality (Mitsch & Gosselink 2000). Rapid fluctuations of lake levels and increased coastal zone precipitation and storm events are also disrupting wildlife habitat, changing wetland structure and function, and creating stormwater drainage problems. There is therefore, a

need to protect and restore coastal ecosystems in the Great Lakes (Great Lakes Restoration Initiative [GLRI] Action Plans) for human health, biodiversity conservation, and high economic returns (Austin et al. 2008).

Habitat restoration and species protection are key recovery strategies for the Great Lakes because many wildlife species preferentially inhabit healthy ecosystems that also provide resources for humans (Sandifer et al. 2015, Naeem et al. 2016). For example, the natural ecosystems of the Chicago Wilderness contribute more than $6 billion per year in economic value to the Chicago metropolitan area (Allen et al. 2014). In addition, actions to protect and restore Great Lakes coastal ecosystems produce economic benefits – every dollar of federal spending on GLRI projects between 2010 and 2016 will produce $3.35 in additional economic activity in the Great Lakes region through 2036 (GLRI Assessment Report). Ensuring climate resiliency within Great Lakes coastal systems through restoration will enhance the impact of these investments over the long-term, and safeguard ecosystem health and functioning under a changing climate.

The Grand River Coastal Corridor

The Grand River Coastal Corridor (GRCC), through natural area restoration and cohesive recreational access, is poised to connect people and wildlife across Grand Haven, Muskegon, and Grand Rapids. The southern boundary of the corridor begins a mile south of Pigeon River. The corridor moves north along the Lake Michigan coastline to the mouth of the Grand River, moving inland along the river east to Grand Haven State Game Area. The corridor continues north of the Grand River along the Lake Michigan coastline to Muskegon State Park, and includes Muskegon Lake, an EPA Area of Concern, and the adjacent marshlands to the east (**Figure 1**). The core area, which will be the focus of the bulk of this report, includes the areas immediately surrounding Ottawa County's recently acquired Ottawa Sands park site (**Figure 2**).

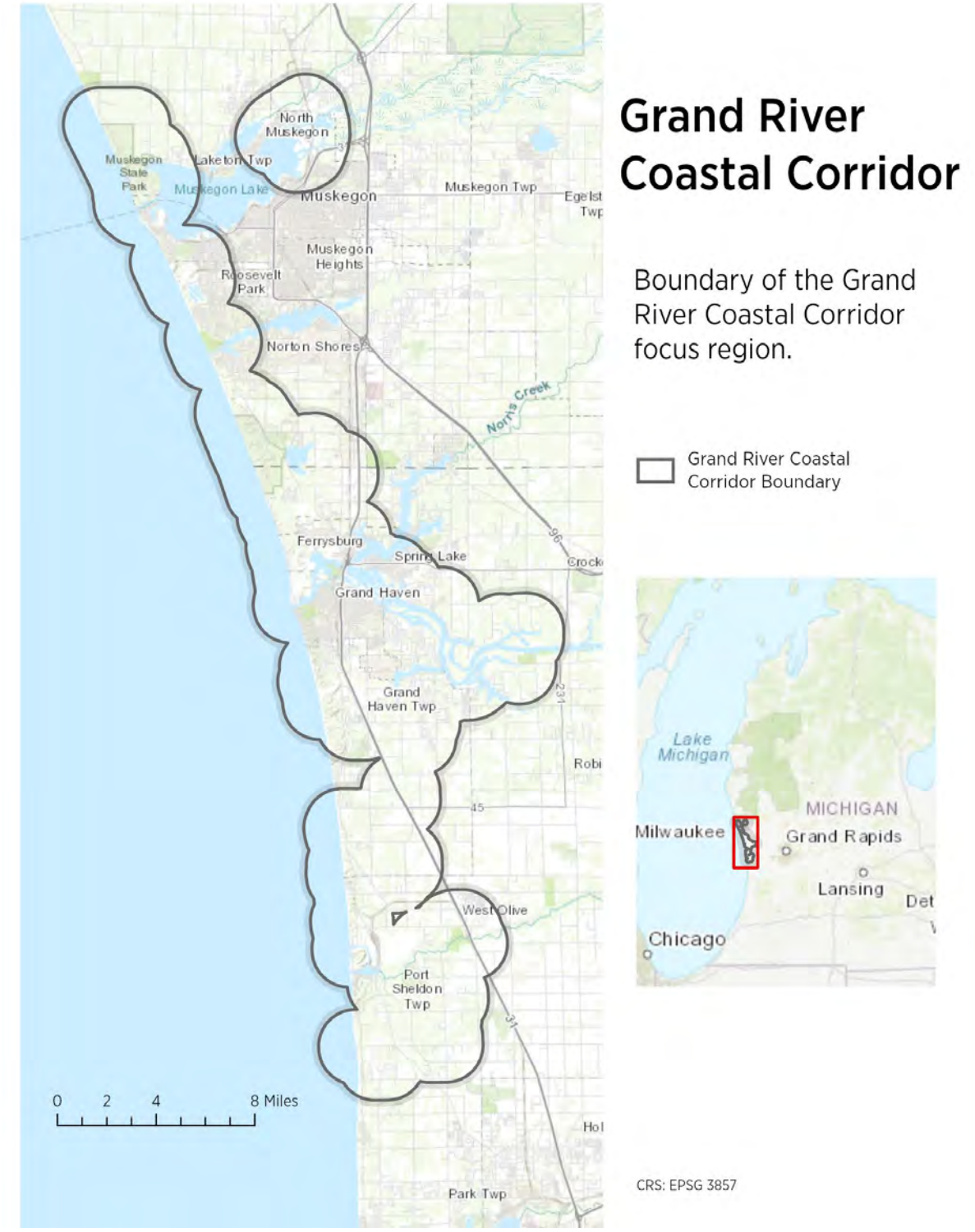
Historically, the GRCC included a vast, interconnected marshland, dunal, and swamp forest hydrologic complex along the southeastern shores of Lake Michigan, which supported abundant wildlife across taxa. As Michigan was colonized in the 18th and 19th centuries, over half of its historic wetlands were lost (Fizzle et al. 2015), and the plants and animals that call them home are now among some of the states most threatened species. The region's legacy of industrialization, urbanization, and agriculture greatly reduced the amount and quality of wetlands and marshes in the GRCC, though many fragmented wetlands and marshes remain.

The GRCC suffers from many of the same threats that negatively impact the coasts in the Great Lakes region. Habitat loss and degradation combined with the impacts of climate change are driving the majority of biodiversity loss in the region. The corridor in particular was transformed when the Grand River was dredged to allow for larger steamboats and logs to travel between Grand Haven and Grand Rapids (EGLE 2016), impacting Great Lakes Marsh, Coastal Plain Marsh, and wild rice beds. Ottawa County has lost 73% of its historic wetlands, with the greatest loss in the Cities of Ferrysburg (97%), Grand Haven (83%), and Spring Lake (74%). Muskegon County has similarly lost 60% of its wetlands, with the greatest losses in North Muskegon (90%) and City of Muskegon (72%) (Fizzle et al. 2015). Few of the historic Wild Rice beds remain within the corridor (**Figure 3.**). The remaining wetlands within the GRCC are therefore of high conservation value.

Surveys indicate that the lower Grand River has degraded habitat (Wilhelm et al. 2005) and macroinvertebrate communities (Wessell et al. 2008, Rippke 2011) when compared to other large rivers in Michigan (EGLE 2016). The Grand River also typically contributes some of the largest nutrient loads to Lake Michigan (Robertson 1997, LGROW 2011) and acts as a master discharge area for the Grand River Watershed (IWR and DCEE 2013, LGROW 2011). The majority of the Grand River watershed contains agricultural land use and the main stem of the river receives treated wastewater from several urban areas (Robertson 1997; Luscz et al. 2015). Development in the lower Grand River watershed also typically takes place in areas with historically permeable surfaces; the increased impermeability of these urbanized areas results in high amounts of precipitation runoff and erosion throughout the watershed (LGROW 2011). The most frequently noted impacts in the lower Grand River watershed were sedimentation, erosion, and lack of substrate and habitat diversity (EGLE 2016).

As is often the case, birds in the GRCC provide an identifiable barometer to healthy ecosystems and waterways. Not as easily identifiable given their secretive nature, breeding marsh birds have suffered a rapid decline across the Midwest in association with a loss of quality hemi-marsh habitat. Hemi-marsh is a type of wetland habitat, which maintains a patchy mixture of open water and emergent vegetation, such as cattail or bulrush. Wetland restoration, particularly hemi-marsh restoration, needs to occur on the landscape level in the GRCC, as both wetland quality and function are strongly influenced by hydrologic dynamics at a broader scale. Increasing habitat connectivity across scales is also extremely important to sustain biodiversity, ecological integrity, and climate resiliency of an area (Newmark 1995, Saunders et al. 1991, Buechner 1989). The GRCC riverine and watershed landscape includes public and private lands, farmlands, and tribal lands, and crosses jurisdictional boundaries. Landscape-scale conservation is the holistic approach to land management that works across these boundaries, lending itself to better increase

FIGURE 1. GRAND RIVER COASTAL CORRIDOR BOUNDARY.



habitat connectivity and optimize biodiversity, while reducing fragmentation along the entire corridor. Stakeholders identified by Audubon Great Lakes and Ottawa County Parks and Recreation from across the corridor were interviewed about the ecological strengths and weaknesses of their properties, management needs, and community partnerships and programming needs (Appendix A).

FIGURE 2. GRAND RIVER COASTAL CORRIDOR CORE AREA.

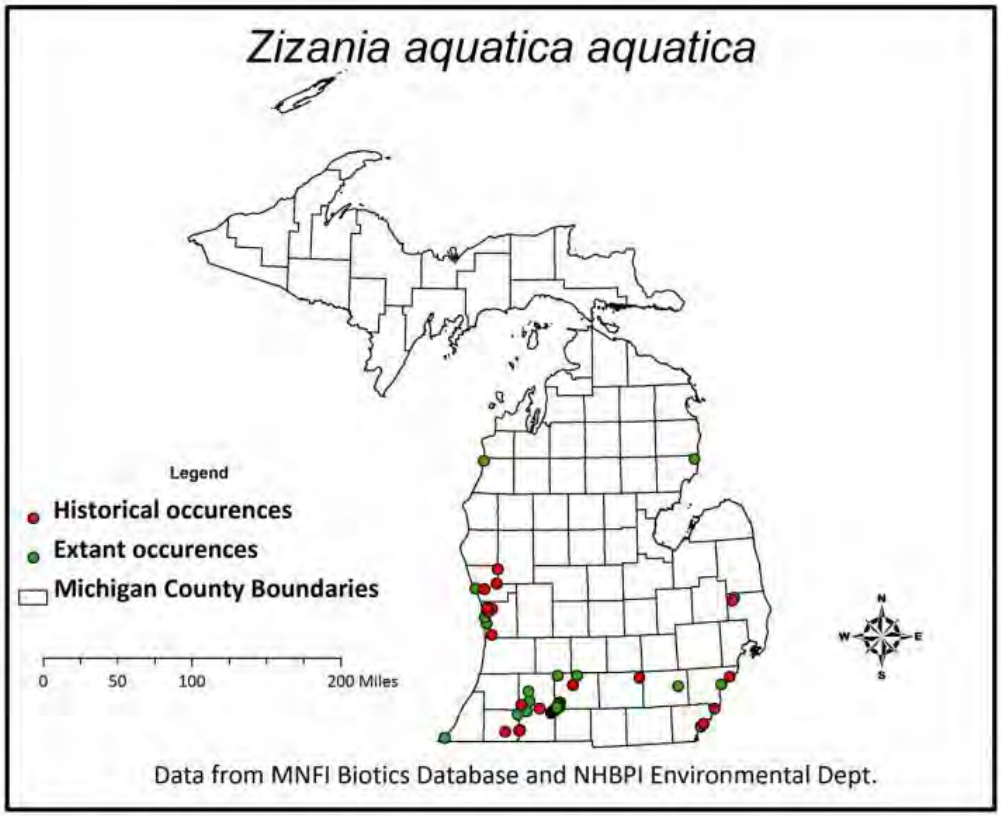
Conventional restoration efforts focus on individual sites. While this is a valuable and necessary measure, it is essential that the corridor's marshes are identified by stakeholders within the region on a landscape-scale as a broad and interconnected ecosystem—the Grand River Coastal Corridor—in order to sustain the water, wildlife, and communities that connect each site in this hydrologic system. Bringing a diverse set of stakeholders together across conservation organizations, public agencies, and private landowners is critical to effective conservation implementation at the landscape-level (Keeley et al. 2018). Landscape-level coordinated water management, outreach and engagement, cooperative weed management, and collaborative fundraising will help build efficiencies, facilitate comparative advantages of partners, and accomplish large-scale restoration and stewardship goals at the GRCC's most important natural areas. Broad and diverse partnerships, alongside years of dedicated effort, will be needed to return high quality functioning wetland ecosystems to the region.

Ecological Significance

Natural Communities and Biodiversity

The Grand River Coastal Corridor (GRCC) falls within an ecological transition zone (or ecotone) between northern and southern hardwood forests, which helps support high levels of biodiversity compared to other parts of the state. Incredibly, 90% of Michigan's natural communities are considered to be at least rare or uncommon in Michigan, and 64% are considered to be at least very rare or local throughout their range (Paskus et al. 2008, Albert et al. 2008). However, over thirty ecosystem types exist within Ottawa County alone, due to its position within an ecotone, including sensitive dunal and coastal plain marsh habitats (Albert et al. 2008, Martinus 2020). Michigan's non-forested wetlands, like the coastal plain marsh and Great Lakes marsh within the corridor, have the highest number of elemental occurrences (EOs, or species and natural communities), at 598, which represents approximately

FIGURE 3. HISTORICAL AND CURRENT OCURRENCES OF WILD RICE (*ZIZANIA AQUATICA AQUATICA*).



Data from Michigan Natural Features Inventory Biotics Database and the Nottawaseppi Huron Band of the Potawatomi Environmental Department. Baron & LaBaine 2018.

44% of all natural community EOs in Michigan (Paskus et al. 2008). Areas with high EOs have been ranked across the state and several high-quality natural communities were identified within Ottawa County, Muskegon County, and the GRCC (Appendix D, Paskus et al. 2008, Cohen & Slaughter 2015).

In instances where high-ranking natural communities had a high number of occurrences within a single sub-section of the state (i.e. several Great Lakes Marsh within the GRCC), the natural communities were compared against one another using the following characteristics: 1) condition/quality (community intactness, structure, human disturbance, invasive species, indicator or rare species), 2) size (sites of small size are more vulnerable to successional changes, invasive species, and "island" effects, while larger sizes are more likely to support higher-level ecosystem function ands and are less vulnerable), and 3) landscape context (identifying landscape buffer conditions and overall landscape condition). The GRCC contains several of these high quality natural communities, which represent the best, most viable occurrences of these natural community types in the state. These high quality areas are important for conservation because they provide the environment necessary for plants and animals to persist over the long-term, through changing environmental conditions, and act as a benchmark for restoration and management projects (Paskus et al. 2008). The top three subsections in the state with the best terrestrial ecological communities include the Southern Lake Michigan Lake Plain, of which the GRCC falls within (Paskus et al. 2008).

Additionally, twelve out of fifteen natural areas within the GRCC have been identified as areas with very high or high levels of biodiversity based on their Floristic Quality Assessment (FQA) scores and The Nature Conservancy's Recognized Biodiversity Value analysis (Anderson et al. 2018). The FQA scores are an indication of the native vegetation present within an area (Martinus 2020; Wilhelm & Rerich 2017; Herman et al. 2017). Please note that while FQA's provide land managers with information on what native species are present in a given area, they do not measure the abundance of the native species present, nor the abundance of non-native species or other ecologically degrading environmental characteristics that could be present. Within this report we utilized FQA scores as an indicator of biodiversity, rather than a measure of the ecological integrity, or quality, of a given habitat. The on-the-ground work needed will vary drastically site-by-site due to local conditions as some sites are more degraded than others.

Migratory Birds

These biodiverse and high quality natural areas help support hundreds of migratory bird species each year. Avian biodiversity across the state of Michigan is relatively high as it lies at the intersection of two migratory flyways, or superhighways, the Atlantic and Mississippi Flyways. This brings over 400 migratory bird species through the state each year, and over 300 species through the GRCC alone (eBird, 2020; Francke et al. 2020). Michigan coastal areas have been recognized as important migratory bird stopover sites where birds congregate to rest and refuel as they journey to and from their wintering grounds (Diehl et al. 2003, Ewert et al. 2005). Radar data shows that the southern Lake Michigan shoreline and near shore areas within Ottawa County in particular, are important migratory hot spots especially during Spring migration (**Figures 4 and 5**, Schools et al. 2012). The importance of the shoreline at the dawn descent is also evident during Fall migration (**Figures 6 and 7**).

Due to its significance for migratory waterbirds in particular, the Lake Michigan shoreline is a globally recognized Important Bird Area. Globally recognized Important Bird Areas support migratory bird conservation in one of the following ways: 1) holding significant numbers of a globally threatened species, 2) supporting a significant population of at least two range-restricted species, 3) holding a significant group of species that are confined to one biome, or 4) holding congregations of greater than 1% of the global population of one or more species on a regular basis. The nearshore waters of Lake Michigan support a globally significant congregation of migratory waterbirds, including the Long-tailed Duck and White-winged Scoter in the tens of thousands each year and is critical to their long-term conservation.

The U.S. Fish and Wildlife Service Upper Mississippi River Valley Great Lakes Joint Venture has created Landbird, Waterbird, Waterfowl, and Shorebird Habitat Conservation Strategies for the region. Focal species were identified within each conservation strategy as *management indicator species*, selected based on their conservation status, and *management umbrella species*, which will benefit a suite of ecologically similar species (Souilliere et al. 2017, 2018, 2020; Potter et al. 2007). 85% of all identified focal species for the region have been observed within the GRCC according to eBird detections, which suggests this area is important for dozens of conservation focal species at various stages of their life cycle (Appendix B). See the online Dashboard to explore eBird data by selecting a focal bird species in the drop down menu and optional date ranges to see where and when different focal species have been observed throughout the corridor over time. Please note that the eBird data reflects the number of detections for each species, but not their relative abundance. The GRCC is well-positioned as an area of high conservation value for focal migratory landbirds, waterbirds, shorebirds and waterfowl alike, across seasons.

Secretive Marsh Birds

A wetland-reliant guild of migratory birds, secretive marsh birds, act as excellent indicators of freshwater wetland quality. Several species are in steep decline across the Laurentian Great Lakes region, with some declines exceeding 60% since the 1990's (Grand et al. 2020). Marsh bird population trends and abundance estimates are limited within the GRCC. Unfortunately, very few Great Lakes Marsh Monitoring Program survey routes are active within the GRCC, and most are concentrated in Muskegon Lake and Muskegon State Game Area. Similarly, none of Michigan Natural Features Inventory statewide marsh bird monitoring routes fall within the GRCC.

In an effort to fill this knowledge gap and obtain baseline data within the GRCC, a partnership between Audubon Great Lakes and Ottawa County Parks and Recreation, organized a volunteer marsh bird survey effort at several high-quality sites including Bruce Bayou, Harbor Island, Ottawa Sands, Stearns Creek and Sag Bay. Surveys were conducted in 2019 and cancelled in 2020 due to COVID-19, but are expected to resume in 2021. While a longer-term dataset is needed to accurately measure population abundance within the GRCC, 2019 results showed a majority of primary and secondary focal species were observed within the GRCC **(Figure 8)**. Of the five sites surveyed, the Sag Bay, Bruce Bayou and Harbor Island were the most species rich, while Ottawa Sands and Stearns Creek had the lowest richness **(Figure 9)**.

Broad-scale datasets like the North American Breeding Bird Survey and Michigan Breeding Bird Atlas (MBBA) do not adequately sample emergent wetlands (Conway, 2011), but they can be useful for suggesting general trends and patterns (Monfils et al. 2003, Kleen et al. 2004). The MBBA I and II indicate losses of focal secretive marsh birds across the state, with decreased detections within Ottawa County and Muskegon County for the following priority species: American Bittern, Black Tern, King Rail, Common Gallinule, American Coot, Black-crowned Night Heron, Blue-winged Teal, Marsh Wren, and Yellow-headed Blackbird (Putnam 2011; Sanders 2011; Getty 2011; Grady 2011). Several focal species have maintained or increased their number of detections within Ottawa and Muskegon Counties between MBBA I and II, including Least Bittern, Pied-billed Grebe, Sora, Virginia Rail and Swamp Sparrow (Brenneman 2011; Putnam 2011; Powless 2011; eBird 2020). Since the MBBA II, there has been an increase in Common Gallinule observations throughout the GRCC as well (Sanders 2011; Francke et al. 2020). This is likely

FIGURE 4. NUMBER OF YEARS (0-6) A POINT WAS A STATISTICALLY SIGNIFICANT HOTSPOT FOR SPRING MIGRATION AT PEAK MIGRATION TIME.

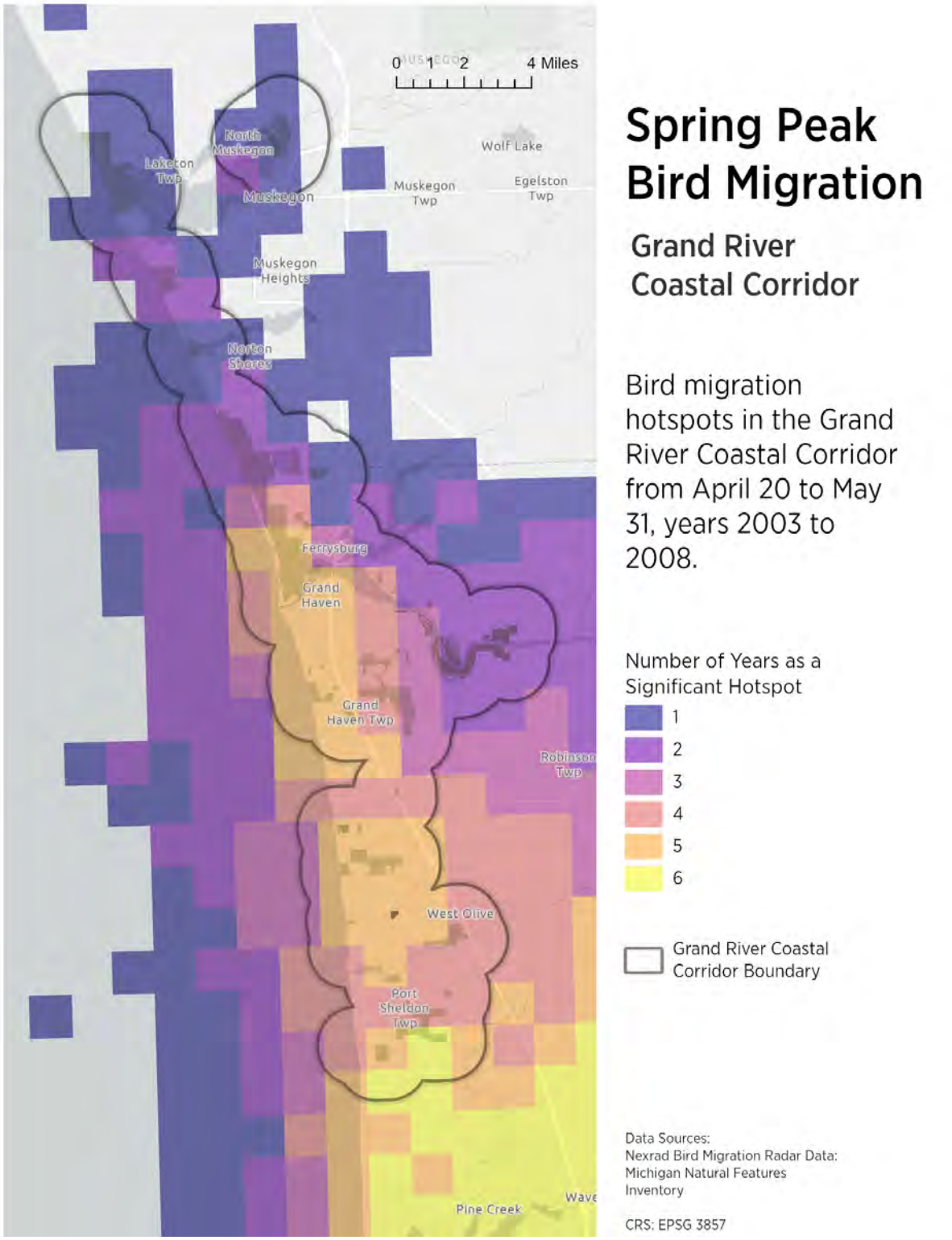


FIGURE 5. NUMBER OF YEARS (0-6) A POINT WAS A STATISTICALLY SIGNIFICANT HOTSPOT FOR SPRING MIGRATION AT PEAK MIGRATION TIME.

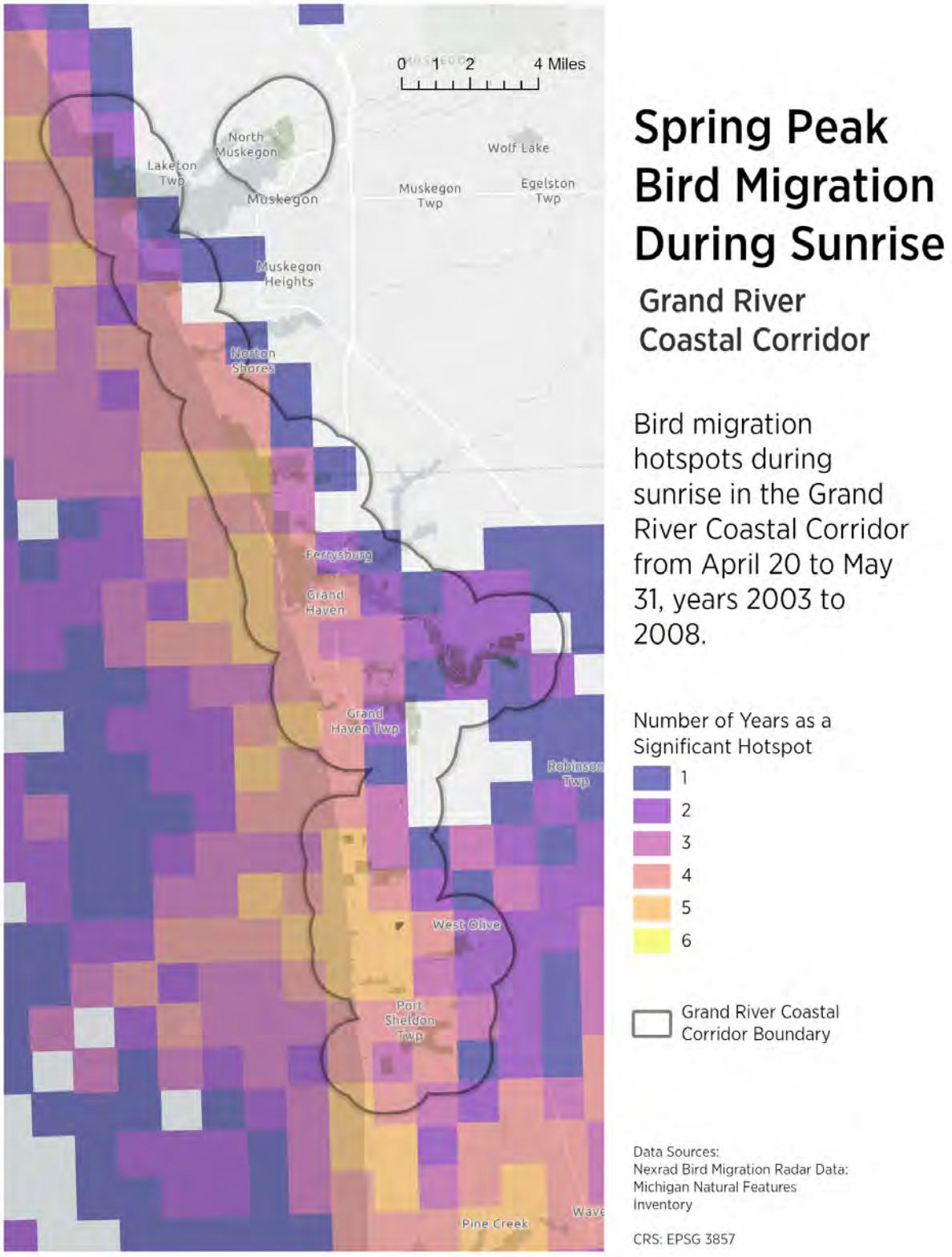


FIGURE 6. NUMBER OF YEARS (0-6) A POINT WAS A STATISTICALLY SIGNIFICANT HOTSPOT FOR FALL MIGRATION AT PEAK MIGRATION TIME.

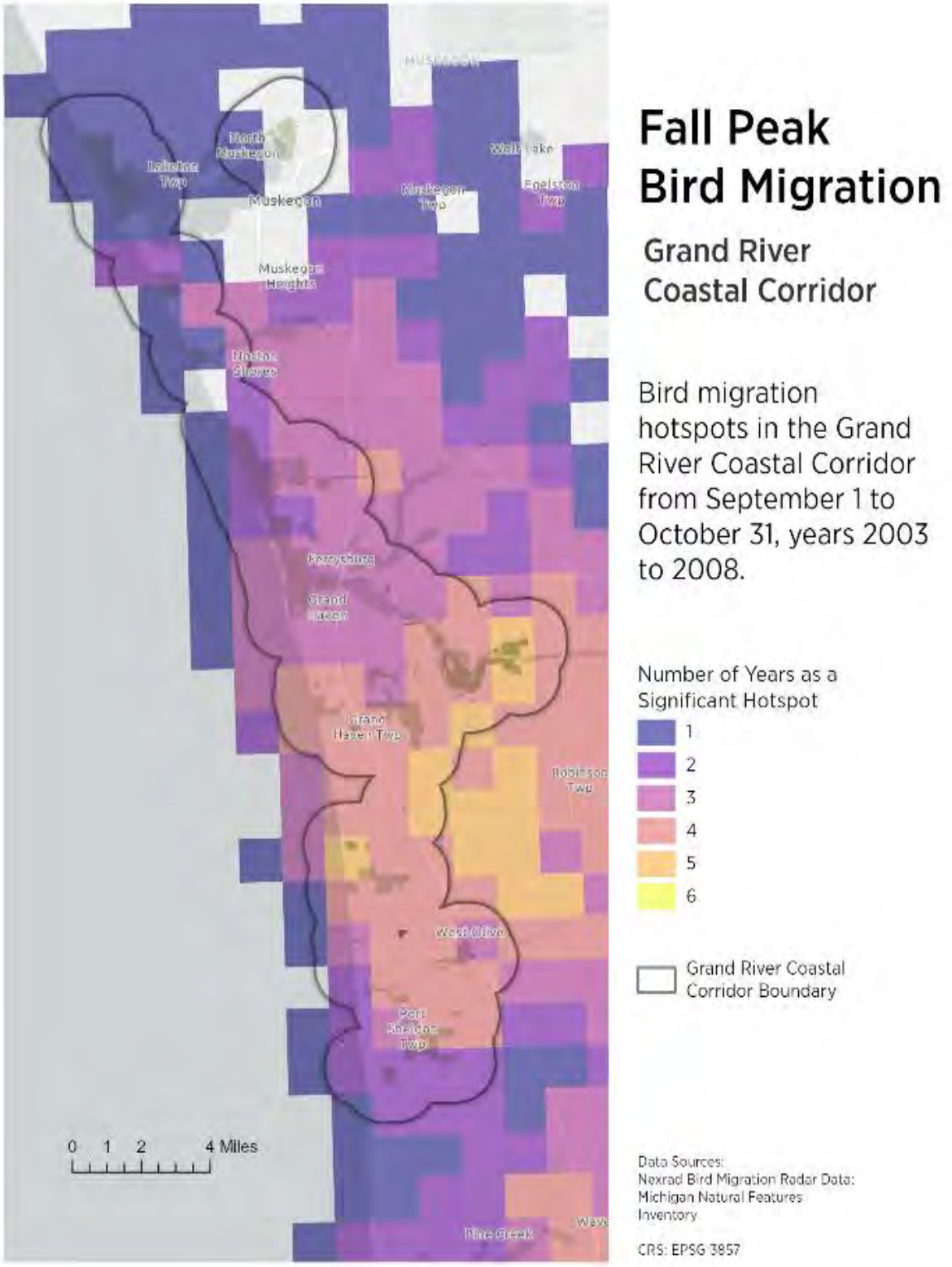
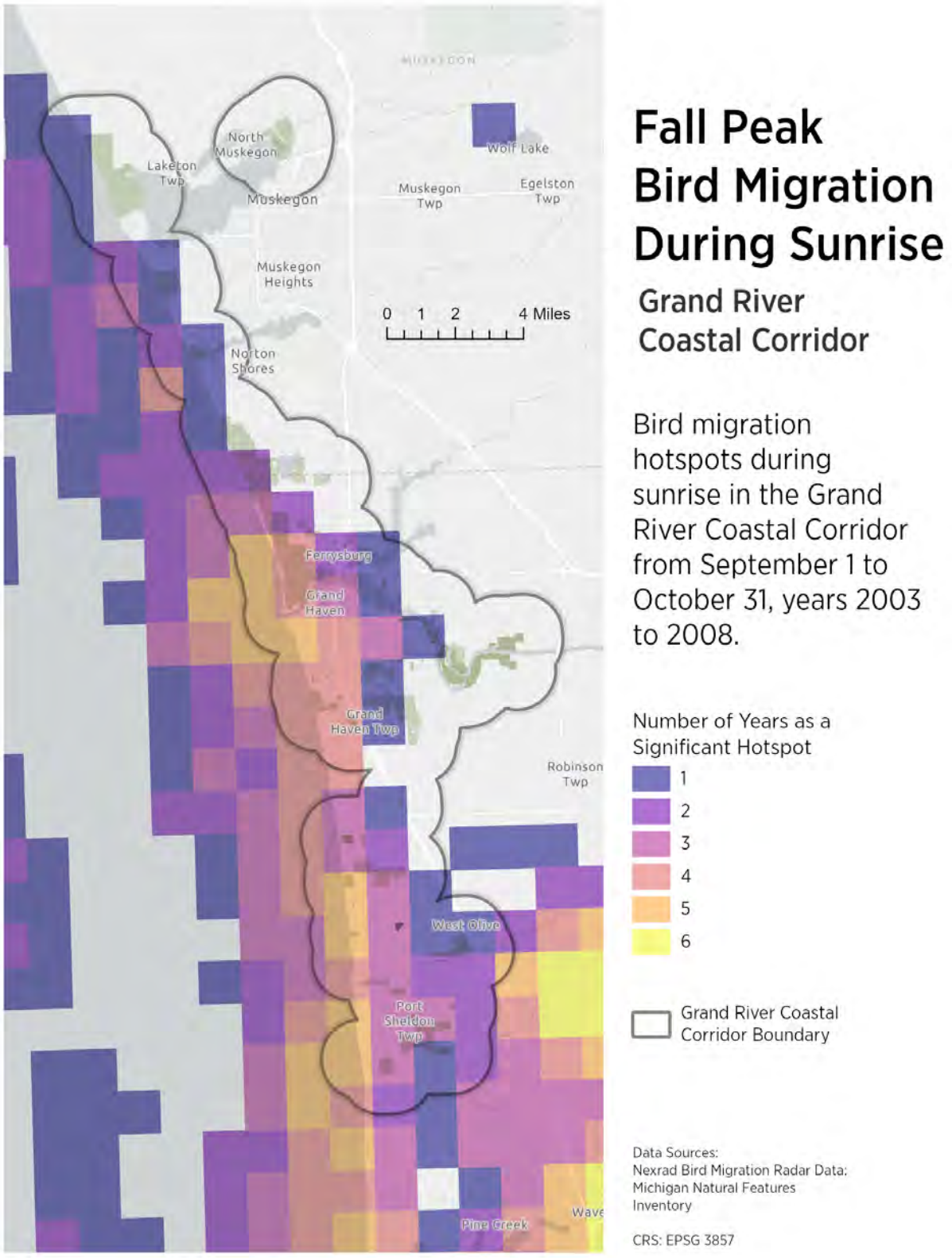


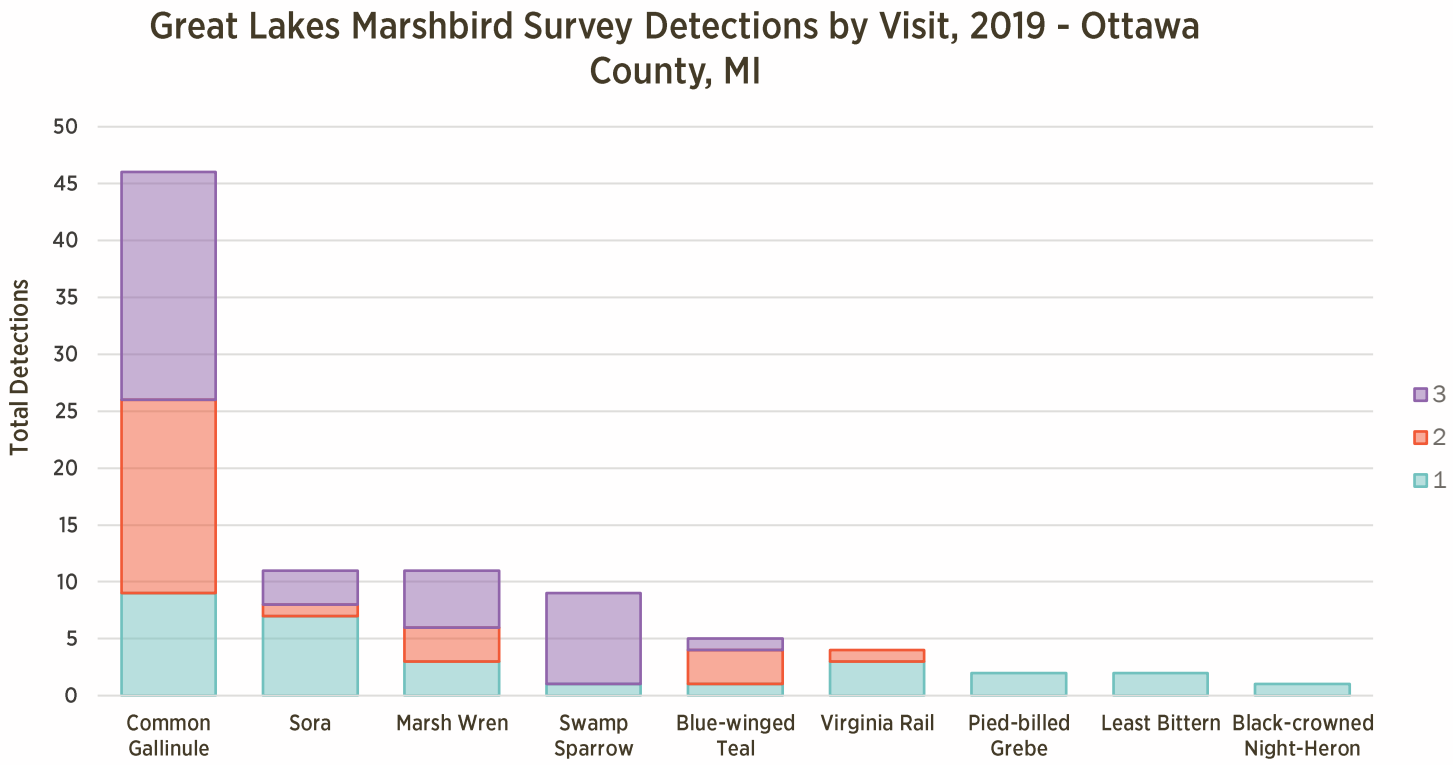
FIGURE 7. NUMBER OF YEARS (0-6) A POINT WAS A STATISTICALLY SIGNIFICANT HOTSPOT FOR FALL MIGRATION AT SUNRISE.



due to higher water levels being experienced across the region and could similarly benefit other deep water obligates like the Pied-billed Grebe, Least Bittern, Yellow-headed Blackbird, and Marsh Wren while negatively impacting shallow water breeders to leave the corridor (i.e. Sedge Wren, King Rail, Swamp Sparrow).

Audubon recently conducted an analysis to prioritize coastal wetlands for marsh bird conservation in the Great Lakes by modeling the occurrence of 14 focal marsh bird species against several habitat variables (Grand et al. 2020). This spatial prioritization identified coastal wetlands that can optimize biodiversity while being mutually beneficial to both wetland-reliant wildlife and human well-being. This analysis also identifies priority areas for future protection and restoration efforts where they could have the greatest impact. See the Dashboard, which visualizes the revised analysis outlining the top 20% of wetlands throughout the GRCC. This includes a gap analysis, which categorizes wetlands that are unprotected (pale grey), with no known mandate for protection (dark grey), and protected (blue outline), but with natural disturbance suppressed. The wetlands to the east of Muskegon Lake are composed almost entirely of top 20% wetlands important for marsh bird conservation (Figure 10). Additionally, a majority of the GRCC core area surrounding Grand Haven falls within the top 20% of wetlands for marsh bird conservation, making the core area a particularly vital important corridor for marsh birds (Figure 11).

FIGURE 8. GREAT LAKES MARSH BIRD SURVEY DETECTIONS BY SITE VISIT, 2019. BLUE INDICATES THE FIRST SITE VISIT (MAY 1 – MAY 14), RED INDICATES THE SECOND SITE VISIT (MAY 15 – MAY 31), AND PURPLE INDICATES THE THIRD SITE VISIT (JUNE 1 – JUNE 15).



Fisheries

Other wildlife, like mammals, reptiles, amphibians and invertebrates are reliant on Great Lakes coastal wetlands for feeding, resting, breeding and rearing their young. Over half of our Great Lakes fish species are known to inhabit coastal wetlands for at least part of their life cycle. The Lake Michigan Committee, which represents fishery management agencies of Lake Michigan, recently outlined their top five environmental impediments and recommended action priorities in order to support fish communities within Lake Michigan over the next 5 years. Coastal wetland reconnection and restoration, softening of the shoreline, and increasing submerged aquatic vegetation were identified priorities, as these conservation actions will provide spawning and nursing

habitats for multiple species of concern, including Lake Sturgeon, Lake Whitefish, Yellow Perch, Esocids and Centrarchids. The southern basin nearshore of Lake Michigan, which includes the coastal portion of the GRCC, was identified as a focal area for coastal wetland conservation. Additionally, in-stream habitat restoration was identified as a priority, which is critical for providing reproductive habitat for multiple species of common concern, particularly Lake Sturgeon and Salmonines. The specific focal area for in-stream habitat restoration is the Grand River, below the Sixth Street Dam, where the GRCC lies.

MI Department of Natural Resources and Department of Environment, Great Lakes & Energy have also identified the Grand River Coastal Corridor as extremely important for Lake Sturgeon, which are state threatened. The population of Sturgeon within the river is small (<200) and declining. Populations of this size are most at risk of dropping below the minimum viable population level and are of highest risk of conservation need (Hay-Chmielewski & Wehan 1997, Hayes & Caroffino 2012). The Grand River has also been identified as a high suitability location for Lake Sturgeon. Improving water quality, riparian habitats, and restoring connectivity could benefit Lake Sturgeon within the GRCC and Lake Michigan (Hay-Chmielewski & Wehan 1997, Hayes & Caroffino 2012).

FIGURE 9. SPECIES RICHNESS AND RAW COUNTS BY SITE – OTTAWA COUNTY, MI – 2019.

Species Richness and Raw Counts - Ottawa County, MI - 2019

Site	Common Gallinule	Sora	Swamp Sparrow	Blue-winged Teal	Virginia Rail	Marsh Wren	Least Bittern	Pied-billed Grebe	Black-crowned Night-Heron	American Bittern	Total	Species Richness (max: 10)
Sag Bay	1	1	4	3	1	6	1				17	7
Bruce Bayou	42	8			1		1	2			54	5
Harbor Island	3	2		1		5			1		12	5
Ottawa Sands			2		2						4	2
Stearns Creek			3	1							4	2

Climate Resiliency

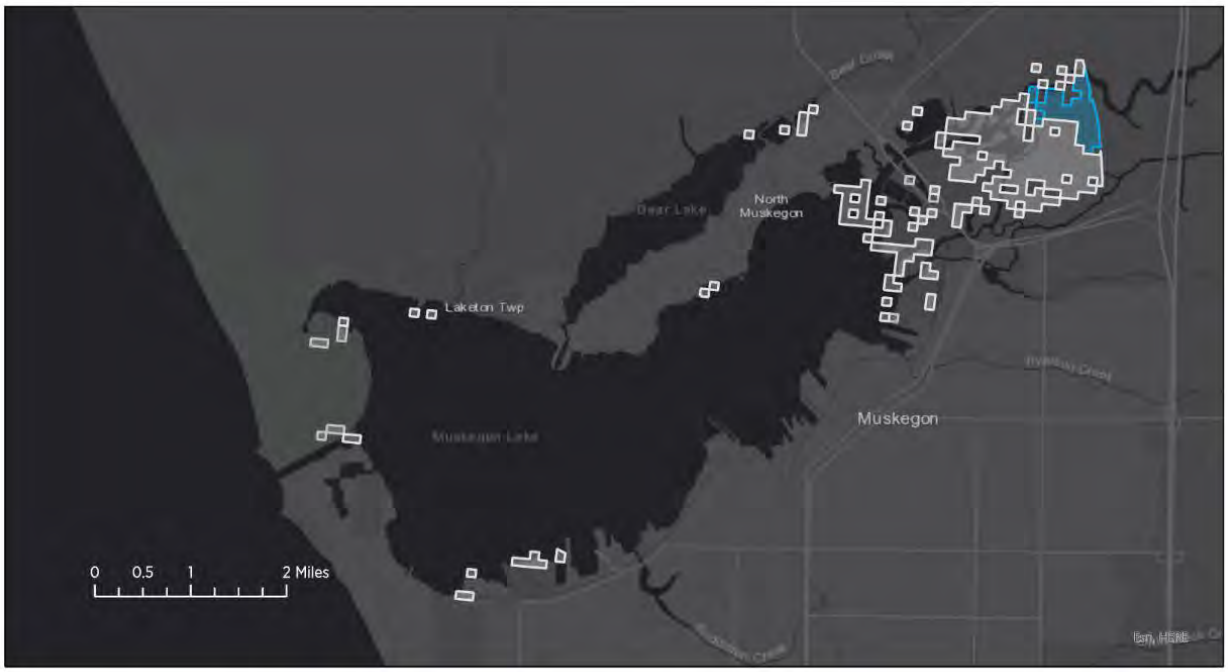
The Nature Conservancy's recent work mapping climate resilient lands, connectivity and climate flow, and biodiversity values across the eastern U.S. also highlights the GRCC as an area that is of high relative biodiversity value with lands that are above average for climate resiliency (Anderson et al. 2018). The most resilient lands within the GRCC include much of the Lake Michigan shoreline, North Ottawa Dunes, Ottawa Sands, Mulligan's Hollow, Grand Haven State Game Area, and Connor Bayou. To the north, Hoffmaster State Park, Lake Harbor Park, Muskegon State Park, and the wetlands within and adjacent to Muskegon State Game Area are highly resilient. Many climate resilient sites are adjacent to Audubon's top 20% of wetlands for marsh bird conservation (Table 1), with developed areas directly surrounding much of the top 20% of wetlands. Visit the Dashboard to view the Nature Conservancy Climate Resiliency data layer overlaid with the top 20% wetland analysis. Conserving the unprotected wetlands within the core area and expanding buffer zones to nearby urban areas could increase the climate resiliency of these communities.

The climate resilient sites within the GRCC have varying degrees of connectivity and climate flow, which refers to the gradual movement of populations in response to changes in the climate. Over time, climate flow results in range shifts and the formation of new natural communities. Connectivity and climate flow are separated into four different categories: diffuse flow, concentrated flow, constrained flow, and blocked or low flow. Diffuse Flow areas are extremely intact natural areas that consequently facilitate high levels of dispersed flow that spreads out to follow many different and alternative pathways. These areas are extremely important to conserve in order to keep them intact and prevent the flow from becoming concentrated

(Anderson et al. 2018). Concentrated flow areas occur where large quantities of flow are concentrated through a narrow area. Because of their importance in maintaining flow across a larger network, these pinch points are excellent candidates for land conservation.

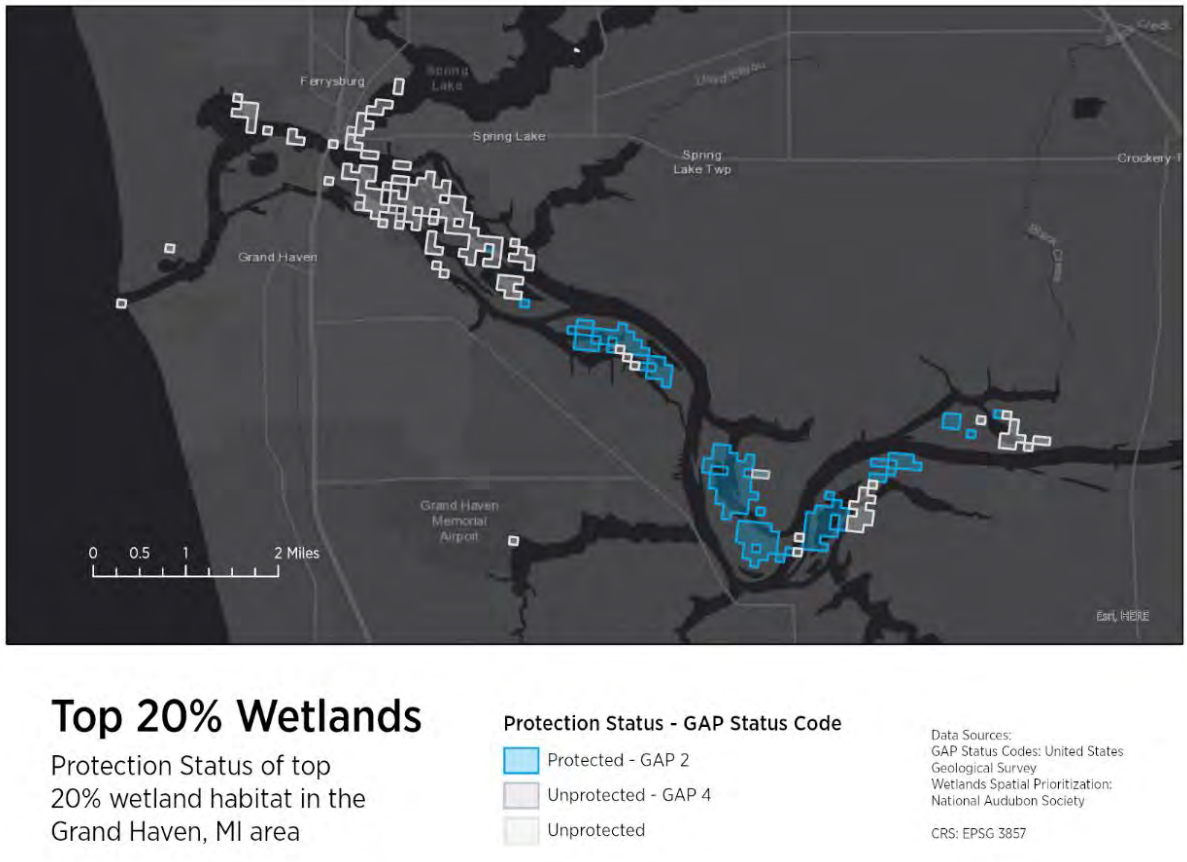
The GRCC is home to both diffuse and concentrated flow areas with minimal flow connectivity between natural areas (Table 1).

FIGURE 10. COASTAL WETLANDS SPATIAL PRIORITIZATION WITHIN THE GRAND RIVER COASTAL CORRIDOR MUSKEGON AREA.



In a time where humans have altered over 75% of our global landscapes, urban areas have more than doubled, natural areas are declining globally at unprecedented rates and species extinctions are accelerating, it is imperative that remaining habitats are conserved and degraded habitats are restored for the benefit of both wildlife and people. Conservation and restoration should be prioritized in areas of high conservation value where conservation work could have the greatest impact. High Conservation Values are measured by an area's species diversity, landscape-level ecosystems and mosaics, ecosystems and habitats of conservation concern, ecosystem services, community needs, and cultural values (Brown et al. 2013). The Grand River Coastal Corridor is an area of high conservation value as it fits all of these criteria on a state, regional, and global level. The GRCC is home to some of the highest quality natural communities in the state and supports high levels of biodiversity, including species of conservation concern. The GRCC is also part of a globally recognized Important Bird Area and is home to 1,475 acres of wetlands that have been identified as critical for marsh bird conservation in the Great Lakes Region. The corridor supports great numbers of migratory birds each spring and fall, who have seen great breeding population losses since 1970, across all guilds. The corridor also provides ecosystem services to communities in the form of stormwater and carbon storage, water filtration, and more. Additionally the GRCC holds cultural value for the Gun Lake Tribe for Wild Rice management and fishing. While the corridor is fragmented, there are opportunities to decrease that fragmentation through a landscape-scale conservation approach.

FIGURE 11. COASTAL WETLANDS SPATIAL PRIORITIZATION WITHIN THE GRAND RIVER COASTAL CORRIDOR CORE AREA.



Ecological Threats

Habitat Loss and Degradation

The GRCC suffers from many of the same threats that negatively impact the coasts in the Great Lakes region. Habitat loss and degradation combined with the impacts of **climate change** are driving the majority of biodiversity loss in the region. In the GRCC stakeholders identified several **high priority invasive species** which are degrading habitat and limiting wildlife conservation efforts. Top species of concern include:

- Amur Honeysuckle
- Autumn Olive
- European (Smooth) Frogbit
- Garlic Mustard
- Hemlock Woolly Adelgid
- Japanese Barberry
- Narrowleaf and Hybridized Cattail
- Phragmites Australis
- Purple Loosestrife
- Spotted Knapweed

While most stakeholders highlighted invasive species as a top threat, some also believe the coordinated efforts of the Cooperative Invasive Species Management Area (CISMA) and partnership Ottawa County Parks have formed are adequately addressing the threat. CISMA leaders urged that there is still much work to be done however. Continued efforts to prevent the spread of new invasive species and identify invasions early are the most efficient in curbing this threat. See the Dashboard and use the drop-down menu in the top right hand corner to view the locations of observed priority invasive plants identified by stakeholders that were submitted to the Midwest Invasive Species Information Network (MISIN 2020). Select a date range to view invasive species presence within the corridor over time.

Forest understory plant species and native forbes have also struggled to thrive in some parts of the corridor due to large local deer populations. Several stakeholders mentioned deer as a limiting factor in getting native plant species established in forest understories, shrublands, and even wetlands as deer have decimated young plants.

TABLE 1. FLORISTIC QUALITY ASSESSMENT (FQA), CLIMATE RESILIENCY STATUS, AND CONNECTIVITY AND CLIMATE FLOW STATUS OF PROPERTIES WITHIN THE GRAND RIVER COASTAL CORRIDOR. SITES THAT FALL WITHIN THE CORE AREA ARE IN GREEN.

Property Name	Landowner	Biodiversity ranking (based on FQA scores)	Climate Resiliency Status	Connectivity and Climate Flow Status	Within or adjacent to top 20% wetlands
Hoffmaster State Park	MI DNR	High	Resilient, Recognized Biodiversity	Concentrated Flow	Adjacent
North Ottawa Dunes	Ottawa County Parks	Very high	Resilient, Recognized Biodiversity	Limited Concentrated Flow	Adjacent
Ottawa Sands	Ottawa County Parks	Very high	Resilient, Recognized Biodiversity	No Flow	Adjacent and within
Kitchel Dunes Preserve	City of Ferrysburg	Very high	Resilient, Recognized Biodiversity	Limited Concentrated Flow (offshore only)	Adjacent
North Beach Park	Ottawa County Parks	Moderate	Resilient, Recognized Biodiversity	Concentrated Flow (offshore only)	Adjacent
Stearns Creek Park	Ottawa County Parks	Unknown	Resilient, Recognized Biodiversity	Concentrated Flow	Adjacent and within
Palomita Preserve	Land Conservancy of WE MI	Very high	Resilient, Recognized Biodiversity	Limited Concentrated Flow	Adjacent
Rosy Mound Natural Area	Ottawa County Parks	Very high	Resilient, Recognized Biodiversity	No Flow	Adjacent
Hofma Park	Grand Haven Twp.	Very high	Resilient, Recognized Biodiversity	Limited Diffuse Flow	Adjacent
Connor Bayou	Ottawa County Parks	High	Resilient, Recognized Biodiversity	Concentrated Flow, Diffuse Flow	Adjacent
Black Lake parcel	Spring Lake Township	Moderate	Resilient, Recognized Biodiversity	No Flow	Adjacent
Hiawatha Forest	Ottawa County Parks	Very high	Resilient, Recognized Biodiversity	Diffuse Flow	Adjacent
Port Sheldon Natural Area	Ottawa County Parks	Very high	Resilient	Diffuse Flow, Concentrated Flow	Adjacent
Hemlock Crossing	Ottawa County Parks	High	Resilient, Recognized Biodiversity	No Flow	Adjacent
Lakeshore Disk Golf Course	Spring Lake Township	Moderate	Not Resilient, No Recognized Biodiversity	No Flow	Adjacent
Muskegon State Park	MI DNR	Very high	Resilient, Recognized Biodiversity	Concentrated Flow	Adjacent

Further habitat loss and fragmentation from development is also a strong concern for stakeholders. With Ottawa County's growing population and demands for more single-family homes, it is important to conserve and manage the remaining wetlands within the GRCC in a way that supports the continued presence of these secretive marsh birds while creating transition zones that can provide coastal protection for upland homes and agricultural resources. Figure 12 imagines an ideal coastal landscape in which vegetation and topography (i.e. dunes) create natural forms of protection. The existing landscapes surrounding coastal habitats that are adjacent to urban areas are typically very different. Building resilience involves protecting or restoring existing natural habitats that provide protective value, as well as using management to improve the integrity and resilience of remaining natural habitats. With new efforts across the globe and within the United States to

FIGURE 12. NATURAL BARRIERS SUCH AS BEACHES, DUNE VEGETATION, WETLANDS, COASTAL FORESTS, AND VEGETATED STREAM BUFFERS PROTECT RESIDENTIAL AREAS, URBAN AREAS, AND AGRICULTURAL AREAS FROM FLOODING, EROSION, AND INUNDATION.

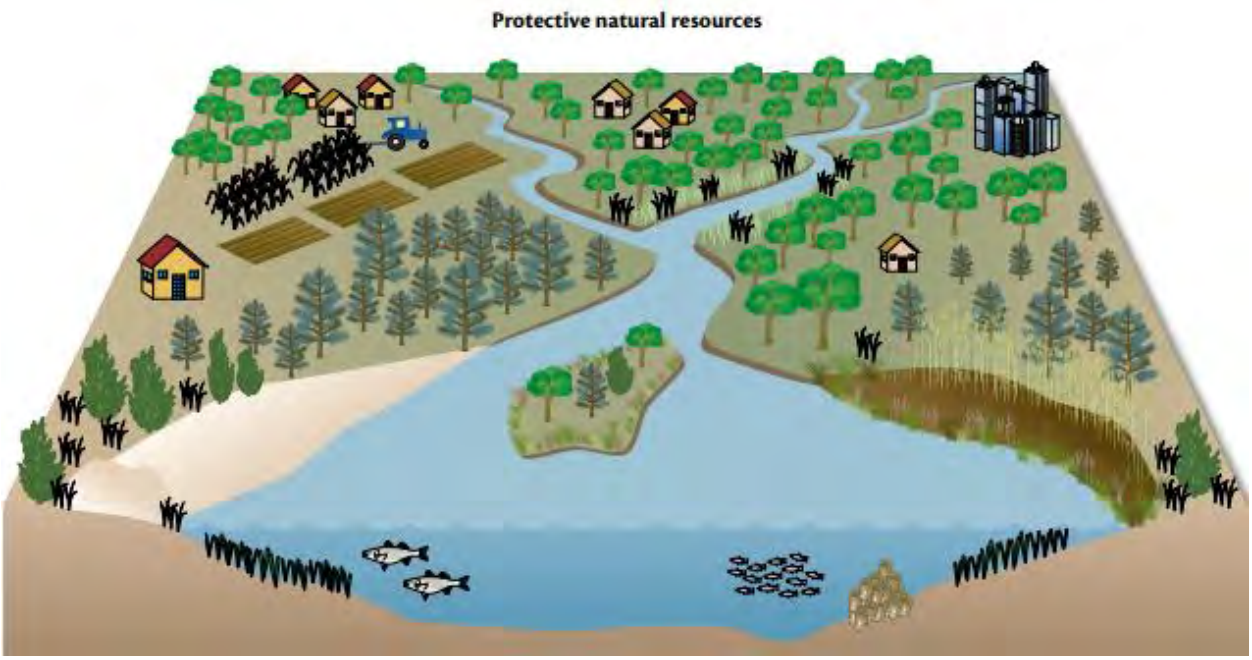


Diagram courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science. Source: Boesch, D.F. (editor) 2008. Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change Phase I: Sea-level rise and coastal storms. Report of the Scientific and Technical Working Group of the Maryland Commission on Climate Change. University of Maryland Center for Environmental Science, Cambridge, Maryland. This report is a component of the Plan of Action pf the Maryland Commission on Climate Change, submitted to the Governor and General Assembly pursuant to Executive Order 01.10.2007.07.

set goals and track progress toward protected area acres (Convention on Biological Diversity 2020), it is an opportune time for landowners and conservation partners of the GRCC to set specific land protection targets. Currently only 31% of the priority wetlands in the GRCC are protected, providing an immediate opportunity to increase legal protection of critical wetland areas.

Climate Change

Climate change is not being adequately addressed in the GRCC from a mitigation or adaptation perspective. While several stakeholders have established Resiliency Plans (i.e. City of Grand Haven, Grand Haven Charter Township), a number of them noted that due to recent high water levels, management and mitigation have primarily been reactionary. Due to current mitigation needs and costs, resiliency plan implementation has slowed when it is perhaps needed most. Climate change is rapidly advancing the global loss of biodiversity, and a recent report suggests that the impacts will be widespread in the Great Lakes region (Wuebbles et al. 2019). These disturbances will include warmer temperatures, heavy precipitation and flooding, more extreme weather events (i.e. heat waves and storms), spread of invasive species, and impacts to water quality (Wuebbles et al. 2019). Audubon's 2019 report found that 64% of bird species (389 of 604) across breeding and non-breeding seasons in North America were moderately or highly vulnerable to climate change (Bateman et al. 2020). In Michigan, 55 species are highly vulnerable to climate change due to significant shifts in climatic suitability. This includes several species already in significant conservation concern such as:

- Yellow Rail
- Piping Plover
- Bobolink
- Henslow's Sparrow
- Cerulean Warbler
- Wood Thrush

Audubon's report also showed that if we are able to limit global warming scenarios to 1.5° C increases, then the number of highly vulnerable bird species in Michigan lowers from 55 to 6. The GRCC is in an ecological transition zone (ecotone) and therefore climatic shift could have a more dramatic impact on species loss (Allen & Breshears 1998).

Climate change impacts in coastal regions of the Great Lakes include the current rapid fluctuations of lake levels along with a great uncertainty of future average levels and rate of change. These are magnified by intensified storms and urban development in coastal areas where

aging infrastructure is threatened. Both high water levels and increased storm events are contributing to water quality issues as erosion and nutrient and contamination runoff increase. In fact, Chloride and Nitrate contamination of groundwater is increasing throughout Ottawa County and many of these hotspots exceed the drinking water standards by 2-5 times (IWR and DCEE 2013). While several studies have suggested that individual wetlands have the potential to improve water quality (Cheng 2000, Thorslund et al. 2017, Fennessy & Craft 2011), this is usually limited by a spatial disconnect between high-density wetland areas and Nitrate hot spots. Increasing landscape-scale wetland areas by just 10% can help remove twice as much Nitrate in affected watersheds (Cheng et al. 2020). Conservation and restoration of wetlands within the GRCC could improve water quality while increasing climate resiliency.

Wetlands and dunal areas are under particular threat to climate change in the GRCC and resiliency and adaptation measures must be highly prioritized by a diverse group of partners in order to maintain current biodiversity levels. Protecting and expanding large areas of natural habitat is perhaps the greatest adaptation response to climate change while also directly providing refuge for species at risk. Areas within the coastal zone and that connect existing areas should be prioritized for protection and for shifts from grey to natural infrastructure. Mainstreaming habitat and climate resiliency goals into city, county and regional planning will be critical. The redevelopment of the Sims Site of the Grand Haven Board of Light and Power on Harbor Island is a great example of the need for holistic master planning that includes habitat and climate change considerations (see recommendations section below).

Audubon's 2019 climate report identified and modeled 9 climate threats that communities and birds will face at a 1.5° C and 3° C warming scenario. These climate threats include: drought, false spring, fire weather, urbanization, spring heat waves, heavy rain, lake level rise, and cropland expansion. While extreme weather events had the most extensive spatial coverage and contribution to risk, urbanization and water level rise also had disproportionate impacts on species relative to their coverage (Bateman et al. 2020). The most persistent climate threats within the GRCC at both warming scenarios was urbanization, fire weather, and heat.

Wastewater Discharge, Hazardous Materials and Ozone

Due to increases in urbanization and industrialization over time throughout and surrounding the Grand River Coastal Corridor, local communities and wildlife are exposed to increased amounts of wastewater discharge, hazardous waste, and ozone. Utilizing the U.S. Environmental Protection Agency EJScreen Mapping Tool (US EPA 2020), Ozone levels throughout the corridor are in the 80-100th percentile for the state of Michigan, increasing along the southern end of the corridor. Ozone can impact human health, particularly in people with asthma, children, older adults, and people who are active outdoors, especially those that work outdoors. Children are at greatest risk because their lungs are still developing, they are more likely to be outside when Ozone levels are high, and they are more likely to have asthma. Ozone can make it more difficult to breathe deeply, can cause shortness of breath, can cause coughing and a sore scratchy throat, aggravate existing lung disease, increase the frequency of asthma attacks and make the lungs more susceptible to infection.

Additionally, Proximity to Hazardous Waste, Risk Management Plan sites, and Superfund sites is also in the 80-100th percentile for the state in parts of Grand Rapids, City of Muskegon and City of Grand Haven. Wastewater discharge is also in the 80-90th percentile for the state of Michigan throughout the Grand River Coastal Corridor (US EPA 2020). These potential sources of pollution could negatively impact water quality, ecosystem health and function, and wildlife and human well-being.

Water Table and Aquifer Recharge

Stakeholders noted that due to current historic high water levels on Lake Michigan, the water table within the Grand River Coastal Corridor has risen, putting more strain on infrastructure during storm events. Flooding and private property damage have been more common as the higher water table is unable to accommodate additional water. Some residents have inquired as to whether the water table could be lowered artificially. Efforts have been made to keep storm drains clear of debris to prevent water from backing up, but in many instances there simply isn't anywhere else for the water to go. Flooding can also lead to erosion, which was a concern for several stakeholders, particularly along the mouth of the Grand River and along Lake Michigan shoreline. The implementation of existing Resiliency Plans and the expansion of Green Stormwater Infrastructure throughout the corridor could assist with stormwater management during these high water table years. Wetlands restorations and installations within the corridor can also help mitigate flooding in nearby communities by intercepting and slowing down stormwater runoff, reducing stream velocity, and providing storage areas for stormwater runoff.

Despite the historic water levels, high water table, and flooding, an emerging and complex threat in the GRCC is the inability to adequately recharge the deep groundwater aquifer. Ottawa County is composed of

two aquifers, one of which is shallow and composed of lacustrine (lake) deposits, outwash and dune sand, while the other is a deep fractured bedrock aquifer primarily made of shale (IWR and DCEE 2013). The regional shallow aquifer is more easily recharged throughout the GRCC, however it seems that clay deposits throughout the county are acting as a confining layer, preventing surface waters from recharging the deeper aquifer. This is affecting communities on the east side of the county, which falls outside of our corridor boundary. However, there is a possible direct connection between the shallow and deep aquifer in the Pigeon River and Pigeon Lake Area, which falls within the southern GRCC boundaries. While there are no priority wetlands (top 20%) for marsh bird conservation in this area, there are wetlands that fall within the top 50% of Audubon's Spatial Prioritization along the length of the Pigeon River from Lake Michigan, past Hemlock Crossing. Wetland conservation in this area and at a larger watershed-level could benefit marsh birds while recharging the deeper aquifer.

Community Engagement

Long-term durable conservation is only successful when diverse groups of people are included in the process and benefiting from the outputs. According to stakeholders, visitation to natural areas in the GRCC tend to be largely comprised of white, wealthy people (Ottawa County Parks and Recreation 2020). While Ottawa County's demographics are also mostly white (83.4%), there is a 10.2% Hispanic or Latino population, 3% Asian population, 2% two or more races population, and 1.9% Black or African American population that are historically underrepresented in natural resources engagement and outdoor recreation. Nearby Muskegon County and Kent County have larger Black or African American populations (14%, and 10% respectively), and Hispanic or Latino populations (5.8% and 10.8% respectively) that could engage with the natural areas within the Grand River Coastal Corridor. While several stakeholders expressed interest in engaging with underrepresented communities, many also noted that there was a lack of knowledge on how best to do so. There is a lack of organizations and programs working to address this issue within the corridor.

In Kent County, there is an existing partnership with Groundswell, Our Community's Children, and Grand Rapids Parks and Recreation to increase engagement with communities of color and youth in natural spaces. These stakeholders have expressed interest in expanding their work west into Ottawa County and the Grand River Coastal Corridor, but capacity-building through additional partnerships and fundraising is needed.

Recommendations

Conservation and Restoration

High-quality remnant and restored habitats are not static systems that will always maintain their quality. There are many influences on habitat quality including invasive species encroachment, the natural growth and death of woody plants, and periodic flooding. These are all inevitable factors of conservation, which need to be accounted for. The guiding hand of stewardship and proper adaptive management will help these habitats maintain their quality and diversity of species that these habitats can serve. Monitoring can ensure when and where to apply management strategies to see these benefits maximized.

Restoring and maintaining habitats across the GRCC addresses the multiple threats to conservation in the region, including invasive species encroachment and climate change. Restoration of sites throughout the corridor improves the resiliency of the entire system and can maintain the corridor's significance for migratory species. While there are many areas to monitor and manage, this report has identified several priorities areas that can increase habitat connectivity and increase the region's resiliency across the Grand River Coastal Corridor's wetlands and coastline, as outlined in Table 2.

TABLE 2. PRIORITY AREAS FOR WETLANDS CONSERVATION AND RESTORATION. HIGHEST PRIORITY IN GREEN.

Property Name	Landowner	Protection Status
Ottawa Sands	Ottawa County Parks	Protected
The Sag	Ottawa County Parks, North Shore MHC LLC, Buckeye Terminals	Somewhat Protected
Harbor Island	City of Grand Haven, SHM Grand Isle LLC, Halls GH LLC	Somewhat Protected
Dornbos Island	Gail Ringelberg Trust	Unprotected
Unnamed islands East of Dornbos Island (several)	Charles Johnson, Probst Family Trust	Unprotected
Owashtanong Islands Sanctuary	Michigan Audubon Society	Yes
Martinique Island	Michigan Audubon, Teddy's Land LLC	Somewhat Protected
Muskegon Marshland Parcels (several)	Consumers Energy, City of Muskegon	Unprotected, Unknown

FIGURE 13. HEMI-MARSH DIVERSITY DEPENDS ON WATER.

One restoration target in the corridor is the increase in hemi-marsh throughout the region's coastal wetlands. Hemi-marsh (Figure 13) is a type of wetland habitat, which maintains a patchy mixture of open water and emergent vegetation, such as cattail or bulrush. This habitat creates many small habitats for fish, birds including waterfowl and secretive marsh birds, and other wetland-dependent wildlife to forage, hunt, and raise young. Migratory birds can use the diverse, patchy landscape as a refuge. In addition, hemi-marsh is a high-quality habitat, which can provide year-round benefits for people due to its high ecological value, including fishing, birding, and hunting, while mitigating the effects of flooding.

Hemi-marsh is largely influenced by water levels, as the natural pattern of vegetative growth during low waters and die-off during high water periods creates the mix of open water and vegetation that creates the rich hemi-marsh habitat. Areas of shallow and deep water within this system drive the diversity of habitat niches within the system and build resiliency to the entire wetland, as the habitat itself can adapt and rebound from long periods of low or high water.

Because of the significant impact of water levels on hemi-marsh, the most important way to restore hemi-marsh is through regaining the natural connection to the river. When physically reconnecting wetlands is impractical, structural improvements like water control structures and weirs can allow landowners to mimic natural fluctuations of water levels. In a system like the Grand River Coastal Corridor, dikes, levees, or culverts have separated wetlands from their riverine connection and can limit the production and maintenance of hemi-marsh. Managing a more integrated system of wetlands will increase the corridor's resiliency, as hemi-marsh is meant to fluctuate over time as a response to daily, seasonal, yearly, and longer fluctuations in water levels as illustrated in Figure 14.

When restoring, expanding, or creating wetlands, it is important to also consider their size and configuration. Marsh birds in particular are sensitive to human disturbance, so trails and boardwalks should occur on the periphery of substantial wetlands. These areas should also be open and free of tall trees, as marsh birds tend to avoid wetlands with too much woody vegetation. Effort should also be made to make the wetlands as large and cohesive as possible; one large

FIGURE 14. THIS PROFILE OF A COASTAL WETLAND ILLUSTRATES WHAT HAPPENS WHEN WATER LEVELS CHANGE FOR PROLONGED PERIODS OF TIME (A FEW YEARS). HIGH WATER KILLS SHRUBS AND TREES AND CAUSES VEGETATION TO MIGRATE INLAND. LOW WATER ALLOWS SHRUBS, GRASSES AND SEDGES TO SPREAD LAKEWARD.

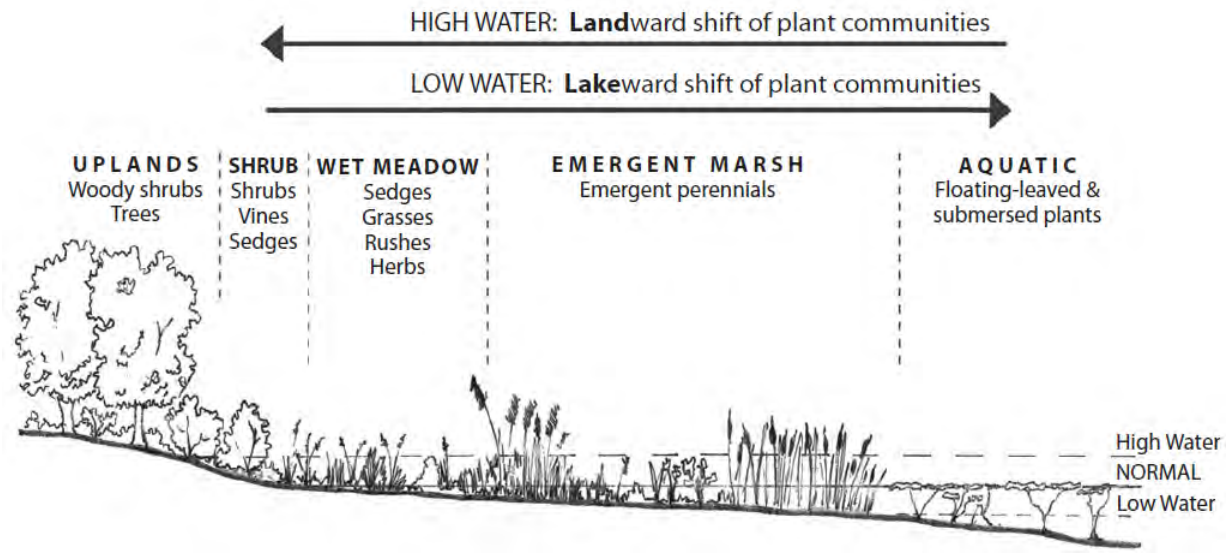


Figure from Lake Huron Center for Coastal Conservation.

wetland can provide better habitat for marsh birds than several small, separate ones.

While water level control is an important tool in hemi-marsh restoration of isolated wetlands, it is only one tool in the toolkit to maximize the diversity of hemi-marsh habitat. Coastal wetlands are under threat by aggressive invasive species, such as the common reed, purple loosestrife, and narrowleaf cattail. These plants can overwhelm a wetland, creating dense stands of vegetation that reduce resources for foraging and nesting birds. Removing and controlling these invasive species allows native species to compete.

Dense vegetation limits marsh bird access to open water. Fire, a common "disturbance" in natural settings, can be used as a technique for reducing the density of vegetation, removing woody plants, and even invigorating new growth. Contained burns reduce the amount of vegetation in a wetland, creating a patchier, more diverse habitat. Clearing vegetation or using water-safe herbicides can create openings for marsh birds when burning is not possible or practical.

Where wetlands have natural features that drive diversity, it is best to embrace these features as management assets. For example, muskrats and beavers are often seen as pests and actively removed from wetlands, but they play very important roles in driving ecosystem diversity. Beavers build dams and muskrats eat emergent vegetation, helping to create the mix of open water and vegetation critical for nesting birds. Natural shorelines of coastal wetlands should be protected because the daily, seasonal, and annual water level fluctuations enhance wetland diversity. Developed, hardened shorelines should be removed or softened to reconnect the wetlands to these natural flow dynamics.

Audubon's marsh bird spatial prioritization documents several large stretches of high-ranking wetlands in the GRCC. The Corridor has a significant number of wetlands (approximately 1,264 acres) ranked within the top twenty percent of all the Great Lakes. Some of these highest-ranking wetlands are legally protected including the southern section of Dermo Island, Indian Channel, islands near Stearns Bayou, Grand Haven State Game Area, and portions of Bruce's Bayou.

Of the highest-ranking wetlands, more than half (69%) are unprotected, including the Sag and the stretch of wetlands within the Grand River between and including Harbor Island and portions of Dermo Island. Further upriver, Bruce's Bayou has parcels considered unprotected as well. These wetlands are vital for the connectivity of habitat within the GRCC and are adjacent to many important greenspaces and recreational areas, such as Ottawa Sands, Hofma Preserve, and Stearns Bayou. Efforts should be taken to monitor and protect these wetlands further.

Wild rice plays an important role in the culture of Anishinaabe people, who call it manoomin. Wild rice beds historically covered thousands of acres along Michigan's river mouths, including the Grand River (Figure 1), but were removed throughout the 1800's, primarily through dredging, to ease transportation.

Additional development and pollution along shorelines lead to further destruction of wild rice beds and their seed banks. Efforts to restore wild rice through seeding, outreach and stewardship is a priority for The Michigan Wild Rice Initiative which is a collaboration of the State of Michigan and the twelve federally recognized tribes within Michigan. Wetland restoration measures that would support the return of wild rice within the Grand River Corridor is of high cultural and conservation value to the Gun Lake Tribe (pers. comm).

In addition to coastal hemi-marsh, Southern Lake Michigan shorelines historically contained both hardwood and conifer-dominated swamp, but nearly all the conifer-dominated swamp and upland forest have been eliminated. Restoration of saturated, conifer-dominated and upland forest ecosystems is also a high priority along the southern Lake Michigan shoreline (Tepley et al. 2004) and will increase habitat connectivity, ecological integrity, and community resilience within GRCC.

Landscape-scale conservation planning that can enhance degraded habitat, connect top priority wetlands to the shoreline, and increase connectivity and climate flow between sites will strengthen the ecological integrity and climate resiliency of the entire corridor for the wildlife and communities that call it home.

Harbor Island

The wetlands on and around Harbor Island are critical for breeding marsh birds, a suite of species suffering rapid population declines across the state and Great Lakes region. The majority of wetlands around the island are within the top 20 percent of high priority coastal wetlands in the U.S. Great Lakes or could connect the top 20% to the shoreline (Grand et al. 2020). The island is perhaps the greatest conservation opportunity area within the entire GRCC. Its location, at the intersection of two major conservation corridors, is why it boasts a list of 232 bird species (ebird 2020). It is also immediately adjacent to Ottawa Sands, a new park undergoing large restoration and access development efforts. By restoring the wetlands around the Sims site and providing adequate breeding habitat for state threatened and endangered species such as Least Bittern and Common Gallinule, the island could contribute to critical state and regional conservation priorities. Wetland restoration should focus on the establishment of native emergent vegetation interspersed with open water, while considering uncertain and rapid fluctuations of Great Lakes' water levels and long-term maintenance to control invasive species. This restoration will be necessary to support a new energy facility in the long term, to increase storm resiliency and reduce environmental impacts.

Considering the history of Harbor Island, and Grand Haven's obligations to restore the Sims site, we suggest a comprehensive plan, which details all aspects of redevelopment, including wetland remediation and restoration.

Ottawa Sands and The Sag

Ottawa County Parks acquired the Ottawa Sands property and a portion of the Sag in 2019. These sites contain high-ranking coastal wetlands, a large oligotrophic lake, dunal grassland, and hardwood forest habitat that are all primed for restoration. These sites are the cornerstone of the GRCC as it sits across the river from the City of Grand Haven, connecting natural areas upriver all the way to Grand Rapids and north along the coast of Lake Michigan up to Muskegon. This connection is a conduit for wildlife and can become an important connection point for people, once recreational paths along the coastline are connected.

The site is becoming an increasingly popular birding and fishing location even in its short time as a public property. Public bird data going back to 2018 reports 186 species. Ottawa Sands currently has nesting bald eagles, and in 2019 Swamp Sparrows and Virginia Rails were identified through marsh bird monitoring. The Sag's emergent wetlands boasted the highest species richness of all marsh bird monitoring sites within the GRCC, with seven secretive marsh bird species recorded. These include Common Gallinule, Sora, Swamp Sparrow, Blue-winged Teal, Virgina Rail, Marsh Wren, and Least Bittern, a diversity of species which highlights the health and structural diversity of the wetlands of The Sag.

Ottawa County Parks has created a master plan for Ottawa Sands Park and The Sag, which aims to significantly improve habitat throughout the park. This includes creating new wetlands, enhancing existing emergent wetlands, and restoring the dunal grassland habitat, as well as enhancing the existing trail system to facilitate more intense usage of the site. Hardwood forests along the riparian edge can be thinned to encourage healthy forest composition more appropriate for hardwood swamp conditions.

Considering the importance of Ottawa Sands and The Sag for connectivity across the entire corridor, we suggest that restoration includes, in order of priority:

1. Wetland restoration along the edge of The Sag and the oligotrophic lake.
2. Wetland creation to the southeast of the oligotrophic lake that has minimal disturbance from pathways, boardwalks, and trees and can be manipulated to alter water levels.
3. Dunal grassland restoration to enhance the diversity of the site and minimize erosion.
4. Design for multi-use trail connectivity between the City of Grand Haven northward to PJ Hoffmaster State Park.

Monitoring

Unfortunately, very few Great Lakes Marsh Monitoring Program survey routes are active within the GRCC, and most are concentrated in Muskegon Lake and State Game Area. Similarly, none of Michigan Natural Features Inventory statewide marsh bird monitoring routes fall within the GRCC. Broad-scale datasets like the North American Breeding Bird Survey and Michigan Breeding Bird Atlas do not adequately sample emergent wetlands (Conway, 2011). Continuing and expanding marsh bird monitoring within the GRCC initiated in 2018 in an effort to fill knowledge gaps on focal state listed marsh bird species within the corridor is recommended. Creating additional survey routes and surveying for longer periods of time will ensure greater precision in population estimates and trends. Recommendations for regional monitoring include prioritizing high-quality wetlands that are most likely to support focal species (Monfils et al. 2020) and enhanced or restored wetlands to measure the effectiveness of management efforts.

The Upper Mississippi River Great Lakes Joint Venture has created management strategies for waterbirds, shorebirds, waterfowl, and landbirds and identified a suite of species that represent management umbrella and management indicator species. The umbrella concept assumes that the occurrence of a particular species in a geographic area is indicative of other species with similar habitat requirements and conservation focused on this species will likewise benefit a guild of species. Management indicators are species selected to focus on conservation delivery, more so for species of conservation concern. Focal JV species, Audubon's focal marsh bird species, and Michigan state-listed bird species are recommended focal species for additional monitoring efforts within the GRCC. eBird observations show a majority of these species present within the GRCC. Explore the interactive Dashboard here and select one or more focal species from the dropdown menu. Please note that Harbor Island and Ottawa Sands are current eBird hotspots and while this shows a higher number of observations, this does not necessarily reflect that there are more birds present, but that more birders are present (observation bias). Organizing structured bird surveys or encouraging bird watchers to submit eBird checklists at other properties throughout the GRCC could help fill existing knowledge gaps on these focal species.

Most water quality and macroinvertebrate sampling sites coordinated by EGLE within the Grand River Watershed were outside of the GRCC boundaries (EGLE 2016, LGROW 2011). While water quality testing has been done in wells across the county, we recommend additional water quality and macroinvertebrate sampling occur within the GRCC to fill knowledge gaps within this important wetland corridor.

Sora. Photo: Becky Matsubara/flickr cc

Programming and Outreach

One of the most notable strengths identified by nearly every stakeholder within Ottawa County was the awareness of local community members of water quality and natural resources issues. It is clear that the communities surrounding the GRCC care deeply about conserving remaining natural resources, maintaining healthy ecosystems, and having access to clean water and natural spaces. Muskegon County communities have a lower level of engagement with natural spaces according to stakeholders. A need has been identified by stakeholders within Muskegon County to increase outreach and engagement within these communities, particularly underrepresented communities of color, with newly restored green spaces within Muskegon Lake. Additionally, there is an interest and need within Ottawa County to increase engagement with underrepresented communities within and outside of the county with the natural areas within the GRCC.

Outdoor recreation has been on the rise since COVID-19 hit Michigan and the number of birders, anglers, and hunters has increased across the state as Michiganders seek solace in nature. Many education and outreach programs in these natural areas have had to pivot and adapt as in-person programming became limited to non-existent during the pandemic. Grand Rapids Parks and Recreation, in conjunction with Our Community's Children and Groundswell worked together to create a Gear Library where residents could rent, free of charge, outdoor recreation equipment, such as binoculars, bird guides, and more without having to attend an in-person nature program. Audubon Great Lakes' Wild Indigo program, which aims to build lasting relationships between urban communities of color and their local natural areas, met virtually with Our Community's Children to discuss the possibility of working together to coordinate a virtual program and professional development program for locally hired Gear Managers as part of the Gear Library project. Wild Indigo will continue communications with community partners to learn about their new operating standards and any programmatic restrictions that have been put on in person learning, outdoor recreation, and stewardship. Using the Wild Indigo Nature Explorations Framework for engagement, the Wild Indigo program coordinator will follow-up with community groups to assess current needs. With input from community partners, together with Wild Indigo, a program experience will be co-designed that is culturally relevant and follows CDC guidelines for safety.

Several stakeholders expressed interest in the Wild Indigo program, while others expressed a need for such a program within the corridor to better engage with communities of color. There is potential for continued discussion with stakeholders to develop a partnership on a proposal that could support a Wild Indigo Fellow or Coordinator in the Grand River Coastal Corridor to fill these important gaps in community engagement. The Grand Haven Area Community Foundation could be a potential source of funding for Wild Indigo.

Increasing community engagement in the form of stewardship and bird monitoring at our identified conservation priority areas could help managers achieve conservation and monitoring goals. Bird watching is a popular hobby within Michigan, and 24% of Michiganders identify as a bird watcher (Carver 2013). Bird watching has historically been dominated by older demographics, and with Ottawa County's aging population, could be an ideal engagement strategy for outdoor recreation. Bird watching, or birding, has also been on the rise during the pandemic as it is an easily transferable hobby that can be enjoyed by the whole family, even from the comfort of your own home. Equipment is not necessarily required and you can watch birds in urban, suburban, agricultural, and natural landscapes. Bird watching can be an effective and meaningful form of engagement as it could potentially reach a wide audience, help fill knowledge gaps, and increase happiness levels and boost human well-being within communities (Methorst et al. 2020, Ferraro et al. 2020). Harbor Island and Hemlock Crossing are the premiere birding hotspots in the county with over 1,500 eBird checklists each. Grand Haven State Park (611), East Grand River Park (549), Hoffma Preserve (536), and Ottawa Sands (422), mark the top six birding locations within the GRCC. Outreach and engagement that encourages bird watchers to venture to conservation priority areas that may or may not be eBird hotspots can help fill knowledge gaps, while connecting residents to new natural spaces.

Michigan is home to 9 birding trails, which birders from within the state and across the region visit year-round. All of these birding trails are restricted to the Upper Peninsula and Northern Lower Peninsula, however. Recently, Macomb and St. Clair Counties were awarded a Michigan Coastal Management Program Grant to establish a birding trail within St. Clair and Macomb Counties. This will be the first birding trail in the Southern Lower Peninsula. The Grand River Coastal Corridor is well positioned to be the home to another birding trail in the Southern Lower Peninsula. We recommend continuing discussions with stakeholders and pursuing funding through the Michigan Coastal Management Program or the Natural Resources Trust Fund grant program.

Audubon Great Lakes' MI Birds program, a statewide engagement and outreach program aimed at increasing all Michiganders' engagement in the understanding, care, and stewardship of public lands that are important for birds and people, has transitioned to virtual programming. MI Birds has led a series of webinars on bird conservation topics that have reached thousands of people across the state, while still encouraging

Michiganders to engage with public lands on their own. Lower Grand River Organization of Watersheds (LGROW) and Groundswell have expressed interest in working with the MI Birds program in the Grand Rapids and Grand Haven areas, as part of the larger watershed management plan for the Lower Grand River. MI Birds will continue communications with partner organizations to coordinate virtual programming experiences and in-person stewardship events when possible. Stewardship events could focus on conservation priority areas outlined within this report that also align with the larger Watershed Management Plan. Invasive species removal and native plantings could be guided by MISIN's invasive species mapper and level of need of land managers. Michigan Natural Features Inventory also outlined stewardship priorities based on the needs of local natural communities within the Grand River Coastal Corridor that could be used to guide on-the-ground habitat enhancements, restoration projects, and stewardship programs (Table 3, Cohen & Slaughter 2015).

In addition to coordinating active stewardship and removal of invasive species, education and outreach on invasive species identification was also highlighted as a need by several stakeholders. Stewardship volunteers could obtain this kind of training as part of their stewardship day in the field, but a coordinated effort among diverse partners within the corridor would be beneficial.

TABLE 3. STEWARDSHIP PRIORITIES WITHIN THE GRAND RIVER COASTAL CORRIDOR.

Location	Landowner	Priority	Natural Communities In Need	Protection Status
Grand Haven State Game Area – Dermo Island	MI Department of Treasury owned, MI Department of Natural Resources managed	High	Great Lakes Marsh	Protected
Pottawattomie Bayou	Grand Haven Charter Township, Ottawa County Parks and Recreation, dozens of privately-owned parcels	High	Great Lakes Marsh	Somewhat
Indian Channel	MI Department of Natural Resources	High	Great Lakes Marsh	Protected
Millhouse Bayou	Dozens of privately-owned parcels (Nancy and James Brady, Bosgraaf Homes LLC, David and Elizabeth Cherin)	High	Great Lakes Marsh	Not protected
Hoffmaster State Park	MI Department of Natural Resources	Medium	Mesic Northern Forest, Open Dunes	Protected
Muskegon State Park	MI Department of Natural Resources	Medium	Interdunal Wetland, Mesic Northern Forest, Open Dunes, Coastal Plain Marsh (Hidden Lake only)	Protected
Kitchel-Lindquist Dunes Preserve	City of Ferrysburg	Medium	Great Lakes Barrens, Open Dunes	Protected
Rosy Mound Natural Area	Ottawa County Parks and Recreation	Medium	Mesic Northern Forest, Open Dunes	Protected
Kirk Park	Ottawa County Parks and Recreation	Medium	Open Dunes	Protected
Hoffmaster State Park	MI Department of Natural Resources	Low	Dry Mesic Northern Forest	Protected

Conclusions and Next Steps

The Grand River Coastal Corridor is an ecologically significant area that is well-positioned to connect people and wildlife across Grand Haven, Muskegon, and Grand Rapids through landscape-scale natural area restoration and cohesive recreational access. The GRCC is home to some of the highest quality natural communities in the state and supports high levels of biodiversity, including sensitive or rare species of conservation concern. The GRCC is regionally and globally important for birds. It is part of a globally recognized Important Bird Area for migratory and overwintering waterfowl, and the core area is composed almost entirely of top 20% designated wetlands critical for marsh bird conservation in the Great Lakes region. The corridor also supports significant numbers of migratory birds each spring and fall, serving as a migratory hotspot and stopover site.

Migratory hotpots support large densities of migratory bird species, which have seen great population losses since 1970, across all guilds (Rosenberg et al. 2019). The corridor also provides ecosystem services to communities in the form of stormwater and carbon storage, water filtration, and more, making it extremely climate resilient, particularly among the Lake Michigan shoreline. Additionally, the GRCC holds cultural value for the Gun Lake Tribe for Wild Rice and fisheries management and restoration.

The main ecological threats to the Grand River Coastal Corridor are habitat loss and degradation, invasive species, climate change, contamination from hazardous materials and pollutants, and a lack of diverse community engagement. In order to address these ecological threats at the landscape-scale while conserving the ecological integrity of the corridor, we recommend taking the following critical actions:

- Facilitate the establishment of a diverse collaborative group to address landscape-level issues: stakeholders should meet regularly to establish a conservation action plan for the corridor that could support and fill gaps in the existing Lower Grand River Organization of Watersheds (LGROW) Watershed Management Plan and collaboratively pursue funding to implement it.
- As part of the development of a conservation action plan, stakeholders should further define and prioritize ecosystem creation, restoration, and enhancement areas.
- As part of the development of a conservation action plan, stakeholders should identify specific vegetation and wildlife management strategies for the corridor: invasive plant removal and management, such as *Phragmites australis,* should be prioritized as secretive marsh birds and waterfowl prefer to breed in areas without it. Hemi-marsh restoration for marsh birds could be done in conjunction with *Phragmites* management, as it often grows in dense stands. Deer population management is also needed if restoration efforts are going to be effective. In-stream restoration throughout the corridor could support the Lake Michigan Lake Sturgeon fishery and wild rice beds.
- Support water quality management strategies of stakeholders: incorporate habitat creation and restoration into green stormwater infrastructure (GSI) where possible, and encourage the inclusion of GSI in stormwater management plans within the corridor where it currently doesn't exist.
- Establish programs for ongoing monitoring of secretive marsh birds, conservation focal species, water quality, and macroinvertebrates to fill critical knowledge gaps and guide management actions.
- Seek higher levels of protections for key properties where possible: properties that can increase habitat connectivity and climate flow within the corridor, and increase protections for currently unprotected priority wetlands are recommended.
- Create outreach strategies and programming to educate the public about the benefits of the corridor and how they can get involved in stewardship and monitoring efforts within the corridor.

For more information regarding how Audubon resolves to conserve high priority Great Lakes Coastal Wetlands, see Audubon's Vision: Restoring the Great Lakes for Birds and People, available at https://www.audubon.org/conservation/great-lakes-restoration

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Appendix A. Stakeholder Interview Notes

Michael Mencarini and Laura Underhill, Community Planners, Rivers, Trails and Conservation Assistance Program, National Park Service
July 17, 2020

- Offering assistance to the Ottawa Sands master planning process and Grand River Coastal Corridor Report, as needed
- NPS Fellow: Center for Community and Environmental Design at Purdue (landscape planner) will work with them through next year
- Current GIS fellow ends their term in December, unlikely to be available to help us with mapping tool
- If we have areas we want to conserve for bird pops/other, they could do some outreach to stakeholders and community members and do some conceptual renderings of what some of these areas could look like with low-impact recreation amenities
    - Maybe this could be part of the next phase of the master planning process

Sarah Pregitzer, Great Lakes Stewardship Initiative, Field Coordinator
August 31, 2020

-Primarily in Newaygo County, not Muskegon (happy to share some Muskegon area contacts, below)
- Interested in working with local tribes in Newaygo Co on wild rice and large Latinx community
- MI Birds/WI – will stay in touch if there is any opportunity for overlap
- Conservation Collaborative – North Country Trail, Conservation District, Ecologically forward thinking drain commissioner
- Doing some virtual field trips – 5-15 minutes each – perhaps MI Birds could be involved!

-Recommended contacts:
- Rob Johnston, MI Nature Association – have preserves along Muskegon (rjohnston@michigannature.org) – Volunteer Coordinator in WE MI
- Erika Johnson, ericajohnson@muskegonisd.org GLSI – 231-767-7337
- Muskegon Watershed Association (MRWA Director) – Marty Holmgren – martyholpgren@ferris.edu
- Stewardship Network – Ann Arbor – might be worth reconnecting with them and becoming a member

Becky Huttenga, Economic Development Coordinator, Ottawa County Parks and Recreation Planning Department
August 31, 2020

- Data that we might want to incorporate in the mapping tool we plan to create:
    - MNFI – data layers on ecological significance of OC properties (is the only Natural Features Inventory from 1988? Anything more recent? Who at MNFI is your contact?)
        - Curt or Melanie could better answer
    - Map layers from your 2016 Parks and Rec Plan that we would be interested in using as reference or within our mapping tool: zoning layer, non-motorized trail map, Grand River and North Coastal Greenway maps and master plans for properties along them
        - Curt and Melanie might have this
    - Land Use cover data from JV is more recent (2011) than OC's (2006)
- Threats identified in plan: invasive species (phragmites, garlic mustard, spotted knapweed)
    - We can focus on these 3 species with our mapping, and expand as we have time/capacity
    - Becky recommends reaching out to : Melanie, CISMA, TNC
- Restoration and monitoring is a priority – already working with us on this within the corridor
    - Any other monitoring or restoration priorities or interests that we're not already aware of?
- Programming opportunities:
    - Ground water vs surface water education and outreach
    - Surface Water level monitoring (OC also to do more ground water monitoring)
        - Elk Grove doing some water level monitoring in Grand Rapids
    - Will get us map or list of communities experiencing water shortages
    - Would benefit from big-picture outreach showing how everything is connected
        - Particularly highlighted need for this during COVID and needing to be resilient and more reliant on local resources
    - USGS data is most likely what they use

Follow-up materials to read/explore: https://www.miottawa.org/GroundWater/default.htm

Lukas Hill, Community Development Director, Spring Lake Township
August 31, 2020

Questions specifically for Spring Lake Township:

- Acquisitions – have any acquisitions been made in the areas identified in the 2016 Parks and Recreation Plan (see below)?
    - Land parcels to be determined along M104 to provide a viewshed to Lloyd's Bayou and to provide a trailhead parking area.
    - Land parcels to be determined along the Grand River and Spring Lake to provide additional waterfront access and pocket park opportunities along the multipurpose pathways. Have purchased as much as they can along the Grand River (Trust Fund, or Township funded)
- Indiana brown bat – no clearing if fed funds involved, but on regulations without federal funding
    - Wants to work with Melanie on Ordinance to encourage/require clearing outside of nesting season
- Has the Green Infrastructure Plan been created with Natural Features Inventory for the Township? What are some of your Green Infrastructure priorities and what problems will they mitigate within the Township?
    - Not as much traction as he would have liked for the GSI plans
        - Without getting access to private property it would be difficult for them to put something together
        - Will look into this and send me anything they have from that process.
    - GSI – especially within some low-income housing areas would be ideal - neighborhood beautification
        - Viewsheds very important
        - Have a stormwater ordinance – water resources office
        - Erosion along Lake MI shoreline is apriority
        - Spring Lake record high water levels
        - How to resolve this? Upstream answers, GSI
        - Have a wetland ordinance – more strict than state – 25 ft set-back zone
- In addition to expanding waterfront access to Spring Lake, Lake MI, Little Black Lake and Grand River, are there restoration or enhancement plans for these shorelines, riverfronts, and wetlands?
    - Phragmites mitigation – wetland associations, Harbor Island, some regional efforts done
- Black Lake Park – has master plan been completed along with Natural Features Inventory in conjunction with Norton Shores? Yes
    - Is this a dataset you may be willing to share? Yes
- Are there any habitat restoration or enhancement priorities/needs for these properties: North Bank Trail, Minnie Skwarek Nature Preserve, River Run Park (shoreline softening/wetland restoration – Ottawa Co Cons District – may have only been partially completed –will it be managed that way long-term? Unknown), Rycenga Park
    - Wetland Watch – community group (aging) – do some programming and acts as community watch dog for wetlands/water quality
    - Township wetland consultant also – Don Tilton (retired consultant, Tilton and Associates, helped craft state laws, PhD, helps out when they have wetland issues or permitting issues)
    - Have a Wetland Review Board
        - If someone wants to appeal decision they go to the board
    - Grand Haven has Natural Resources Committee of some kind
- NORA (North Ottawa Rec Authority) – programming with OC Parks in the works
- Sounds like a priority for the Township is preservation (there are more people that are development-friendly, so important for us/cons orgs to highlight preservation of natural areas)
    - Do we need to put a campground in?
    - If preserved, increased programming to increased awareness of natural spaces, rather than perceiving them as fallow or something that should be developed, would be beneficial
    - Especially thinking historically with population growth, increased lifespan, how best to plan and develop to maintain green spaces (which also increases property values)
    - Sounds like there is some low-income housing in this community that people are seeing as ripe for development, but low-income housing and green spaces near them should be maintained/preserved
    - Sounds like some neighborhood beautification (green infrastructure) and interp signage for green spaces could also help

- Non-motorized trail system:
    - 2008 Ottawa County Parks and Rec study shows proposed regional routes for the North Bank Trail, and the US 35 Bicycle Route from Sault Ste. Marie, MI to Natchez Trace, MS.

    - Has master plan for pathway development been created for the township? No
- Other priorities:
    - Has purchased land along Grand River and Leonard Rd – purchased mostly for viewshed over the Grand River
    - 30 acres adjacent to Little Black Lake –put in accessible kayak launch last year
    - Total public space there is about 80 acres on eastern side of Little Black Lake
    - Other side is Hoffmaster – bordered by a lot of public lands
    - Lots of edge wetland – high water quality
    - Thought about putting watershed plan together, but not quite yet (thought about using Muskegon Water District to do that)
    - Some wetlands south of Black Lake – April Sholtz at Land Conservancy also interested in those (unlikely acquisition, landowners not interested)
    - Wilson Rd. between Little Black Lake and Old Grand Haven Rd – have disc golf course there (Township owns the property, dic gold club own and operate it)
        - Bill Martinez – the local yocal – field botanist – lots of pre-settlement vegetation there
        - Enjoy the disturbance and need it to thrive, so good for disc golf course
        - Some of the area has been left alone - xmas tree rows
        - Very cool space – looking to preserve that space even if it's not perfect
        - Not far from North Dunes and Hoffmaster (Township Board mebers also want to make it an industrial parks

Craig Bessinger, City Manager, Ferrysburg
September 1, 2020

Questions for all stakeholders:

- What are your organizations priorities within this region? This question applies to land management, recreation, and programming priorities.
    - Pretty built out, but priorities for recreation are likely Ottawa Sands, Coastguard Park, and North Ottawa Dunes
    - Lakeshore is pretty open (west of Lakeshore Drive) - 300-400 acres of open area
    - Dune Preserve is south in City of Grand Haven (use it for scientific and education purposes)
    - Lots of wetlands developed there and along Grand River
    - Working with Ottawa county on Ottawa Sands master plan
    - Dune Preserve to HP Hoffmaster trail, but concern over increased traffic of the area
- What do you see as the biggest threats on your properties in this region? Do you have any management or restoration needs that could be better achieved through partnerships?
    - A lot of the open space is owned by Ottawa County
    - Have worked with Ottawa County to work with Dune Preserve invasive species management (Spotted Knapweed, Dalmation Toadflax)
    - Used to do birding at the Preserve
- What do you see as strengths on your properties ecologically, recreationally, or programmatically?
    - Coastguard Park is the premier park in the city – softball, pavilion for picnics, dog park – so long as this is updated, it's the most visited park
    - Beautiful land at the Preserve – their gem
- Do you have existing community partnerships that help support your organization's goals and lands? (i.e. friends groups, school districts, non-profits, etc).
    - OC Parks
    - Calvin College
- What are some existing programs in place with partner organizations?
    - Do you feel that there are any programmatic gaps for particular demographics or cultural backgrounds?
        - Don't think so – work with NORA – all park access is free
        - NORA does programming with soccer and sports
- Do you have or know of any habitat, land-use, socio-economic datasets that could be shared with us to incorporate into this report and mapping tool we are going to create?
    - Natural Features Inventory was done on preserve
- Is your community facing any flooding, drought, ground water, or water quality issues that might be helped through additional habitat enhancement or restoration?
    - Early rains caused flooding this Spring
    - Lake levels still very high – erosion of Spring Lake from waves/motors (got buoys moved out more to protect the shoreline)
    - Are there any existing plans to help address these issues?
        - East of Coast Guard Park had flooding issue – working on a county drain to help with flooding
        - East side of Lakeshore Drive – high ground water in backyards – Drain commission going to help with that as well
    - Do you have or know of any available datasets related to these issues?
        - No

Questions specifically for Ferrysburg:

- Do you have any habitat restoration or enhancement priorities or needs at Ferrysburg Nature Preserve specifically?
    - Just east of Coast Guard Park ~ 40 acres, no development, no plans to do anything there
    - Again, hope to just preserve this area, but for now doesn't seem like there are any threats here
- Does the City Hall Park master plan include any restoration or enhancement of habitat or native plantings
    - 14 acre parcel – 2-3 years ago, sold 8 acres of it to a non-profit for low-income housing (Gracious Grounds – work with Autistic adults)
        - Mostly turf, but have a small butterfly garden at entrance
        - Signage is at the butterfly garden

Eric Snyder, Professor of Biology, GVSU and Board Chair, Kitchel-Lindquist-Hartger Dunes Preserve
September 1, 2020

- What do you see as the biggest threats on your properties in this region? Do you have any management or restoration needs that could be better achieved through partnerships?
    - Invasives are a main issue: spotted knapweed, Japanese barberry, honeysuckle
        - Catcher's thistle (endangered is also on-site)
    - Jack pine is there too, though not sure what to do with it
    - Don't have a great bird inventory (one intern did a comparison against the Jack Pine and other old growth forest in the past)
- What do you see as strengths on your properties ecologically, recreationally, or programmatically?
    - Set aside specifically as a preserve, rather than recreation area
    - Mission of preserve 1) preservation, 2) education and outreach, 3) scientific research of dune ecosystems in general
    - Location – you've got this great Dune corridor and it's so great to see how this has been expanded and preserved/conserved (Ottawa Sands, Coastguard Park, and Hoffmaster SP)
- Do you have existing community partnerships that help support your organization's goals and lands? (i.e. friends groups, school districts, non-profits, etc). What are some existing programs in place with partner organizations? Do you feel that there are any programmatic gaps for particular demographics or cultural backgrounds?
    - Open to the public, educational pavilion, bathroom (for special events)
    - Guidelines to stay on trails, leash dogs
    - Specific programming has been hit or miss (some school groups do repeated annual surveys, volunteer events for invasive species removal/control, have paid summer interns for stewardship/education docent)
        - Have done a few programs they'd like to repeat, ie. monarch butterfly release
    - Program gaps do exist – really important to think about accessibility
        - Those in wheel chairs can only reach the education pavilion
        - Don't reach out to underrepresented communities
            - Just a lack of information and knowledge in this department
- Is your community facing any flooding, drought, ground water, or water quality issues that might be helped through additional habitat enhancement or restoration? Are there any existing plans to help address these issues? Do you have or know of any available datasets related to these issues?
    - Water monitoring – had been done one year, but not continued – ground water monitoring stations are not in the area that he is aware of

Questions specifically for Kitchel-Lindquist-Hartger Dunes Preserve:

- Is the new master plan available?
    - 5-yr planning document (priorities)
        - No conservation plan in place
- Has a natural features inventory been completed? Is this something that can be shared with us?
    - MNFI report is available (should be online – no raw data)
    - Bill Martinus could also send
    - Graduate student of his did a thesis at the Dunes (amphibian populations) – generated GIS based map, migration corridors, could share.
    - Intern created general distribution map of invasive species – could also share.

Cassandra Hoisington, Associate Planner, and Stacey Fedewa, Community Development Director, Grand Haven Township
September 2, 2020

Questions for all stakeholders:

- What do you see as the biggest threats on your properties in this region? Do you have any management or restoration needs that could be better achieved through partnerships?
    - Erosion, invasive sps, climate change, water level issue
- What do you see as strengths on your properties ecologically, recreationally, or programmatically?
    - Feel that local CISMA and coordinated efforts with Ottawa County Parks and Recreation are on top of invasive species
    - New acquisition (more detail below)
- Do you have existing community partnerships that help support your organization's goals and lands? (i.e. friends groups, school districts, non-profits, etc).
    - NORA, OC Parks and Recreation, WE MI CISMA
- Do you have or know of any habitat, land-use, socio-economic datasets that could be shared with us to incorporate into this report and mapping tool we are going to create?
    - 2017 Hoffma Preserve Plan
    - 2019-2022 Parks and Rec Plan (ght.org)
    - FEMA flood maps
- Is your community facing any flooding, drought, ground water, or water quality issues that might be helped through additional habitat enhancement or restoration? Are there any existing plans to help address these issues? Do you have or know of any available datasets related to these issues?
    - Ground water issue is more central, but it seems they might start to be impacted (due to Golf Course, possibly though no current evidence to support this)

Questions specific to Grand Haven Charter Township:

- In your 2016 Outdoor Rec Plan you specifically mentioned wanting to provide multi-generational recreational opportunities within the community as the Township is comprised of persons of all ages and that you wanted to identify your majority age and activity groups.
    - What are your majority age and activity groups?
    - Do you feel there are existing recreational gaps for particular demographics?
        - 2019 parks and rec plan adopted
        - NORA – they handle a lot of recreation for tri-cities area
        - Census data could lend itself to this info – some folks are retiring in place or moving there to retire and often play with grandkids
            - A lot of these older folks want to recreate too (kayak, bicycle, grandkids to waterfront and playscapes, birding)
            - Hoffma Park Preserve community science – some birders doing this
            - District Library partners with Audubon chapters and co-leads birding trips, County Parks program too
            - Lack waterfront parks, have some on Pottawatomie Bayou and some road ends, but not much waterfront
- Grand Haven Charter Township continues to focus on the acquisition of lands adjacent to Hofma Park and Hofma Preserve in order to expand the natural based recreational resources within this unique and naturally rich area of the Township.

    - Are there any restoration or management priorities for the preserve or the following locations?
        - Mercury, Bignell, Pottawattomie Park (tree plantings, water access), Hofma Park and Preserve, Palomita Preserve, Kirk Park, Pottawattomie Bayou, Brucker St. and Buchanan St Access
        - Pottawattomie Park: NOAA, EGLE Coastal Program project – shoreline preservation project
            - Losing frontage, have lost 60 ft thus far
            - Establishing a natural shoreline there
            - Did an invasive species survey (some, but not a lot here)
            - Some purple lustrife here

                - Some surveys done here, but not super thorough (long-eared IN brown bat, birds, a couple T & E plants)
            - Hoffma Park and Preserve – 115 acres donated in 2015 – old Xmas Tree Farm and
                - Have about 100 acres of invasive species
                    - Scotch and Austrian Pine trees left and are diseased
                    - Ecological dead zone
                - Have grant apps in for Trust Fund grant to remove trees – have annual contract with Cardno to remove woody invasive species (Honeysuckle)
                - The rest of it is very natural – not a lot of development – just trails
                - Full natural features inventory of Hoffma Preserve for next year
    - Any acquisitions planned as part of the Grand River Greenway?
        - For about 15 acres northside of Hoffma Park for north entrance point
        - Hoping to improve road ends
        - Buchanan St – might get some natural shorelines installed over the next couple of years
- What has the progress been on non-motorized pathway routes within the Township? In the 2016 plan it sounded as if a township master plan was in the works in addition to the regional plan, is that correct?
    - 2008 Ottawa County Planning and Grants Dept study shows proposed regional routes along Lake Michigan Drive, and Mercury Drive along the Grand River as well as more newly proposed US 35 Bicycle Route from Sault Ste. Marie, MI to Natchez Trace, MS.
- Are there programs, special events, or recreation initiatives currently ongoing with partners that are a priority for the city?
    - Not specific to recreation, but the below initiatives are a priority for the city (natural resources-related):
    - Green Infrastructure – new ordinance – 75% of plants need to be native to MI, to help with water use too!
        - Landscape islands to help assist with stormwater – basins have different planting requirements
        - Pollinator plants
    - 10 ft set-back from county drains
        - Set back any hazardous facilities or drains – working to expand this so it's not right on the water front
    - Michigan Energy Assistance Program (Dept of Agriculture) – for equitable and sustainable energy use

Chip Franke, local naturalist and author of Birds of Ottawa County (2015)
September 3, 2020

Introductions:

- Chip just completed a 2020 revision to Birds of Ottawa County, which incorporated eBird data
  - Melanie has copies of 2015 publication
  - The 2020 update is a free download on the Ottawa County website
- Also recommended the Butterfly list for Muskegon, Ottawa and Allegan County – published in MI entomological society newsletter
  - Moe Neilson – Butterflies of MI (has range maps based on museum specimens)

Questions:

- What do you see as the biggest ecological threats in this region? Do you have any management or restoration needs that could be better achieved through partnerships?
  - Invasive species
  - American Lotus (endangered) – expanding in OC
    - There is a record of someone planting lotus, non-native (not sure where it came from)
  - Climate Change – effects unknown
    - In the transition zone of northern and southern forests (100 miles wide transition zone)
    - OC has greater biodiversity because of this
    - Climate change could shift this zone
  - Development in general – so much more natural public lands here in OC, and with population growing, important to conserve these spaces
    - Hoffmaster, Hofma Park, North Ottawa Dunes, GHSP, Muskegon SP, County Parks, Rosy Mound – lots of great public land
  - Conflicts between recreational uses of land and noise pollution (potential impacts to birds)
    - Airport in OC – doing helicopter tours along shoreline every 15 mins (already banned by one community)
    - What time of year do these tours occur?
- What do you see as strengths on your properties ecologically, recreationally, or programmatically?
  - Good amount of public land already protected
  - Lake MI - regional ecological asset (globally recognized Important Bird Area)
    - Migratory corridor
    - Moderating climate
    - Anything we can do to protect Lake MI (community against wind turbines off the coast)
  - Good diversity of habitat (mature forest, Hemlocks, White and red pines, ecotone)
    - Red pine – some management to remove these (they're not native to this part of MI)
    - Good number of wetlands
    - Would like to see to more management for shorebird migration
      - Used to have a farm field where thousands of birds would feed and nest there, but that's gone now
      - Lake MI shoreline doesn't attract as many shore birds – Muskegon Wastewater is where most are seen
      - All manmade areas seem to be where shorebirds congregate – not a lot of natural mudflats
      - A lot of farmland isn't farmable due to high water, so some of those could be converted to mudflats/install straits
- Do you feel that there are any programmatic gaps for particular demographics or cultural backgrounds?
  - There probably are, but not sure he knows them
  - When he started in 98 there really weren't programs
  - Elizabeth at Hoffmaster Nature Center leads great programs (butterfly walks, bird groups – didn't do as much with school groups until more recently)
  - Recommended chatting with Curtis Dykstra and Degraff Nature Center, Outdoor Discovery Center (northern OC, and Holland area)

Pat McGinnis, City Manager, City of Grand Haven
Jennifer Howland, Community Development Manager, City of Grand Haven
September 3, 2020

- What are the City of Grand Haven's priorities within this region? This question applies to land management, recreation, and programming priorities.
    - High water is taking a lot of priority in time and money
    - Creates challenges in public and private infrastructure
    - Some advances to start talking about resiliency, were somewhat paused to address these issues
        - Put some things in place, i.e. armories, more short term though
        - High water has caused some variances
    - Haven't thought broadly about conservation and programming
    - Infrastructure is the current priority
    - One big piece of City property in between Hoffmaster and Ottawa Sands corridor down to Kitchel-Linquist, but no inventory done (not a priority right now)
        - Open for people to hike on and use and don't actively manage it
        - People tend to respect it because it's next to the Preserve and Ottawa Sands
        - Have tried to prevent people from walking on some of the sensitive dunes
        - When North Ottawa dunes was acquired, it brought conservationists together to fundraise
        - Fundraising also occurred for Ottawa County to purchase Ottawa Sands (~40 acres that fall within City of Grand Haven)
            - Don't have any land left for development/future residents
            - Now seeing value in residents moving near preserved natural land
            - City Council divided on increased development (need $$ from tax payers)
- What do you see as the biggest threats on your properties in this region? Do you have any management or restoration needs that could be better achieved through partnerships?
    - Vegetative invasive species are also a priority – Purple Lustrife, Garlic Mustard, Phragmites
    - Disease as well: Oak wilt, hemlock woolly adelgid
        - Duncan Woods, Mulligan's, Cemetery – all wooded
        - Biologist at Grand Valley working with them – Dr. Alexandria Locher
        - Southernmost stand of virgin MI timber (Ottawa Conservation treatment)
        - Not managed really – focusing on preservation
        - Deer population is a problem – no new undergrowth in forested areas
            - Urban deer – used to have a deer management program (hunting), but no longer
- Jennifer Howland primarily works with private lands:
    - Interface with EGLE often
    - Sensitive Area Overlay – will share
        - City map layer with latest floodplain and critical dunes outlined/steep slopes, wetlands, etc
    - Ottawa Sands project – had been involved in master planning process and how it would connect to surrounding neighborhood, northern and southern river connectivity
    - Priorities for private lands: high water is still dominant
        - Keep pervious surfaces and parking lot islands
- Every building or land use permit funnels through her office:
    - Natural Features – if permits fall within sensitive area overlay, outside of development envelope, the goal is to keep things natural
    - Not a lot of impact on natural areas, doing what they can to keep those natural
    - Houses going up on North Shore Dr. near the Dunes
        - Rely on EGLE for permits/approval
        - Creating a pretty straight forward homeowners guide book for those living in sensitive areas
            - Could be better with outreach/education
        - They do have public notification requirements and provide community members opportunities to provide input
            - Usually contract consultants to do this work
            - Downtown waterfront master planning
    - City is built out – so encourage upward growth where it makes sense so surrounding townships can preserve farmland and public land (Grand Haven city infrastructure could handle increased growth if development went vertical)

    - More topography in Grand Haven Township (steeper) have had development pressure there, but lots of erosion there, making development difficult
    - Marinas along the river also dealing with high water
    - Geotube sandbags, for 9 homes along the lakefront (but 80 feet away from shoreline still)
- Groundwater recharging – not a focus in city
    - Hear more so that water table is too high
    - County planning Director Paul Sachs – has informed area planners about their work on groundwater, wells – seems like County is leading this effort
    - Don't allow wells within City of Grand Haven except for North Shore Dr. (they are old wells)
- What do you see as strengths on your properties ecologically, recreationally, or programmatically?
    - Keen local awareness, active in storm water and water-resource management
    - High aptitude for preserving water resources
    - Wetlands Watch – invasive plants and phrag control – they help with their management often
    - Being at the mouth of the Grand River, they are sensitive about water issues, point source solution, septic permits, etc
    - Water treatment facility manager would know more about invasive species
- Do you have existing community partnerships that help support your organization's goals and lands? (i.e. friends groups, school districts, non-profits, etc). What are some existing programs in place with partner organizations?
    - For private lands – realtors mostly, for projects on current properties (because so built up, few new developments occurring)
- Do you feel that there are any programmatic gaps for particular demographics or cultural backgrounds?
    - Doesn't feel like the appropriate person to answer this question – chat with Melanie at OC
- Millage effort for recreation program voted in August, but didn't pass
    - Recreation authority is made up 5 municipalities (more ag area within some of these municipalities, which is why she suspects it did not pass)
    - Would like to see an outdoor environmental approach
        - Due to fragmentation due to 4-5 units of govt, YMCA, and different units of programming, they are not yet working together – want to create more robust recreation programming plan
- Do you have or know of any habitat, land-use, socio-economic datasets that could be shared with us to incorporate into this report and mapping tool we are going to create?
    - Will send report on water management/watershed resources
    - Topography map, sensitive area map, and new city master plan
- Is your community facing any flooding, drought, ground water, or water quality issues that might be helped through additional habitat enhancement or restoration? Are there any existing plans to help address these issues? Do you have or know of any available datasets related to these issues?
    - Clean MI Initiative – was doing a lot of storm water management best practices
        - Tried to do a lot (difficult approval processes)
        - Looking at a lot of open spaces and how to control runoff
        - Entire attention has been more reactive (ie. sandbags more important than building rain barrels this year)
            - Getting started with rain barrels (have them, but haven't gotten them out to community yet)
            - Strong low-impact development ideas
        - Green roofs too – drainage swales
- City is very aware about natural resources, but parcel by parcel we are limited on what we can do – haven't pushed a lot though, could potentially do more with private landowners
    - Want to make sure there's a good balance on property rights

Specific questions for City of Grand Haven:

- Could you tell me a little bit more about your role in the Grand River Greenway and non-motorized pathway initiatives? Are there any other programs or initiatives like this that are a priority for the city? Are you considering any acquisitions of property along the Grand River as outlined in the Greenway plan?
    - Have identified to work with county on Itowa trail (Curt TerHaar) – have ID'd route and have made some plans
- Do you have any habitat restoration or enhancement priorities at the following locations?
    - Mulligan's Hollow
        - Is the redevelopment master plan available to the public? Yes

- Five Mile Hills Trails, East End Waterfront Trail, Highland Park Preserves, North Shore Dunes Nature Trails, Duncan Woods, Klemple Park overlook deck, Harbor Island non-motorized pathway, South Channel Linear Park (new landscaping)
- Harbor Island
    - Tearing down Sims coal plant – very sensitive to containment of contamination

Gerald Thayer, District 7 Law Supervisor, MI DNR Law Enforcement Division
September 3, 2020

- What are your organizations priorities within this region? This question applies to land management, recreation, and programming priorities.
    - Try to offer outdoor recreation opportunities for outdoor enthusiasts and families
    - More important than ever to provide those opportunities – challenge to balance that with resources protection, depending on location
    - Kent County – some problems – Rogue River SGA, primarily for hunting, hiking, but also target shooting
        - Close proximity to Grand Rapids
        - Mass amount of shooters
        - Lots of AR platforms – overwhelming masses that are out there right now
        - Problems with litter, debris, shot at trees, concern over lead being left behind
        - North Country Trail goes through there – have had some close calls with hikers/shooters
        - Only two officers in Kent Co, so limited capacity and resources
- What do you see as the biggest threats on your properties in this region? Do you have any management or restoration needs that could be better achieved through partnerships?
    - Erosion
        - ORV's not a big problem in that area, but dirt bikes, mountain bikes, hikers – constant regulation to keep ppl on trails
        - Reduce footprint (most ppl comply)
        - Partygoers litter and go off trail
        - Muskegon State Park block house was almost burnt down by partyers last year (built for site seeing)
    - Potential T & E species (wildlife folks would have more info)
    - Warren Dunes State Park – used to have Ginseng (had been poached), not as many people looking for it now
    - Most counties have 2-3 officers
    - Handful of counties with no officers, a few with 1 officer
- Do you have existing community partnerships that help support your organization's goals and lands? (i.e. friends groups, school districts, non-profits, etc).
    - MUCC, City of Grand Haven (attends monthly meetings), Grand Haven SP (traffic, partygoers, increased enforcement there when drug selling was spotted)
    - Local Scouts, Sheriffs, Coast Guard
    - No work with conservation groups at the moment
- What are some existing programs in place with partner organizations? Do you feel that there are any programmatic gaps for particular demographics or cultural backgrounds?
    - Kids from Muskegon inner city have been out kayaking with a Muskegon community group to teach them about the outdoors and going kayaking – Law Enforcement involved in this program
        - Trying to help the kids see that other facet of life
    - Provides survival type training, and 5k runs to raise funds for these programs
    - Law Enforcement wants to share this knowledge about natural resources and let people know that there's more outside of the neighborhood they grew up in that they can get involved with
    - Hunter Safety program, gun safety/responsibility, hunter education field days for youth

Mark Meyers, Norton Shores City Administrator
September 4, 2020

- What do you see as the biggest threats on your properties in this region? Do you have any management or restoration needs that could be better achieved through partnerships?
    - High water, erosion
    - Lake Harbor Park – couple hundred acres – Lake MI, Mona Lake
        - Received a grant to do some planning and assessment for erosion
    - Have been able to keep on top of invasive species pretty well
        - MSU Extension, school groups, assist
    - Watershed Council on water quality on Mona Lake did a recent 2 phase study to look at Phosphorous
        - Western MI University
    - Ross Park, south side of Mona Lake, another priority area
    - County airport – PFAS issue with foam use in the past – told by EGLE
        - Can't water softball fields with well water because it tested above threshold
    - Oak Wilt and Hemlock Wooly Adelgid (HWA) also big threats
- What do you see as strengths on your properties ecologically, recreationally, or programmatically?
    - Pretty on top of invasive species management
- Do you have existing community partnerships that help support your organization's goals and lands? (i.e. friends groups, school districts, non-profits, etc). What are some existing programs in place with partner organizations? Do you feel that there are any programmatic gaps for particular demographics or cultural backgrounds?
    - Recreation program = sports mostly
    - Formerly worked with City of Grand Haven as Assistant Manager
    - Harbor Island became a bird watching area qualified for signage
    - Don't have that kind of thing in Norton Shores – would be an opportunity to market birding
    - Lots of Eagles – Hidden Cove Park
    - Hoffmaster State Park – used to be a Township Park – Galette Nature Center with staff lead lots of programs now with youth
- Do you have or know of any habitat, land-use, socio-economic datasets that could be shared with us to incorporate into this report and mapping tool we are going to create?
    - Census, Alice study, Nat Feat, new parks plan possibly too – will send
- Is your community facing any flooding, drought, ground water, or water quality issues that might be helped through additional habitat enhancement or restoration? Are there any existing plans to help address these issues? Do you have or know of any available datasets related to these issues?
    - Flood plain neighborhood off of Mono Lake – have talked to FEMA about it
        - 2 alternatives – raise homes, purchase homes to demolish
        - No specific plans for high water (GSI, BI, Stormwater management)
            - Stormwater management is a big requirement for any new infrastructure
            - Lots of stormwater retention areas – work closely with drain commission office to maintain county drains within the city (they don't really have a budget, so that falls to city)
            - Drain commissioner seems in-tune with doing some bioswale install-like projects, but not sure about possible opportunities for habitat
    - Watershed group has done a lot of outreach with private landowners
    - Have banned phosphorous contained fertilizer (county put that ordinance in place years ago)
        - Enforcement is not guaranteed though

Questions specifically for Norton Shores:

- Black Lake Park – has master plan been completed along with Natural Features Inventory in conjunction with Norton Shores? Yes
    - Is this a dataset you may be willing to share?
        - Yes – with Spring Lake
- Land Conservancy – former sand mine – Nugent Sand Mine – created two inland lakes (northwest corner of the city)
    - County of Muskegon has applied for DNR Trust Fund grant to purchase site, buildings recently demolished

Dave Walters, General Manager, Grand Haven Board of Light and Power
September 8, 2020

- History of Sims Power Plant on Harbor Island
    - Sims Coal Power Plant has been on Harbor Island since 1960's – formerly City Dump
    - EPA/EGLE discussions ongoing on what needs to be done to remediate
    - Historically, soccer fields filled with dredge and trash and marsh covered in dredge and trash
    - Sims was a coal operation, power plant
        - Historically, locals would dump ash here too
    - A portion of plant is above 100-yr flood plain, the rest is below
- With Sims closure, next steps include:
    - Electrical substation being rebuilt and the rest of the plant is coming down
    - By next year, hoping to have new electrical substation and new building for snow melting equipment
- Shared BLP's Sims Site Redevelopment Master Plan and Program Statement
    - Will have to remove a significant portion of ash
    - Some areas are considered impoundments and will have to remove as much as they can (but will likely not be able to remove it all, due to high water, and historic dumping)
    - Hoping for wetlands creation and restoration along southern portion of property
        - Whole property is 25 acres, about half would be set aside for wetlands restoration
        - Will be required to create some wetlands by law
    - Some regulated wetlands on northern property that will likely be filled and capped
    - Also looking to redevelop northern portion
    - The substation supplies the whole city of GH with electricity for snow melt system (would be very difficult to remove that entirely since it acts as the infrastructure hub)
        - Trying to reach a compromise
    - No approvals yet (funding needed)
    - Pre-1980's ash present under ash ponds
        - Will have to see if they have to remove more ash
        - Will likely cover this area with dune sand/dune grass
    - E. Marsh on Harbor Island – there is still ash in there (had been dried out, unregulated waste dumped here historically)
        - Birds are landing here, but it's likely not a healthy environment for them
        - Dredge/remove/fill this area? Not sure what's best just yet
        - Will have to do remediation in southern ash storage area as well
        - Hoping to tear down berm/Linear park and that whole southern corner will be wetland
            - Will move entrance to the west with tighter security perimeter
        - Remediation – will have to recreate wetlands 1.5 to 1 ratio, if wetlands are filled
        - EGLE, EPA and Dave Walters are chatting about best remediation practices
- Timeline: Hope that by the end of next year, remediation and restoration could be complete
    - EGLE wants them to pull more ash out than they think is economical
        - Drain, test, remove – cost with dewatering is so high, and high water levels add other complexities to remediation
- Have Environmental Engineer working with them, but would appreciate Audubon's input, support and partnership to ensure the wetlands are done right
    - Some areas that look like wetlands have historic ash in them (wetland to the north and east) and will need to be remediated
        - Trying to negotiate this process so they can start building new facility in 2022 with remediation/restoration complete by the end of 2021
    - Funds not yet allotted to see this work through – Sierra Club also reached out to Dave
        - Sierra Club was opposed to coal power plant, which is now gone
        - Natural gas that will be built will be small primarily for snowmelt purposes – will be much smaller than existing plant (half the footprint total)
        - Would welcome Audubon and Sierra Club support in partnerships
            - Surely contaminated water is in the ponds, but the River water tests appear okay
- Next steps: Audubon will follow-up with recommendations on Redevelopment Master Plan and continue conversations with Dave to work towards remediation and restoration of wetlands on Harbor Island

Pat Whalen, Unit Manager, Hoffmaster State Park/Bass River Recreation Area
September 10, 2020

-What do you see as the biggest threats to Hoffmaster? Do you have any management or restoration needs that could be better achieved through partnerships?
  - Living dunes – 500,000 ppl vist each year – additional trails through dune systems
  - Lost shoreline this year (150ft of shore dune) – will come back
  - Try to educate ppl about this as much as they can – have a Nature Center at park to teach youth and adults
  - Tree diseases – oak wilt (7 years), Hemlock Wooly (HWA)
    - Stewardship unit has treated over 12,000 trees in the park
  - Trail systems are also used by bicyclists
  - Garlic mustard, Japanese knotweed, lime grass (along shoreline)
  - Oak wilt – also in North Ottawa Dunes park (Melanie would know more about this)
    - Additional support to help with private properties surrounding parks
  - Controlling pedestrian traffic – signage collaboration

-What do you see as strengths on your properties ecologically, recreationally, or programmatically?
  - Dunes draw folks in – stable dune system, shoreline (3 miles)
  - Interpreter and visitor center in the park help with programming and outreach
  - Proximity to larger cities gets people out to green spaces (Grand Rapids, Muskegon)
    - Elizabeth (interpretor) will have more to say
    - In general DNR wants to increase diversity of attendance

-Do you have existing community partnerships that help support your organization's goals and lands? (i.e. friends groups, school districts, non-profits, etc). What are some existing programs in place with partner organizations?
  - Have had some overnight stays with a Latinx group from Grand Haven
  - Some school groups
  - Sounds like increasing this is a priority for DNR once in-person instruction allowed again
  - Did some work with archery program too
  - Do you feel that there are any programmatic gaps for particular demographics or cultural backgrounds?
    - Yes, want to increase diversity
    - Only one interpreter (schedule gets full quickly) – lack of time
    - Camping 1-on-1, sounds similar to City of Detroit program (they provide equipment and some training)

-Do you have or know of any habitat, land-use, socio-economic datasets that could be shared with us to incorporate into this report and mapping tool we are going to create?
  - MNFI did a survey of the area – only have hard copy available:
    - The MNFI I have was done in 2002 so I am sure there are changes since then. The report does mention two rare plant species in the park. Picther's Thistle and Ginseng. In addition, there are eight special concern animal species documented.
      - Hooded Warbler
      - Northern Goshawk
      - Eastern Box Turtle
      - Black Tern
      - Common Morehen
      - Cerulean Warbler
      - Prothonotary Warbler
      - Blanding's Turtle
      - The State threatened Yellow Throated Warbler was also documented. There are several other rare animals that have the potential to occur in the park.
  - Calvin College – Diana Van Dyke – has done dune research at the park for decade
    - Might have lots of data re: movement of dunes, ppl impacts on dunes, trails, etc.

- Is your community facing any flooding, drought, ground water, or water quality issues that might be helped through additional habitat enhancement or restoration? Are there any existing plans to help address these issues? Do you have or know of any available datasets related to these issues?
    - Lost shoreline, erosion, starting to regain some of the beach now as water levels have dropped
        - Army Corps predicts lake levels will go down this fall
        - Have had to install storm drains to Black Creek through campground to Lake MI
            - Storm Drain commission folks might be good to reach out to
        - Spring flooding in campgrounds
    - Water table has impacted trails in south of the park 12-16 inches of standing water
    - Debris and dune grass moves in along shoreline

Joseph VanderStel, Water Facilities Manager, City of Grand Haven
September 21, 2020

- What are your land management, recreation and programming priorities within Grand Haven?
    - This is a better question for the City Manager and the City Council.
- What do you see as the biggest threats on your natural areas?
    - High water level's and erosion, invasive species, imbalance of wildlife populations, human impact-need to designate a trail system, plastics and microplastics found on the beach & in the water and climate change in general.
- Do you have any management or restoration needs that could be better achieved through partnerships?
    - Yes, human impact on dune erosion. The partnership needed would be financial support through grants or funds to help restore and stop human impact/erosion on these sensitive and critical dune areas within the City. There is the potential to work with towns, city's upstream from Grand Haven to include a pathway, hiking or biking to connect Grand Rapids with Grand Haven and provide a natural corridor that would open partnerships to manage the Grand River watershed. I think there is something in the plans already if I recall (this may be, but I'm not familiar with your Grand River Greenway). Real time source water monitoring of the Grand River, maybe a partnership with NOAA/GLERL or USGS.
- What do you see as strengths on your natural areas ecologically, recreationally, or programmatically?
    - City's capabilities to maintain the parks within the City and to hold invasive species in control at some level. Also the availability to provide hiking/walking access to some beautiful area's within the City. While again maintaining our beaches, which truly are our greatest attraction.
- Do you have existing community partnerships that help support your goals and public lands? (i.e. friends groups, school districts, non-profits, etc).
    - This is a better question for the City Manager, Public Works Director and City Council.
- What are some existing programs in place with partner organizations?
    - Ottawa County Invasive Phragmites Control Group (OCIPG) and Wetland Watch from Spring Lake, and the Ottawa Conservation District/West Michigan CISMA and the Nature Conservancy – all four have been instrumental in helping to control and manage various invasive species.
    - LGROW/Metro Council in conjunction with storm water/source water protection. The rest of this question could be answered by Derek Gajdos, Public works Director.
- Do you have or know of any habitat, wildlife, land-use, socio-economic datasets that could be shared with us to incorporate into this report and mapping tool we are going to create?
    - This is a better question for the City Manager and Public Works Director
    - Harbor Island has been a point of control and restoration against the invasive species Phragmites australis, as well as the islands up stream on the Grand River. This is basically our partnership discussed above, for Harbor Island as well as a few other parks in the City, coordinated with the DPW staff and the Conservation District to control, Phragmites, Black Swallow Wort, Japanese Knotweed, Garlic Mustard, Hemlock woolly Adelgid, European Frog-bit, Oriental Bittersweet, etc…
- Do you have any habitat restoration or enhancement priorities at the following locations? Five Mile Hills Trails, East End Waterfront Trail, Highland Park Preserves, North Shore Dunes Nature Trails, Duncan Woods, Klemple Park overlook deck, Harbor Island non-motorized pathway, South Channel Linear Park (new landscaping)

Dan Small, Chairperson of the City of Grand Haven's Environment and Natural Resources Committee (ENRC)
September 23, 2020

-What are your land management, recreation and programming priorities within Grand Haven?
- While this question may be better suited to administrative personnel (or the Parks Board) the City of Grand Haven typically tries to balance the preservation of sensitive habitats (through the City's *Sensitive Areas Overlay* ordinance) with responsible growth. Much of the recreation and programming is handled through the Northwest Ottawa Recreational Authority (NORA). In these times of COVID-19, NORA is trying to maximize outdoor activities for area youth as much as possible. The area has a wealth of outdoor recreational opportunities, including one of the best beach volleyball parks in the country (at the Grand Haven State Park), numerous hiking trails, parks, and bike paths.

-What do you see as the biggest threats on your natural areas?
- At this point, the biggest threat to the natural areas in the Grand Haven area are exotic and/or invasive species. The City is currently dealing with oak wilt disease, the emerald ash borer, and the hemlock wooly adelgid as threats to the local urban forest. In addition, the presence of Phragmites, purple loosestrife, European frogbit, and several other plants and insect pests pose risks to the local wetland and aquatic habitats.

-Do you have any management or restoration needs that could be better achieved through partnerships?
- This question is better suited to the City of Grand Haven administrative personnel. However, it has been my experience that the City is more than willing to form suitable partnerships where both parties may benefit.

-What do you see as strengths on your natural areas ecologically, recreationally, or programmatically?
- One of the most important characteristics of the Grand Haven area is the diversity in local habitats. These include riverine areas (the Grand River - one of the largest watersheds in Michigan), the Great Lakes shorelines and the associated sand dunes, wetlands, and upland forests. These habitats generate recreational activities to both locals as well as visitors.

-Do you have existing community partnerships that help support your goals and public lands? (i.e. friends groups, school districts, non-profits, etc). What are some existing programs in place with partner organizations?
- The ENRC is comprised of environmental and ecological scientists, geologists, urban planners, and engineers. We have been providing the City support with a number of issues for nearly 20 years.

-Do you have or know of any habitat, wildlife, land-use, socio-economic datasets that could be shared with us to incorporate into this report and mapping tool we are going to create?
- The *Sensitive Area Overlay* ordinance contains maps, which depict known areas which include (but are not limited to): wetlands, critical sand dunes, Great Lakes shorelines, and inland lakes and streams.

-Could you tell me a little bit more about your role in the Grand River Greenway and non-motorized pathway initiatives? Are there any other programs or initiatives like this that are a priority for the city?
- This question is better suited to the City of Grand Haven administrative personnel.

-Are you considering any acquisitions of property along the Grand River as outlined in the Greenway plan?
- This question is better suited to the City of Grand Haven administrative personnel.

-Do you have any habitat restoration or enhancement priorities at the following locations? Five Mile Hills Trails, East End Waterfront Trail, Highland Park Preserves, North Shore Dunes Nature Trails, Duncan Woods, Klemple Park overlook deck, Harbor Island non-motorized pathway, South Channel Linear Park (new landscaping)
- This question is better suited to the City of Grand Haven administrative personnel.

Mark Van Putten, President and CEO, Wege Foundation
September 25, 2020

- How are the Foundation's priorities shifting within this region? What has formed the basis of this shift?
    - Emergency response w/ COVID:
        - How do we fill government gaps with current philanthropy?
        - About to go into their fall grant cycle
            - Want to see if there's a difference in past years – so far about the same number of applications – many folks in financial peril
            - May not be enough money to save all organizations – want to have some sensitivity in this and look at it through EDI lens (more diverse orgs may not have as much revenue or consistent funding)
            - No events or in-person site visits for Wege currently
        - Having similar discussions with funders in Chicago
        - POC led businesses – theres a particular fund ($25 mill), for loans/grants
            - Another aimed at providing start up funding for local entrpeneurs of color
            - Often direct service industry (either community-based)
            - Some corporate foundations are in on these conversations too – not very focused on environment, more economic/basic needs
        - Wege has a large environmental portfolio
    - Completed new strategic plan
        - A couple of outcomes:
            - Organizational - working through governance and staff transitions
            - WE MI focus with continuation of target allocation of 80% of grant funds
            - Consolidation of 5 program areas to 4
                - Arts and Culture
                - Environment
                - Education
                - Community Health and Wellbeing
                    - Decrease in arts and culture and health and community service with increase in Environment (by 10%)
            - Review new themes and goals:
                - Wants to see MI be an environmental leader
                - With the increased funding would like to fund work that is more state-wide and great lakes focused that still has importance for WE MI
                - Continuation of environmental education focus and experiential environmental education with youth of color, public school students
                    - Will continue to fund these programming
                    - Partnership with City of Grand Rapids and Grand Rapids Parks and Recreation
                    - Schools selected are in underparked neighborhoods (lack of green spaces)
                        - Mayor wants a park within 10 minute walk of all children
                        - Have already outlined a plan on green spaces
- What do you see as the biggest threats to sound ecological management in this region? What management or restoration needs could be better addressed through partnerships?
    - Climate change – biodiversity loss
    - Continued development boom and loss of habitat
    - Allendale Township has been particularly highlighted
    - Ottawa County is the fastest growing, sprawl is the worst, loss of habitat
        - One longer term impact of pandemic is fewer ppl wanting to live in big cities
    - Groundwater – Allendale again allowing big developments when there is not sufficient groundwater
    - 5-10 years ago a ground water study showed Ottawa County as priority region that is threatened to have water loss
- What lessons have been learned through the landscape collaboration along the Grand River?
    - Jason Chandlina and Ottawa County Parks and Rec

    - Landscape shoreline collaborative – 6 mile corridor with Harbor Island with potential regional and national significance
    - Ionia, Kent, Ottawa County is focus
    - Without having an iconic symbolic resources based objective like a river or shoreline corridor or IBA
    - Ottawa County has so many birds moving through
    - Grand River – really hard and relationships matter a lot – have a trusting network of relationships is essential
    - Having a rallying point (like the river) can bring people together
    - Very fortunate to have LGROW - has been effective – transportation for fed dollars and transportation planning
        - They fund a lot of projects through the LGROW watershed plan
        - They have a model and network there that has already been developed
        - Overlaps with River restoration and greenway project
        - Fairly robust organization framework at LGROW – to what extent is it a model that others can replicate
            - Viewing coastline up to Hoffmaster – could we recreate?
            - Getting the right people with the shared vision and values is the most important thing
- What do you see as regional strengths? Ecologically, recreationally, or programmatically?
    - Basic environmental ethic of general public and love for Lake MI and the commitment of the shoreline
    - Landscape level ecological planning/vision also enhances recreational opportunities
        - Very potent constituency – with the right kind of plan and vision could engage a lot of communities
- What are some existing, outstanding programs in place with partner organizations? Do you feel that there are any programmatic gaps for particular demographics or cultural backgrounds?
    - Emerging river restoration and what will happen along banks of restored river
    - Millennium Park up to Riverside Park
    - Highly developed, but there's a group: City Manager County Admin Business Leadership and Wege want to put out recommendations for an organization like the Detroit River Conservancy to be created for the Grand River
        - Might be a new partner programmatic organization – would be 7 mile corridor of Grand River/rapids
- Do you have or know of any habitat, land-use, socio-economic datasets that could be shared with us to incorporate into this report and mapping tool we are going to create?
    - PFAS issues with water quality - more testing needed in Grand River
        - Lisa Wojniak is leading some of this
        - Use of firefighting foam at airport
    - WE MI a little different because there's also the issue of past dumping by Wolverine Worldwide and contamination of the Rogue River
    - Trout Unlimited has done Rogue River work
        - Also part of the citizen advisory committee (Natalie)
    - Have also done some smaller grants to other funders for PFAS and water table work
        - Melissa Demaske and Herb Foundation have taken the lead on this
    - What happens to Harbor Island is huge from a variety of ways
        - Cost
        - Environmental
            - Anchor for corridors
            - With the existing contamination there, can't be developed on most likely
            - Opportunities for wildlife and habitat exist
        - Recreation
        - Community Development
            - Energy independence – they want to build natural gas plant that wouldn't be used often
            - City Council just rushed a study with a citizen committee
                - Have approved the financing to do this already, even though they haven't committed to it
        - Sierra Club advocacy work – 200-250 activists now in the area (LTE, grassroots organizing), strong citizen committee
            - We could partner with her and connect her to Audubon members/others

        - They're organizing a series of 3 webinars – perhaps we could be part of that and help promote
        - Follow-up with Jan
    - Management Plan with Ottawa Sands will be done this year
        - To what extent can Ottawa Sands plan talk about compatible uses with Harbor Island

Alex Wietan, Water Resources Specialist, Gun Lake Tribe
September 30, 2020

- What are the Gun Lake Tribe's priorities within the Grand River corridor:
    - Majority of Wild Rice priority areas (2,000 acres) are inland, not within our boundary map
    - Some Wild Rice priority areas are within the boundary (along Grand River, Kalamazoo River and Pigeon River)
    - Historically a lot of Bayous had wild rice, but some have very little now (this could be from high water or they could be due to cyclical seeding)
    - Not comfortable sharing the maps with us (they like to keep them somewhat hidden/unknown)
    - Another priority for them is Lake Sturgeon
        - Have a hatchery along Grand and Kalamazoo Rivers
- What are the ecological threats within the corridor?
    - High water, invasive species, Grand River restoration (if they remove the dam, a lot of issues could arrive with invasive species but also lampreys moving in – additionally, if they dredge the river, other problems could also arise)
    - Frogbit in particular is spreading, primarily in waterfowl hunting areas – not sure if it's the hunters or the ducks that are spreading them – working with EGLE to control this species with local CISMA.
        - Stearns Bayou is the upstream boundary of their current management zone and the plan is to continue removal from there, downstream
    - Other invasive species of importance: narrowleaf cattail - some control along Stearns Creek
- Are there any outreach or programming gaps?
    - Outreach needed on invasive species
    - Identification and prevention of spread, on Frogbit especially
- What would you say are the ecological or community strengths within the corridor?
    - Community awareness and pride in natural places
    - Lots of existing preserved green space and lots of public access to green space
- Are there any dataset recommendations you think we should look into?
    - Coastal Wetlands Consortium at CMU (Don Uzarski) – have loads of wetlands data
    - Muskegon – Annis Resources – GVSU supported (do quarterly surveys, usually in Muskegon, historically in Grand and Pigeon River – might have some data for us)
    - Water Quality Forum is coming up (virtual), could be useful to attend

Kathy Evans, Environmental Program Manager, West Michigan Shoreline Regional Development Commission and Muskegon Lake Watershed Partnership,
October 5, 2020

- What are your organizations priorities within this region? This question applies to land management, recreation, and programming priorities.
    - Going forward beyond the Area of Concern delisting, I could see where a lot of focus would be to maintaining access for outdoor recreation
    - Have done restoration and monitoring and want to make sure it's preserved and public access remains there and are enhanced in these areas
    - If we could increase engagement with community in these areas, that can help with prioritizing preservation and maintenance
    - Stewardship could be big focus at these sites
    - Maybe some invasive species removal through CISMA partnerships, but not a lot of control probably will be prioritized at this point
    - Would hope personally, that control could be done without chemicals at some point
    - Reforestation is also key – non point source – storm drains
    - Coastal Wetlands too need some trees – planting trees in riverine and stream corridors as well to create some more buffer
        - Would like to work more closely with local units of government and NGO's on some ordinance development for improved water quality and natural resources
    - Do some master panning for more rural communities that don't have master planning staff for mitigation, restoration, other plans
    - Service area is 5 counties (Muskegon is southern limit)
    - Blue Lake, Houtown Township, Karner Blue habitat and reforestation priorities
    - Education – would like to try to get more involved with K-12 education and stewardship (westlands stewardship – NOAA – GL Stewardship Program is an existing education program)
        - Works with GVSU too and promote educators involvement in those programs
        - Want to connect teachers to those community groups/NGO's working on habitat
    - Climate resiliency is another priority
- What do you see as the biggest threats on your properties in this region? Do you have any management or restoration needs that could be better achieved through partnerships?
    - Resiliency – will be rocking and sea walling
    - Farms – nutrient runoff (phosphorous)
    - Watershed inventory in 2008 (some outdated) – on their website (some watershed group info would be listed too to see if they did more recent ones)
    - Prioritize areas of high quality water to maintain that – so far has focused on more degraded areas to help them get to better quality levels
    - Will also look at GSI
        - Macatawa Area Coordinating Council – also do metropolitan transportation planning – NGO
        - Kelly Goward – holds GSI council every year
    - Muskegon County has fewer parks staff – so a need to fill would be stewardship there
    - Outreach on active habitat work being done too is a need – a lot of folks don't know about all the great work being done there
    - Lots of county parks on the lake – really great to work with
        - Would love to have a stewardship coordinator
- What do you see as strengths on your properties ecologically, recreationally, or programmatically?
    - Lots of great partners, including county and local jurisdictions in support of environmental improvements
        - Universities, researchers, ngo's, DNR's, watershed partnership, regional planning – AOC program brought them together and have been working together for a long time
    - General public – a mixed bag in Muskegon – some think it's important, but others that are going to do business as usual
        - More awareness would be beneficial

- Lots of farms too, so maybe working lands/working with farmers type-work is a possibility

-Do you have existing community partnerships that help support your organization's goals and lands? (i.e. friends groups, school districts, non-profits, etc). What are some existing programs in place with partner organizations? Do you feel that there are any programmatic gaps for particular demographics or cultural backgrounds?

- See below re: Great Lakes Marsh Monitoring Program
- Would be very interested in partnering with Audubon more, especially with engagement
  - Really want to do more work with communities of color or more poor communities and increase engagement and ensure public access is possible – environmental justice issues in Muskegon
  - A community was separated from a shoreline because it was so industrial – now that the industry is gone, they want to get the community out there and connected with the shore
  - Look-up Environmental justice coordinator for MI
  - Have a shoreline stewards program

-Do you have or know of any habitat, land-use, socio-economic datasets that could be shared with us to incorporate into this report and mapping tool we are going to create?

- Muskegon Lake Action Plan – Stewardship, Restoration, Engagement plans
  - AOC – Fish and Wildlife Habitat Plan was for AOC and was not the end all be all – will be updated
  - Did community input meetings too – plenty of open spots for partnerships – Audubon could be added as a partner
  - This document guides the Muskegon Lake Watershed Partnership (which includes a large group of partners which meet monthly – they act as an advisory group)
  - Resiliency plan and vision 2020 plan are focused more on shoreline (industrial to restored areas)
- Do reforestation within 5 different counties, work with State Parks to plant native trees
- Phragmites Plan and Biodiversity Plan was added onto Muskegon Wildlife Habitat Plan
  - One shot thing – not necessarily going back into controlling phrag
  - But when they do restoration, they focus on removal of phrag
  - They do this in stages to keep some veg structure present
- Brian Johnson, does bird banding near Muskegon Lake
- Muskegon Nature Preserve, Brian Mikka, Melanie, and maybe Brian Johnson – might have some data
- Great Lakes Marsh Monitoring (CWS Program) – since at least 2000 (possibly earlier) – MI Frog and Toad Survey too at their properties
- Priority restoration sites are still monitored (along lakes and shorelines
- Used this monitoring as their measure of success for restoration until delisting from AOC
  - Muskegon Lake, Lower Muskegon River, and Bear Creek are priority zones
  - Maybe Audubon would want to do monitoring here? Their volunteers committed through AOC delisting – not sure if they're going to continue
  - Snug Harbor – Muskegon SP – may not have a volunteer
  - Grand Valley Research Institute – does monitoring for them

Bill Martinus, retired Botanist and Naturalist, formerly with Ottawa County Parks and Recreation
October 7, 2020

-What are your organizations priorities within this region? This question applies to land management, recreation, and programming priorities.
  - High quality natural areas with biodiversity or rare species include:
    - Lost Lake - Muskegon SP
    - Spring Lake Township – Black Lake, Disc Golf Course (some threatened species)
    - North Ottawa Dunes
    - Northshore Park
    - Ottawa Sands
    - Kitchel-Dunes
    - Grand Haven City – between Kitchel and Ottawa Sands
    - Grand River, east to Crockery Creek
    - Connor Bayou
    - Rosy Mound
    - Hoffma Park – unofficial inventory
    - Hiawatha Forest
    - Kirk Park
    - Palomita Preserve (West MI Land Conservancy – Little Pigeon River)
    - Ottawa Shores
    - Hemlock Crossing
    - Van Buren Dunes

-Any data recommendations for this region?
  - Harbor Island Bird List – reach out to Chip Franke for this
  - Plant surveys/Natural Features Inventories - Ottawa County approved the sharing of these datasets
    - Includes birds, reptiles, amphibians, T&E etc (dozens of plant T&E plants in these lists)
    - Some of his personal inventories include dates of latest observation (many parks revisited)
    - All represent a snapshot in time, some are old, some terminology and formats have changed
    - FQI: https://www.fws.gov/midwest/endangered/section7/s7process/plants/FQA.html#:~:text=The%20FQI%20is%20an%20indication,considered%20high%20quality%20aquatic%20resources. All non-native plants = 0, Native and common = 10. Adapted and adopted by MI DNR, you can score a property based on the plants that are found there. Anything over 35 is good, 50+ outstanding and rare.
    - Can objectively score any property – sound scientific way of scoring any property.

-What do you see as the biggest threats on your properties in this region? Do you have any management or restoration needs that could be better achieved through partnerships?
  - Deer – areas where Bill has done unofficial surveys in, lots of these areas are disappearing
    - In OTSA, North Dunes, Spring ephemerals used to thrive there and now only 1-2 where trees have prevented deer access
    - They're eating everything and locally extirpating a lot of species
    - No saplings, no seedlings
    - Forests along the lakeshore are not regenerating – Rosy Mound is still healthy, but going up to Hoffmaster, not as good (they've taken out some deer)
    - Deer are terracing the hillsides too – even getting into the emergent and aquatic wetlands species
    - Did some veg mapping at Sleeping Bear Dunes on Manitou islands – nothing hardly left on N Manitou (got rid of 3k deer – the deer were so starving they swam out to eat insects in the lake)
    - Silicon dioxide – the deer don't eat sedges because of its content, so sedge plantings could be most effective, where appropriate

-What do you see as strengths on your properties ecologically, recreationally, or programmatically?
  - Vast areas that are being preserved and the biodiversity within them

- Public that is knowledgeable of and enjoys natural areas
- OC has parks millage
- Townships and cities take care of sports complexes and OC is caring for natural areas and network of conservancies, park systems
    - Seems to be an efficient system
- More outreach and education these days, promoting natural areas

-Any other recommended resources we should consider?

- James Pontchere in the late 60's – Birds of Ottawa County plus Chip Franke's update
- Working on book of Plants of OC – found 300-400 new species
- Muskegon Nature Association – Rich Peddler – have been active since late 40's mostly birds, and plants – may have additional datasets
- Several T&E species of IN have been found in OC as well because of northern/southern hardwood ecotone/transition zone

Jessica Vander Ark, Groundswell Manager, GVSU College of Education, Center for Educational Partnerships
October 8, 2020

-What are your organizations priorities within this region? This question applies to land management, recreation, and programming priorities.
- Groundswell is a hub of the Great Lakes Stewardship Initiative – one of 7 hubs, also in Muskegon
- They are based out of Grand Valley State University
  - They have a 3 pronged approach
    - support stewardship
    - place-based education
    - professional development for teachers (offered monthly)
      - Have teachers and community partners go to development events to help build those partnerships between educators and partners
- Also provide some funding for stewardship projects
  - Funding works like a mini-grants program
  - Teachers apply $250-1000 in funding and give them their goals, student voice can be part of the project
  - Identifying issue, figuring out partners, and solutions and then act on those solutions
  - Examples: Bioswale installations, public outreach campaign, etc
- Primarily working in Kent Co school district, but also some Ottawa County schools
- Summer institute – community inventory done, building communities, and meeting who is in your community
- Also do more intensive subject areas – mushrooms, forestry and water quality
  - Really wanted to get a bird workshop on calendar (will be in touch!)
- Works with our Community's Children
- For stewardship: a combination of on and off-campus work
  - Majority of work on school campus (most accessible), partnerships with parks (City of GR parks school adopted park, pick up litter, bring up concerns, meet with grounds crew for job exposure), invasives removal at adjacent parks, year after year
  - Specific properties: Roselle Park Garlic weed pulls each spring, some interest in Rosy Mound partnership
  - East End park too in GH area
  - Kent County adopt a drain program – Lower Grand River Organization of Watersheds (LGROW), helps keep drains clear
  - Sometimes they just pay for transportation for teachers without stewardship
- Increased interest in recycling on campus and composting
- NOAA BWET working with Ottawa Conservation District and school at nearby parks
- River restoration (removing dams, making it more accessible for folks to recreate)
  - They want to highlight outdoor recreation
  - Want to be able to kayak OC to GR
  - What kind of education and signage would be needed
  - Lots of opportunity to publicize

-What do you see as the biggest threats on your properties in this region? Do you have any management or restoration needs that could be better achieved through partnerships?
- Lack of Green Stormwater Infrastructure (GSI) across the region
- Grand Rapids is very focused on GSI and disconnected combined sewer overflow
  - They have been very ahead of the game
- When it comes to west MI along lakeshore there is a gap in GSI
- Drain Commissioner/Water Resources commissioner is pretty progressive in Kent Co.
  - Spring Lake was flooded all spring
  - No guidance from above on how to remediate this
  - Need for rebuilding habitat too, which goes hand in hand with GSI, reducing flooding, healthy bird populations, and other indicator species

- Invasive species also a threat – Kent and Ottawa County working hard on this
  - Sounds like more funding would be good for this
  - Runoff and flooding out of control in recent years
- In Kent county – there is major development upstream of Grand River Coastal Corridor – has heard of development trying to happen on wetlands – still has some blighted and industrial areas that could be revitalized – seems like they will focus on EJ

-What do you see as strengths on your properties ecologically, recreationally, or programmatically?

- Increasing engagement with underrepresented groups, but more work to be done

-Do you have existing community partnerships that help support your organization's goals and lands? (i.e. friends groups, school districts, non-profits, etc). What are some existing programs in place with partner organizations? Do you feel that there are any programmatic gaps for particular demographics or cultural backgrounds?

- Gaps: they could increasing EDI in the work they do with speakers and teachers
- Gaps in knowledge – people think swamps/wetlands are bad

-Do you have or know of any habitat, land-use, socio-economic datasets that could be shared with us to incorporate into this report and mapping tool we are going to create?

- City of Grand Rapids has live reading of water – monitors on water levels and quality
- LGROW – data repository that they're working on – might be worth reaching out to them
  - Jessica is working with them on a grant to help compile this data
- Trout Unlimited West MI has some data loggers also – water quality data
- EGLE – wetlands and water quality trends/mapping tool

Drew Rayner, West Michigan CISMA, Coordinator Ottawa Conservation District
October 21, 2020

Introductions:

- West MI CISMA Coordinator – service area includes Allegan, Nowaygo, Montcalm, Ottawa Counties
- Two main lines of work:
    - Invasive plant work (aquatic and terrestrial) – lots of public and private lands projects
    - 350 sites this year
    - Works a lot with USFS – also does invasive treatments for them
- Hemlock Woolly Adelgid (HWA) is a big priority and threat
    - Some state lands have it – he coordinates private lands
    - Mostly up north in Oceana County
    - Trying to control that northern boundary
    - Sticks to coastline for now, but would be a huge mess if it moved inland and south
    - Land Conservancies now contracting them to do the work – they are 1/12 to 1/13 the cost of consultants
    - Duncan Woods, Cemetery, Mulligan's (all three parks treated – 160 acres)

Questions:

- What are your organizations priorities within this region? This question applies to land management, recreation, and programming priorities.
    - More outreach needed – a lot of landowners don't know what invasive species are, what's good/bad to have on property
- What do you see as the biggest threats on your properties in this region? Do you have any management or restoration needs that could be better achieved through partnerships?
    - Hemlock Wooly Adelgid
    - Phragmites/narrowleaf cattail (Grand River)
        - Phrag is really starting to come back
    - European Frogbit also filling up grand river, slower marsh areas, wetland areas
        - Only one Bayou has it now, but spreading like crazy
        - State Game Areas – hunters likely spreading it
        - 5/7 hunters had frogbit on their boats
    - Outreach partnerships needed on invasive species
        - Higher-level planning – he has way too much control over what they do – wants to see bigger conversations looking at more data and conservation priorities being set
- What do you see as strengths on your properties ecologically, recreationally, or programmatically?
    - Work in a lot of different areas – Forest Service properties are great – intact, unused, pretty high quality
    - Willingness to spend money on natural resources
    - Amount of protected lands here is outrageous – with great connectivity
        - Not used too much either – folks don't tend to go too far
    - Hunting opportunities (parks get opened to hunting in Parks and Rec areas), lots of access to parks for hiking,, waterfront and boating/kayaking/duck hunting/fishing
- Do you have existing community partnerships that help support your organization's goals and lands? (i.e. friends groups, school districts, non-profits, etc).
    - CISMA – west mi conservation network – cluster of the Stewardship Network
        - 50 plus organizations within the Stewardship Network
        - 2 other conservation districts – Kent and Muskegon run their on the ground crews
        - Lots of State Agency and Federal Staff too –with lots of help as well (State Park Forestry Resources Division staff)
        - Shaun at TNC also works with them a lot – lots of consultants too (some on their board)
            - Do surveys from consultants and then do the on the ground work
- Is your community facing any flooding, drought, ground water, or water quality issues that might be helped through additional habitat enhancement or restoration? Are there any existing plans to help address these issues? Do you have or know of any available datasets related to these issues?
    - Regional Conservation Partnership Program (RCPP) funding for groundwater best practices – Grand Haven Township in better shape because of City Water (not wells) – groundwater is a county issue

- E. coli issues – watershed – BMP's for farmers – septic tank replacement, cover crops, buffers, reducing runoff
  - Bass River, Pigeon River, Deer Creek are priority areas
- Microplastics – Hope College had some students working on this in OC and Allegan County
- Phragmites management – spraying – marsh masters (up to 7 miles up to 144th St Boat launch)
  - Shaun Howard at TNC also involved in this work

Justin Heslinga, Stewardship Director, West Michigan Land Conservancy
October 22, 2020

Questions for all stakeholders:

- What are your organizations priorities within this region? This question applies to land management, recreation, and programming priorities.
    - More on conservation side
    - Robust Land Protection Program
        - Private lands (easements and agreements with Private landowners along the lakeshore in our corridor)
        - Acquiring Nature Preserves (purchase or donation) – manage them outright for ecology and public access
        - One small preserve in the corridor boundary
        - Community partnerships (use their expertise to work with partners – OC, DNR, Saugatuck Natural Area, OTSA, North Ottawa Dunes)
            - Helped with acquisitions and fundraising for OTSA
            - Not involved in follow-up management in these properties (OC Parks and Rec, DNR)
        - Haven't been on the ground as much as their partners in some ways
- What do you see as the biggest threats on your properties in this region? Do you have any management or restoration needs that could be better achieved through partnerships?
    - Shoreline – land protection – dune systems, unstable shorelines
        - High lake levels damaging properties, but is part of the cycle
        - Thistle (state threatened, federally threatened)
        - Landscape-level disturbances important but difficult to find that large contiguous area (shoreline is very developed or is protected)
        - Not much left for conservation and development
        - Prices of what is left are very high too so acquisition is challenging
    - Work with CISMA on invasive species management and disease
        - Hemlock Wooly Adelgid (HWA), Beech-bark disease (north, but moving south - Pentwater), Oak Wilt
        - Trying to do some reforestation along shoreline (thinking about climate change and resiliency)
- What do you see as strengths on your properties ecologically, recreationally, or programmatically?
    - Lakeshore – resilience factor (see TNC map) and connectivity of lakeshore
    - Migratory birds too – monarchs also along lakeshore
    - Grand Haven area – have been able to work with OC, DNR, to string together a 6 mile corridor Hoffmaster to Grand Haven
        - Looking for opportunities to expand and connect isolated areas to this area
    - This area sits at an intersection of northern and southern community types (MNFI data)
        - This area has great biodiversity with N and S species
        - Lots of opportunity with resilience and climate change (ecosystems/biodiversity could move around)
- Do you have or know of any habitat, land-use, socio-economic datasets that could be shared with us to incorporate into this report and mapping tool we are going to create?
    - EGLE Estimated Groundwater Recharging Dataset
- Is your community facing any flooding, drought, ground water, or water quality issues that might be helped through additional habitat enhancement or restoration? Are there any existing plans to help address these issues? Do you have or know of any available datasets related to these issues?
    - Watershed-level water issues - looking at watershed management plans and what they've prioritized (EGLE 319 program)
    - In their niche, Land Conservancy approach is to protect the lands around shoreline to maintain buffers
    - Conservation plan has one water quality dataset within it (upper buffers, wetlands, recharge priorities – EGLE data)
        - With Climate change, heavier rain events, drier summers, groundwater influence will help stabilize this
        - Protect areas with soils that can accept recharge

Land Conservancy of West MI:

- Ottawa Sands and Grand River are within their mapped priority areas
    - Habitat Quality data layer – what data went into this layer? Read footnotes
- Lake MI shoreline is another priority area, which includes some OC shoreline in our corridor
        - Threats: Invasive species, shoreline development, land limitations
        - Strategies: Protect and manage few remaining sand dunes, protect remaining shoreline habitat and provide public access for nature-based recreation where appropriate, work with landowners to improve forest health/remove invasive species
            - They helped raise funds for OTSA – are they involved in long-term management of this site at all?
                - No, but good time to reengage them in the regional plans/thoughts
- Are you working with public or private landowner partners on additional properties within the corridor?
    - Yes, mainly on shoreline protection within our corridor boundary – outside of corridor boundary looking at preserving stream and river shorelines for water quality, reforestation/forest management on private lands

Eileen Boekstein, Grand Valley Metropolitan Council, Lower Grand River Organization of Watersheds (LGROW)
October 28, 2020

Introductions:

- Works with Lower Grand River Organization of Watersheds (watershed council for lower Grand Rapids – Portland - Grand Haven)
- Umbrella watershed organization of the area
    - Smaller friends groups exist for smaller rivers and creeks that feed into Grand River (more in Kent County rather than Ottawa County, so potential area of need for OC)
    - Other stakeholders also engaged to protect these stream ways
- Macatawa Area Watershed Council (regional planning, environmental programs)
    - Assist communities in this region with municipal storm water permits
    - Work with municipalities, counties, cities, school districts
- LGROW focus is to reduce non-point source pollution, runoff, and improve watershed management
- Eileen works with education/outreach re: storm drain permitting/projects
    - Also engages folks in community science
- Not a grassroots non-profit – came out of the storm water management plan
    - 2011 – storm water management plan (EPA approved – available on EGLE)
    - Opening up funding for subwatershed groups to do some more specific projects
- Want to create watershed resiliency plan
    - Looking at broader vision
    - Natural Connections map (watershed-wide vision for ideally what green space and infrastructure could look like)
        - Working on report to go along with it
    - Each sub-watershed is broken down within the map
    - Hoping to engage stakeholders and community members on this map/report
    - Have worked with GVSU on first draft
    - Have interactive story map version (will share)
- Wetlands and bayous not only important for birds and biodiversity but also for water management
- Storm water management on the community's mind due to high water levels
- Do lots of education and outreach (more targeted in Grand Rapids area, but also do some work in Ottawa County too)
    - Working moreso with individual teachers and schools in OC
    - MS4 – storm water community does a lot of outreach of their own
- Trying to get all water quality data into one place for the watershed (so you don't have to search for it within USGS and MyPoint)
    - Looking for more water quality data to put in there (macroinvertebrate data, other)

Questions:

- What are your organizations priorities within this region? This question applies to land management, recreation, and programming priorities.
    - Water Quality and Water Quantity (runoff and localized water level issues)
- What do you see as the biggest threats on your properties in this region? Do you have any management or restoration needs that could be better achieved through partnerships?
    - Encourage Green Infrastructure with municipalities
    - Have lots of projects ongoing to do tree plantings and native plantings on school properties to store storm water – more of this needed
    - Also have residential program pilot project (rain gardens, native plantings, riparian zones, etc)
        - MAC – Rainscaping
    - National Wildlife Federation grant wrapping-up right now (providing some habitat but also storm water management)
- Do you have existing community partnerships that help support your organization's goals and lands? (i.e. friends groups, school districts, non-profits, etc). What are some existing programs in place with partner organizations? Do you feel that there are any programmatic gaps for particular demographics or cultural backgrounds?
    - Trying to do a better job with community engagement, especially with an environmental justice lens:
        - Have done some work with River Network (National organization that has provided some technical assistance)

        - One reason they aim to foster the development of sub-watershed groups (for more localized engagement)
    - Lots going on in terms of Environmental Ed in Grand Rapids Area
        - Thrive Outside Initiative lead by City of Grand Rapids (Outdoor Foundation possibly funded)
        - Community Outdoor Ed and Env Ed – Outdoor Recreation – working to make it accessible to all people and break barriers
            - offering gear and opportunities
        - WE MI area too – community gardens, nature center, piloting a collective impact model – how can we as community partners wrap around this school district and provide opportunities for hands on env ed for all ages levels
            - Grand Rapids Environmental Network
            - Could be a model to other school districts
            - Could involve a lot of new partnerships
    - Lots of interest in birds – in-class side of things with teachers
    - Field trips
    - Also partner with Groundswell (Jessica Vander Ark) – Groundswell has helped connect LGROW with communities
        - She said they also have hubs out in southeast MI (follow-up with Jessica about this too)
        - Based out of Eastern MI and then Flint area (Discovering Place) – Great Lakes Stewardship Initiative website will have their locations
- Do you have or know of any habitat, land-use, socio-economic datasets that could be shared with us to incorporate into this report and mapping tool we are going to create?
- Is your community facing any flooding, drought, ground water, or water quality issues that might be helped through additional habitat enhancement or restoration? Are there any existing plans to help address these issues? Do you have or know of any available datasets related to these issues?
    - Working on water quality on the whole through watershed plan
    - Priority areas for green infrastructure/habitat
        - Sub-watersheds have wetland restoration listed as a priority
        - Rogue River is one, Indian Mill Creek (Ottawa Conservation District)
            - Ben Jordan, manages their watershed projects (more wetlands focused) – might have some good ideas re: priorities
        - They have some funding through the Regional Conservation Partnership Program (USDA – Farm Bill), which includes wetlands restoration and protection
        - Had a grad student do a landscape-level analysis of wetlands – Toff Park was a priority area in Grand Rapids (urban wetland, provides a lot of storm water management for city and everyone loves it)
        - National Wildlife Federation (they have done some work with Sacred Grounds program too)

Appendix B. Marsh Bird, Landbird, Waterbird, Waterfowl and Shorebird Conservation Plan Focal Species, conservation status, and presence within Grand River Coastal Corridor based on eBird observations.

Common Name	State Status	Global Rank	State Rank	Federal Status	AGL Marsh Bird Focal Species	JV Focal Species (breeding)	JV Focal Species (non-breeding)	Within GRCC
American Bittern	SC	G5	S3		X	X	X	X
American Coot		G5	S3				X	X
American Golden-Plover		G5	SNRN				X	X
American Tree Sparrow		G5	SNRN				X	X
American Woodcock		G5	S4			X		X
Bald Eagle	SC	G5	S4					X
Barn Owl	E	G5	S1					
Black Tern	SC	G4G5	S2		X	X		X
Black-backed Woodpecker	SC	G5	S2					
Black-crowned Night-heron	SC	G5	S3		X	X		X
Blackpoll Warbler		G5	SNRN				X	X
Blue-winged Teal		G5	S3		X	X		
Bobolink		G5	S4			X		X
Canada Warbler		G5	S5			X		X
Canvasback		G5	SNRN				X	X
Caspian Tern	T	G5	S2					X
Cerulean Warbler	T	G4	S3			X		X
Chimney Swift		G4G5	S5			X		X
Common Gallinule	T	G5	S3		X			X
Common Loon	T	G5	S3			X	X	X
Common Nighthawk	SC	G5	S3					X
Common Tern	T	G5	S2			X	X	X
Dickcissel	SC	G5	S3					X
Dunlin		G5	SNRN				X	X
Eastern Black Rail		G3		T*				
Eastern Meadowlark		G5	S5			X		X
Eastern Whip-poor-will	SC	G5	S3			X		X
Forster's Tern	T	G5	S2					X
Gadwall		G5	SNRN				X	X
Golden-winged Warbler	SC	G4	S5			X		X
Grasshopper Sparrow	SC	G5	S4					X
Great Blue Heron		G5	S5				X	X
Green-winged Teal		G5	S3				X	X
Henslow's Sparrow	E	G4	S3			X		

Hooded Warbler	SC	G5	S3					X
Killdeer		G5	S5			X		X
King Rail	E	G4	S2			X		
Kirtland's Warbler	E	G3G4	S3			X		
Lark Sparrow	X	G5	SNA					X
Least Bittern	T	G4G5	S3		X			X
Lesser Scaup		G5	SNRN				X	X
Long-eared Owl	T	G5	S1					X
Louisiana Waterthrush	T	G5	S2					X
Mallard		G5	S5			X		X
Marsh Wren	SC	G5	S3		X			X
Merlin	T	G5	S3					X
Migrant Loggerhead Shrike	E	G4T3Q	S1					
Northern Goshawk	SC	G5	S3					
Northern Harrier	SC	G5	S4					X
Northern Pintail		G5	SNRN				X	X
Osprey	SC	G5	S4		X			X
Peregrine Falcon	E	G4	S3					X
Pied-billed Grebe		G5	S4		X		X	X
Piping Plover	E	G3	S2	E		X		X
Prairie Warbler	E	G5	S3					X
Prothonotary Warbler	SC	G5	S3					X
Red Knot		G4	SNRN	T*				X
Red-headed Woodpecker	SC	G5	S3			X		X
Red-shouldered Hawk	T	G5	S4					X
Ring-necked Duck		G5	S4			X		X
Rusty Blackbird		G4	SNRN				X	X
Sanderling		G5	SNRN				X	X
Sandhill Crane		G5	S4		X		X	X
Sedge Wren		G5	S3		X			X
Sharp-tailed Grouse	SC	G5	S3S4					
Short-billed Dowitcher		G5	SNRN				X	X
Short-eared Owl	E	G5	S1				X	X
Sora		G5	S4		X	X	X	X
Spruce Grouse	SC	G5	S2					
Swamp Sparrow		G5	S5		X			X
Trumpeter Swan	T	G4	S3					X
Upland Sandpiper		G5	S3			X		X
Virginia Rail		G5	S4		X			X
Whooping Crane		G1	SNRN	XE*				X
Wilson's Phalarope	SC	G5	S3				X	X

Wilson's Snipe		G5	S4	X		X
Wood Duck		G5	S5	X	X	X
Wood Thrush		G4	S4	X		X
Yellow Rail	T	G4	S2	X		
Yellow-headed Blackbird	SC	G5	S2			X
Yellow-throated Warbler	T	G5	S3			X

Appendix C. Global and State Ranks, Federal and State Conservation Status

GLOBAL RANKS
G1 = critically imperiled globally because of extreme rarity (5 or fewer occurrences rangewide or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
G2 = imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3 = either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a single western state, a physiographic region in the East) or because of other factor(s) making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.
G4 = apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.
G5 = demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
GH = of historical occurrence throughout its range, i.e. formerly part of the established biota, with the expectation that it may be rediscovered (e.g. Bachman's Warbler).
GU = possibly in peril range-wide, but status uncertain; need more information.
GX = believed to be extinct throughout its range (e.g. Passenger Pigeon) with virtually no likelihood that it will be rediscovered.

STATE RANKS
S1 = critically imperiled in the state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation in the state.
S2 = imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.
S3 = rare or uncommon in state (on the order of 21 to 100 occurrences).
S4 = apparently secure in state, with many occurrences.
S5 = demonstrably secure in state and essentially ineradicable under present conditions.
SA = accidental in state, including species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range.
SE = an exotic established in the state; may be native elsewhere in North America (e.g. house finch or catalpa in eastern states).
SH = of historical occurrence in state and suspected to be still extant.
SN = regularly occurring, usually migratory and typically nonbreeding species.
SR = reported from state, but without persuasive documentation which would provide a basis for either accepting or rejecting the report.
SRF = reported falsely (in error) from state but this error persisting in the literature.
SU = possibly in peril in state, but status uncertain; need more information.
SX = apparently extirpated from state.
SNRN = No status rank (SNR/SU/SNA).

FEDERAL CONSERVATION STATUS
T = Threatened
E = Endangered
XE = Experimental essential population
* = if/whenever encountered (if outside normal range)

STATE CONSERVATION STATUS
SC = Species of Conservation Concern
T = Threatened
E = Endangered
X = Probably Extirpated

Appendix D. High Quality Natural Communities within the Corridor with an EO rank of >= BC

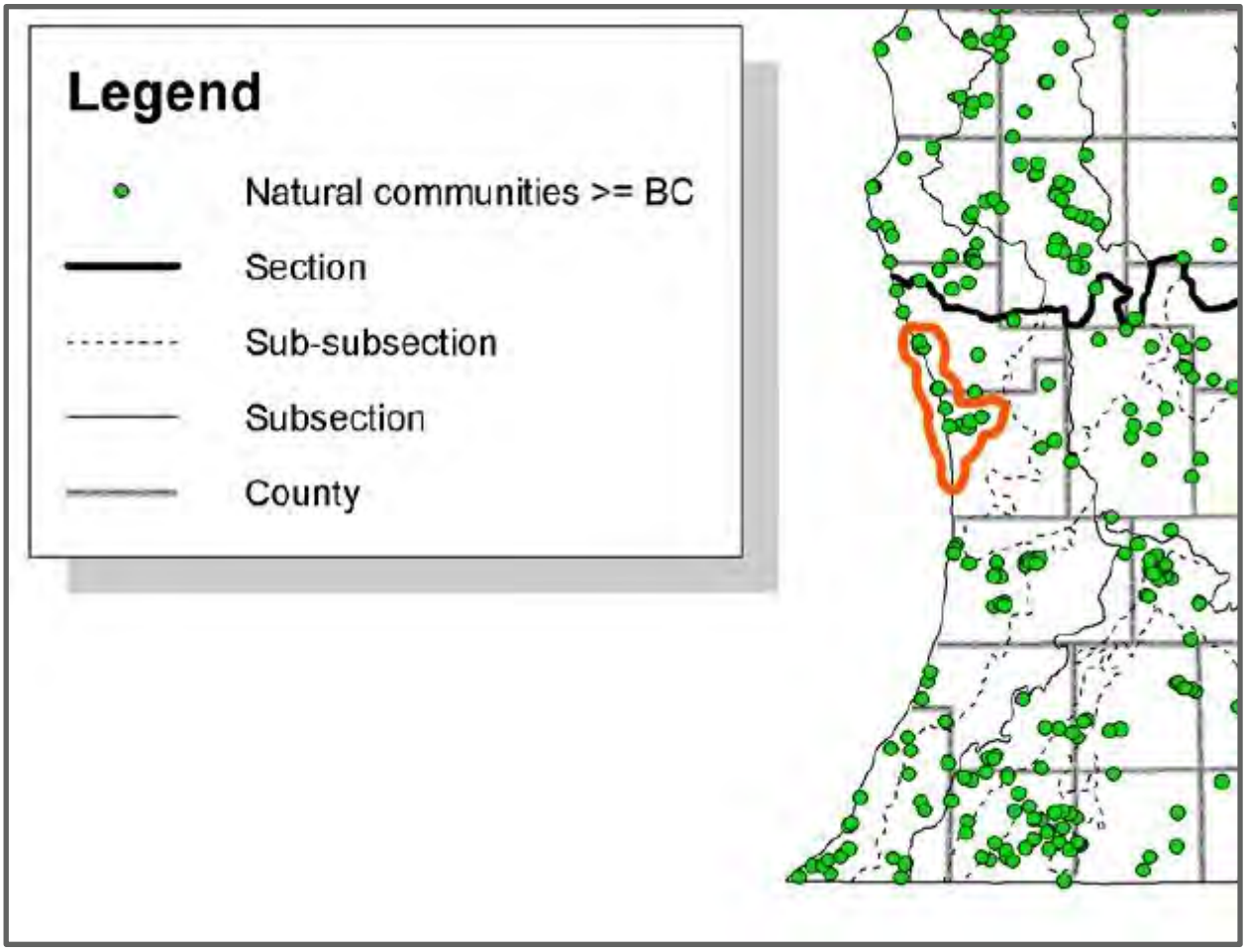

Figure from Paskus et al, 2008. Biodiversity Assessment of Michigan Technical Report, Michigan Natural Features Inventory.