Identification of Critical Nesting Habitat for Wetland Birds in Michigan: Western Lower Peninsula — Year Three Progress Report



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Cover Photo Credits:

Photo: Least Bittern (*Ixobrychus exilis*) at Hamlin Lake Marsh, Mason County, Michigan. This bird responded to taped playback calls during MNFI canoe survey on 2 June 2005 (photo by M.A. Sanders). Inset photo: Brad Yocum scanning the lower reaches of Flower Creek marsh, Mason County, Michigan (photo by M.A. Sanders).





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Introduction

Both coastal areas and inland wetlands provide unique habitats that sustain considerable native biodiversity. Informed management of these ecosystems is required to enhance the long-term viability of native species and sustainability of ecological resources. Devising appropriate protection and restoration strategies relies on the availability of current status assessments of environmental features and associated biota. Nearly two-thirds of the birds that are listed as federally threatened or endangered in the United States are associated with wetlands (Mitsch and Gosselink, 1993). In Michigan, at least 19 bird species currently listed (endangered, threatened, or of special concern) are associated with wetlands.

Although much is known about many terrestrial or land birds of the Great Lakes, the ecology of most marsh-dependent species has received less attention (Weeber and Vallianatos, 2000). The wetland birds, as a group, have suffered severe population declines over the last several decades (McPeek and Brewer, 1991). Draining and filling of wetlands, and other human actions continue to threaten habitat for these birds and associated flora and fauna. Many of the remaining Great Lakes wetlands are fragmented due to intensive agriculture or urban development. Additionally, the spread of exotics such as common reed (Phragmites australis) and purple loosestrife (Lythrum *salicaria*) into coastal and inland waterways presents a very serious threat to the ecological integrity of these systems further fragmenting suitable wetland bird nesting habitats. Some wetland birds are area sensitive, and therefore, do not occur at small, isolated sites (Brown and Dinsmore, 1986). Wetland birds provide great value as indicators of environmental integrity, as well as substantial aesthetic and recreational value to those who enjoy the outdoors.

In 1996, the State of the Lakes Ecosystem Conference (SOLEC) began to evolve from a small group of indicators to an initiative developing a comprehensive set of basin-wide indicators that would more accurately report on progress under the Great Lakes Water Quality Agreement (Weeber and Vallianatos, 2000). Through this process, a recommended set of indicators was presented at SOLEC 1998, two of which are directly related to this project – wetland bird diversity/abundance and threatened and endangered species.

Our purpose is to identify critical sites in Michigan for the continued protection of wetland birds. Many projects (e.g., Michigan Natural Features Inventory's Great Lakes Marsh Work, the Great Lakes Marsh Monitoring Program, MSU graduate studies, Important Bird Areas Programs, and the Michigan Breeding Bird Atlas II Project) are currently underway to study wetland birds in Michigan. Most, however, have been limited in scope or have answered specific research questions, therefore lacking the state-wide perspective needed to identify and potentially prioritize these critical wetlands.

The existing data needs to be compiled, analyzed, summarized, and presented at the appropriate spatial scale that is useful to land managers, planners, and others. New and updated inventories and ecological assessments of these coastal wetlands will provide valuable data describing 1) the status of important wetland breeding bird communities and species, 2) current status of encroaching exotic species at survey sites, and 3) conservation management needs for coastal wetland bird species. In addition, up-to-date inventories will help fill information gaps and will provide a much stronger foundation for devising sound conservation and management strategies.

This four-year project is helping public land managers and planners identify the wetland bird species, communities, and habitats of concern - both locally and statewide. The first year focused on public lands on the eastern side of Michigan's Lower Peninsula along the coastal areas of Lake Huron, Lake Erie, and Lake St. Clair (Cuthrell and Monfils, 2004). Year two looked at private and public sites in the eastern Upper Peninsula (Sanders, Cuthrell, and Enander, 2005). Year three **(this report)** was carried out along the Lake Michigan shoreline in the Lower Peninsula from New Buffalo to the Straits of Mackinac. The fourth year will look at sites in the western Upper Peninsula along the shores of northern Lake Michigan and southern Lake Superior.

The Michigan Natural Features Inventory (MNFI) is prepared to undertake research to: 1) gather reports and other records for nesting wetland birds in these coastal wetlands and incorporate the information into an environmental decision-making process for planning and management, 2) conduct targeted wetland bird surveys on public lands where records older than 20 years exist and update occurrence records and population status estimates for these wetland bird species, 3) collect ecological data at survey sites to characterize critical habitats and communities necessary for sustaining viable populations of wetland birds in Michigan and elsewhere, and 4) disseminate this information to key land management partners.

This progress report presents the results of the third year of a four-year project to conduct

systematic inventories of selected Great Lakes wetlands in order to identify critical nesting habitat for listed wetland birds. Over the past two decades MNFI has surveyed numerous coastal communities and rare species found in or allied with Great Lakes wetlands. In this compilation we provide the results of wetland bird inventories conducted by MNFI zoologists during the spring of 2005. These surveys focused on private and public lands along the eastern shoreline of Lake Michigan ranging from the Galien River in New Buffalo northward to sites near the Straits of Mackinac. Important wetland bird nesting habitats are highlighted in a site summary section as well as depicted on regional maps. Also provided are brief descriptions of these survey sites and results of bird surveys, and summaries of data review activities. In addition, an analysis of the project to date is provided as both an overview and a basis for assessing the future direction of this multi-faceted effort.

Study Area

The study sites for the third year of the wetland bird inventory included emergent and submergent wetlands associated with the eastern shoreline of Lake Michigan in Michigan's Lower Peninsula (Figure 1). A total of 34 sites representing 24 study areas were visited on at least one occasion by MNFI field staff during the spring of 2005 (List 1). These sites represent both public and privately-owned parcels. Public lands included eight state game areas, the Mackinac State Forest, the Manistee National Forest, and several local parks. Privately-owned sites included Sarett Nature Center, Flower Creek marsh, and Stony Lake marsh.

Regional Landscape Ecosystems of Michigan, Minnesota, & Wisconsin (Albert 1995) provides a useful framework for

Allegan (Subsection VI.3.)

This section is characterized by a narrow band of sand dunes and flat lake plain along the

understanding broad patterns of occurrence for natural communities, species, and natural disturbance across the state. The landscape units integrate climatic, landform, soil, and vegetation factors. The classification is hierarchically structured with three levels in a nested series. from broad landscape regions called sections, down to smaller subsections and subsubsections. Survey sites identified in this study spanned four subsections including the Allegan subsection, the Manistee subsection, the Leelanau and Grand Traverse Peninsula subsection and the Presque Isle subsection (Figure 1). These are further divided into four sub-subsections to include Southern Lake Michigan Lake Plain, Traverse City, Stutsmanville, and Cheboygan.

southern Lake Michigan shoreline, with both end and ground moraine glacial deposits further inland. The growing season ranges from 150 to 170 days, decreasing northward. Annual average rainfall is around 35 inches. Annual snowfall ranges from 70 inches in the south to 100 inches in the north. Elevations range from 580 to 998 feet. Soil textures vary from sands to clays. The Galien, Kalamazoo, Grand, and Muskegon are some of the major rivers crossing the subsection with inlets to Lake Michigan. Many of these streams represent drowned river mouths with extensive emergent wetlands extending upstream several miles (Albert, 1995). A Sub-subsection of interest within our study area is the Southern Lake Michigan Lakeplain.

Southern Lake Michigan Lakeplain (Subsubsection VI.3.2.)

This linear sub-subsection along the Lake Michigan shoreline consists primarily of lake deposits and fine-textured end and ground moraines. A 1- to 3-mile wide discontinuous band of steep sand dunes runs parallel along much of the shoreline.

Several of the region's larger rivers, including the Kalamazoo, Grand, Muskegon, and White have sand dunes near the point where they enter Lake Michigan, resulting in small lakes behind the dunes. There are extensive marshes within these shallow lakes, some extending several miles upstream. General Land Office (GLO) surveyors reported the largest wetlands occurred along the rivers, where both extensive marshes and lowland hardwoods existed (Comer et al, 1995). The wet prairies found here differ from those in other parts of the state. Many of the marshes harbor disjunct species from the Atlantic and Gulf Coastal Plains. Seasonal water level fluctuations of the coastal areas result in prairie or marsh species depending on the water level. Such fluctuations can produce major changes in plant compositions in these wetlands (Albert, 1995). Large deltas were associated with the Glacial Grand and Muskegon Rivers.

The coastal marshes found here harbor high concentrations of state listed species, some being under constant threat from residential development, dredging, and off-road vehicle use. Rare birds include Black Tern (*Chlidonias* niger) and Prothonotary Warbler (*Protonotaria citrea*).

Manistee (Subsection II.4.)

The Manistee subsection lies along the west coast of the state extending from northern Muskegon County to just past Sleeping Bear Dunes National Lakeshore in Leelanau County. The climate of this physiographically-diverse region is moderated by Lake Michigan, resulting in one of the major fruit producing (orchard and vineyard) areas in the country. The lake-tempered climate produces a long growing season of 140-150 days. Lake-effect snowfalls are heavy, averaging 100-140 inches throughout. Annual precipitation is 33 inches. (Eichenlaub et al, 1990). Elevation ranges from 580 to 1.150 feet.

Landforms found here include sand dunes, sand lake plain, ground and end moraines, and outwash plains. Some of the highest dunes reach 600 feet in elevation. Several large lakes associated with marshes are separated from Lake Michigan by sand bars and low dunes. These lakes were once large bays of Lake Michigan, but became disjunct as water levels receded. Pentwater Lake, Pere Marquette Lake, and Hamlin Lake on the Big Sable River are examples. Extensive marshes formed in the mouths of many of these rivers such as the Manistee and Big Sable. Many of these marshes are protected within federal and state lands.

Glacial drift ranges in thickness from 400 to 700 feet. Soils range from dune sand to fine-textured soils on the moraines. Red-shouldered Hawk (*Buteo lineatus*) and Piping Plover (*Charadrius melodus*) breed here (Albert, 1995).

Leelanau and Grand Traverse Peninsula (Subsection VII.5.)

This section is divided into several narrow peninsulas, bays, and long, slender lakes, including Torch Lake and Lake Charlevoix. Elevations range from 580 to 1,220 feet. The climate is heavily influenced by Lake Michigan, with cooler spring and early summer temperatures then those occurring in the higher plains to the east. The growing season ranges from 110 to 150 days along the inland ledge of the shoreline (Eichenlaub et al. 1990). Lakeeffect snowfall is abundant, averaging 100 to





Figure 1. 2005 Wetland bird study area (with MNFI sampling locations numbered) 1-24



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Sampling Locations	Number
New Buffalo Marsh	1
St. Joseph Area	2
Lower Paw Paw River	3
Lower Kalamazoo River Backwaters	4
Grand River Bayous	5
Muskegon State Game Area	6
White River Marsh	7
Flower Creek Marsh	8
Stony Lake Marsh	9
Pentwater River State Game Area	10
Pere Marquette State Game Area	11
Hamlin Lake Marsh	12
Manistee River State Game Area	13
Portage Lake Marsh	14
Bar Lake Marsh	15
Arcadia Marsh	16



140 inches annually. Sub-subsections of note include Traverse City.

Traverse City (Sub-Subsection VII.5.2.)

Long, narrow ridges, called drumlins, characterize the Traverse City Sub-subsection. This area is divided into several narrow peninsulas by Grand Traverse Bay, and several large lakes including Torch Lake and Lake Charlevoix. Several other long, narrow lakes, including Leelanau, Skegemog, and Walloon, are found here. The moderating effects of Lake Michigan provide prime conditions for orchards and vineyards. The spring and early summer are cooler along the lakeshore than further inland. Growing season ranges from 150 days along the lakeshore to 110 inland (Eichenlaub *et al* 1990).

Drumlins are long, narrow ridges approximately one-quarter mile wide and 100 feet high with moderate to steep slopes. Drumlin soils are well-drained gravelly sand and gravely sandy loam. Most of the soils in the narrow depressions between the drumlins are organic rather than of mineral deposits, resulting in productive swamps, marshes and small lakes within these low areas. The drumlin fields are important to the fruit production industry, and many of the depressions are used for pasturage. The extensive wetlands along the Lake Michigan shoreline represent some of the few areas in the region retaining natural qualities as urban sprawl is rapid throughout (Albert, 1995).

Presque Isle (Subsection VII.6.)

This topographically diverse subsection is located at the northern end of the Lower Peninsula. Lakes Huron and Michigan strongly affect the region's climate. The growing season ranges from 110-150 days; extreme minimum temperatures are moderated by the lakes. Lakeeffect snow is heavy (140 inches) along the western edge, dropping off significantly inland. Annual precipitation (28 to 32") is uniform throughout.

Glacial drift, as thick as 500' inland, discontinues within 30 miles of the shore. The soils are predominantly sandy throughout. Forestry and agriculture are important economic activities in the subsection. Limestone, dolomite, and gypsum are mined. Devonian period deposits of salt, brine, and petroleum reservoirs are also found (Albert, 1995). Significant Sub-subsections include Stutsmanville and Cheboygan.

Stutsmanville (Sub-Subsection VII.6.2.)

This relatively small (219 mi²) subsection consists of glacially-deposited sand ridges, as well as high sand dunes near Lake Michigan. The entire area is almost completely forested. The growing season is 140 days along the Lake Michigan shoreline. Average precipitation is 30 to 32 inches. The average snowfall is 80 to 120 inches. Glacial drift is several hundred feet thick throughout. Large, broad sandy ground moraines reach upwards to 500 feet. Well-drained sands and sandy loam soils predominate. Red-shouldered Hawk and Caspian Tern (*Sterna caspia*) breed here (Albert, 1995).

Cheboygan (Sub-Subsection VII.6.3.)

A relatively flat calcareous glacial lake plain makes up this sub-section. Northern white-cedar (*Thuja occidentalis*) predominates. A wide range of lacustrine features are present including bog, coastal marsh, and coastal fen. Annual precipitation is 28 to 30 inches, and average snowfall is 80 inches throughout. Similar to other sand lake plains in Michigan, the topography is a series of dune and swale complexes that extend several miles inland. These swales, or depressions between ridges, are typically poorly drained and sometimes ponded.

Soils are mostly lacustrine sands, ranging from fully to very poorly drained. The Original Swamp Map of Michigan (Lane 1907) depicts most of the sub-section as swamp. Black Tern, Caspian Tern (*Sterna caspia*), and Common Tern (*S. hirundo*) breed in the area. Unfortunately, several areas of pristine, undeveloped Great Lakes shoreline remain unprotected. Residential development is concentrated along the shoreline westward from the Straits of Mackinac to Wilderness State Park (Albert, 1995). The Michigan Natural Features Inventory obtains information from a variety of sources including university researchers, government and non-government organizations, nature centers, and the general public. This information is screened for reliability, accuracy, and whether or not the data conform to natural heritage methodology standards. Only then is it entered into Michigan Natural Features Inventory's Biological and Conservation Database (Biotics Database).

For this specific study, data from the Michigan Breeding Bird Atlas I Project, the Great Lakes Marsh Monitoring Program, several university graduate thesis works, and other data sources were compiled, consulted and then reviewed. Relevant information was added to the Biotics Database. Maps were generated and key wetland bird nesting areas delineated.

Wetland-obligate birds currently listed as Michigan endangered, threatened, or of special concern were our primary survey targets (Table 1). The Natural Heritage Biotics Database was consulted for known occurrences of rare wetland birds throughout the study area. Information on various species was gathered by consulting expert ornithologists, zoologists, wildlife biologists, pertinent unpublished reports, and a variety of published sources.

Survey areas were prioritized based on their potential for supporting listed species, and by the degree to which they have been recently surveyed. Priority was given to those coastal areas lacking recent survey work. Potential for detecting listed species was determined by several characteristics including the existence of historical records, the presence of suitable habitat, and location within a range currently known for one or more listed birds. A field schedule was developed based on prior Michigan observation and collection dates for each target species.

Our sampling window occurred during mid-May through June when detection (activity) is high for wetland-obligates. The field season ran from 10 May to 9 June 2005. We began with the New Buffalo marsh in the south, and finished with Cecil's Bay near the Straits of Mackinac in June.

Morning surveys began at, or shortly

			State	Global
Common Name	Scientific Name	State Status	Rank	Rank
American Bittern	Botaurus lentiginosus	Special Concern	S3S4	G4
Least Bittern	Ixobrychus exilis	Threatened	S2	G5
Caspian Tern	Sterna caspia	Threatened	S2	G5
Forster's Tern	Sterna forsteri	Special Concern	S2	G5
Common Tern	Sterna hirundo	Threatened	S2	G5
Black Tern	Chlidonias niger	Special Concern	S3	G4
Marsh Wren	Cistothorus palustris	Special Concern	S3S4	G5
Yellow Rail	Coturnicops noveboracensis	Threatened	S1S2	G4
Common Moorhen	Gallinula chloropus	Special Concern	S3	G5
Common Loon	Gavia immer	Threatened	S3S4	G5
Black-crowned Night Heron	Nycticorax nycticorax	Special Concern	S2S3	G5
Osprey	Pandion haliaetus	Threatened	S4	G5
Wilson's Phalarope	Phalaropus tricolor	Special Concern	SN	G5
King Rail	Rallus elegans	Endangered	S1	G4G5
Yellow-headed Blackbird	Xanthocephalus xanthocephalus	Special Concern	S2	G5
Northern Harrier	Circus cyaneus	Special Concern	S3	G5
Short-eared Owl	Asio flammeus	Endangered	S1	G5
Prothonotary Warbler	Protonotaria citrea	Special Concern	S3	G5
Great Blue Heron Rookery	-	-	_	-
Black Rail	Lateralus jamaicensis	-	-	-

Table 1. Endangered, threatened, and special concern bird species and natural features which were targeted for surveys or for which data was entered into our database.

after sunrise and ended around 1100 EST. Evening surveys commenced around 1900 EST and terminated around 2200 EST. Bird species presence/absence and relative abundance were recorded at each survey site. Surveys were not conducted if sustained winds exceeded 16 mph (24 km/h) or during periods of heavy rain. Survey methods included 1) 100m fixed radius plots for passerines, 2) con-specific taped playback call surveys for rails (Rallidae), bitterns (Ardeidae) and marsh wrens, 3) visual surveys for terns and other wetland birds along line transects when appropriate, and 4) meandering canoe/kayak and foot surveys. Standard Natural Heritage Special Animal Forms were completed for all rare bird occurrences. Data from all sightings included numbers of individuals seen or heard and the extent and quality of occupied habitat. These data establishing new or updated element occurrences were entered into MNFI's Biotics Database. In addition, a list of all birds observed at each location was compiled. This data will be submitted to the Michigan Breeding Bird Atlas II Project, as these secretive wetland species often go undetected and are vastly underrepresented in such compilations.

Methods – data review/transcriptions

An important component of this project is the preparation of field information for use within MNFI's new, Geographic Information System (GIS) based data platform. A GIS system allows the known spatial extent of an occurrence to be represented. Spatial data is far more useful for resource managers, land-use planners, scientists, and the general public than the traditional natural heritage database. Before the advent of GIS, occurrences were recorded with an estimated lat/long point and a mapping precision. Three types of precision were used: second (S), minute (M), and general (G). "Second" precision means the location was known exactly. "Minute" precision means the location was known to within a mile. "General" means that the location is only known to the township level.

Now, with GIS, the known spatial extent of an occurrence can be digitally represented. Data best represented by a point (i.e. single bird nest, small populations, etc.) are represented with a small, approximately six-meter radius circle. Older, pre-GIS records are represented spatially by applying a buffer to the estimated lat/long point. The buffer size is based on the mapping precision of the occurrence. Second precision records are assigned a 100 meter diameter buffer, minute precision records are assigned a 2,000 meter buffer, and general records are assigned 8,000 meter buffers.

During the wetland bird survey, new natural features data were transcribed and

entered with respect to heritage data standards developed for the spatial representation of element occurrences. Heritage data standards and methodology are defined by NatureServe (www.natureserve.org). Under heritage methodology, only the known extent of an occurrence may be digitized. For example, if the only information known about an occurrence is that it occurs within a specific legal section, with no more precise spatial information, the section boundary becomes the extent of the occurrence.

In addition to digitizing MNFI data obtained during the 2005 wetland bird surveys, information from outside sources was also entered and digitized when appropriate. Then all existing breeding bird information within the study area was carefully reviewed, and where possible circular buffers replaced with a digitized spatial extent. This digitizing effort entailed closely examining source information for previously documented records, including field forms and any associated maps indicating the specific locations and the spatial extent of the records. The digitizing effort results in a natural heritage data set that supplies more precise and useful information than either a stand-alone database or circular spatial extents derived solely from a mapping precision protocol.

Results

From our 2005 fieldwork, a total of thirty-seven element occurrences were either updated or newly transcribed. Of these, eighteen were updated occurrences and nineteen were either new occurrences or transcribed for the very first time (Table 2). Eight new element occurrences (EO) were documented in 2005 for the Marsh Wren (*Cistothorus palustris*), five new EOs were established for Least Bittern (*Ixobrychus exilis*), two new EOs for both American Bittern (*Botaurus lentiginosus*) and Black Tern, and one new EO for Common Moorhen *(Gallinula chloropus)*. A new occurrence was also documented for Prothonotary Warbler.

Several existing element occurrences were updated this year. Five breeding records for the Marsh Wren were updated as part of the data mining component of this study. These data, along with data from the last breeding bird atlas, help provide a more complete picture of wetland bird breeding habitats along the western shoreline of Michigan's lower peninsula.

Common Name	State Status	Updates	New	Total
American Bittern	Special Concern	0	2	2
Least Bittern	Threatened	0	5	5
Caspian Tern	Threatened	0	0	0
Forster's Tern	Special Concern	0	0	0
Common Tern	Threatened	1	0	1
Black Tern	Special Concern	1	2	3
Marsh Wren	Special Concern	5	8	13
Black Rail	-	0	0	0
Yellow Rail	Threatened	0	0	0
Common Moorhen	Special Concern	0	1	1
Common Loon	Threatened	2	0	2
Black-crowned Night Heron	Special Concern	0	0	0
Osprey	Threatened	2	0	2
Wilson's Phalarope	Special Concern	0	0	0
King Rail	Endangered	0	0	0
Yellow-headed Blackbird	Special Concern	0	0	0
Northern Harrier	Special Concern	0	0	0
Short-eared Owl	Endangered	0	0	0
Great Blue Heron Rookery	-	1	0	1
Prothonotary Warbler	Special Concern	5	1	5
TOTALS		18	19	37

Table 2. Summary of data that was updated or newly added to MNFI's Biological and Conservation Database during 2005.

Site Summaries

A major goal of this project is to identify critical breeding habitat for wetland birds in Michigan. As established in the format of several other coastal zone inventories, we provide here a summary description of the significant wetland sites identified during the project's third year. These summaries are categorized by Ecoregion as defined in the Study Site section. These descriptions summarize the importance of these wetland areas as well as provide context for the study area. While a complete analysis requires multi-year data, areas we feel are important nesting sites are described.

MNFI staff visited thirty-four (34) areas representing twenty-four (24) sites, and we determined the following sites to be of conservation value to wetland breeding birds based on field surveys in 2005, existing element occurrence records, habitat value for rare birds, existing protections, and site viability. Most of these sites are classified as drowned river mouth type wetlands. Drowned river mouths develop in the "transition zone of riverine/lacustrine interface" along the lower reaches of tributary rivers (Albert, 2003). Historically, during periods of low lake levels, tributary rivers scoured broad ravines through bluffs bordering the lakeshore. The ravines flood during high water levels and effectively "drown" the river mouths. The reduced water flow leads to large amounts of organic material accumulation resulting in extensive, fertile wetlands that often extend for miles upstream.

The site descriptions contain information on general habitat types, survey results, existing rare bird records, potential for other rare bird occurrences, and opportunities for conservation and management. Since MNFI staff could not survey all of these sites multiple times, inventory needs are also identified as applicable.

Allegan Sub-section

Southern Lake Michigan Lake Plain Sub-subsection (VI.3.2.)

1) New Buffalo Marsh – the New Buffalo Marsh lies to the northeast of the village of New Buffalo in the floodplain of the Galien River. Similar to many wetlands along the west Michigan shoreline, the emergent marsh represents the drowned river mouth of the Galien River. This typical Great Lakes marsh is dominated by extensive, dense stands of hybrid cattail (*Typha x glauca*) (Figure 2) which grades to a bluejoint grass (*Calamagrostis canadensis*) and softstem bulrush (*Scirpus validus*) meadow to the Northeast. The New Buffalo Marsh represents the best marsh habitat in Berrien County (Black and Smith, 1994).

A variety of rails and herons, including Yellow-crowned Night-Heron (*Nycticorax violaceus*) have been observed at this site (Black and Smith, 1994). Bryne (2002) reported Marsh Wren on 18 July 2001. One autumn (Chartier, 1998) and one winter (McWhirter, 1997) occurrence for Marsh Wren have also been reported. However, all of these earlier reports do not provide any specifics regarding behavior or breeding activity. MNFI zoologist conducted foot surveys of the marsh on 9-10 May 2005. This site is not easily accessed because most it is surrounded by private property. Foot access can be achieved by turning right onto East Water Street just before Whitaker Street crosses the Galien River. Follow East Water Street around to where there is an open access to the marsh and public foot traffic is allowed (Powers, 1998).

Three Marsh Wrens responded to conspecific taped playback calls from various points in the marsh. These detections represent a new element occurrence for Marsh Wren at this location. Three Caspian Terns were observed foraging overhead along the Galien River. Other wetland-obligates observed include Virginia Rail (*Rallus limicola*), Sora (*Porzana carolina*), Sedge Wren (*Cistothorus platensis*), and Great Blue Heron (*Ardea herodias*). Both the Sora and Virginia Rails responded to the con-specific calls. Also, a Red-headed Woodpecker (*Melanerpes erythrocephalus*) was observed entering and exiting a tree cavity. Additional efforts to search for American Bittern and King Rail (*Rallus elegans*) should take place further upriver. Also, a canoe or kayak survey should be conducted into the upper reaches of the marsh to search for Yellowcrowned Night Herons. The site lacks the deep water habitat preferred by Common Moorhen and Least Bittern. Site surveys should be conducted in early summer (June-July) to confirm breeding activity; as early observations may reveal only migrants.



Figure 2. A new element occurrence for Marsh Wren was established at the New Buffalo marsh in Berrien County. The wrens were found among the monotypic cattails that dominate the lower reaches of the marsh.

2) St Joseph area (Berrien County) – the waterfront at St. Joseph, Michigan is a prime spot to scan Lake Michigan for resting and migrating terns (Chartier & Ziarno, 2004). Black and Smith (1994) mention observations of King Rail and Common Loon (*Gavia immer*). MNFI staff visited two waterfront locations – Tiscornia Beach Park, and Jean Klock Park on 11 May 2005.

2a) Tiscornia Beach Park is located on the north pier of the St. Joseph River. The park is somewhat out of the way but is a local favorite among birders. Thirty Caspian Terns and forty Common Terns were observed overhead and at

rest. A Rusty Blackbird (*Euphagus carolinus*) was observed near the north pier.

2b) Jean Klock Park is another excellent spot to scan the lake and beach. The park is located approximately one mile north of Tiscornia Park and can be accessed by foot along the beach or by driving. The marshes found behind the backdune have produced rails and other marsh species (Black and Smith, 1994). MNFI staff conducted a foot survey of the park the morning of 11 May 2005.

Seventeen Caspian Terns and one Common Tern were observed resting on the beach (Figure 3). Two Red-headed woodpeckers were observed exploring tree cavities behind the backdune. The marshes immediately behind the dunes were dry and nonproductive birdwise. However, two Virginia Rails responded to con-specific taped calls in a cattail (*Typha sp.*)-dominated marsh located across the road from the park. This marsh is adequate enough to support Marsh Wren brood habitat. The St. Joseph waterfront is an excellent spot for observing a wide variety of avian species. However, any of the target wetland species found here are probably migrants, a fact supported by the lack of suitable habitat. Any additional survey work should focus on Marsh Wrens in the marsh across the road from Jean Klock Park.



Figure 3. These Caspian Terns resting on the beach at Jean Klock Park in St. Joseph are migrants.

3) Lower Paw Paw River – Berrien County offers some of the best birding opportunities in the state. Many important avian observations have been recorded in this area. Barred drowned river mouths are a dominant wetland feature along the Lake Michigan shoreline in SW Lower Peninsula where extensive dune features have partially blocked riverine flows. As a result, well-protected, fertile wetlands extend for several miles inland along the Paw Paw River, and feature many wetland types, including cattail marsh, all the way past Berrien Springs to Sarett Nature Center. We surveyed three local sites along the marshes of the lower Paw Paw River during the 2005 field season: Sarett Nature Center, Brown Preserve/City of David Marsh; and Airport Marsh.

3a) Sarett Nature Center - This Michigan Audubon Society facility is well-known for its excellent wetland habitats and superb birding opportunities. Five miles of earthen trails and elevated boardwalk provide access into the many wetlands found here. Although Sarett is open to the public, permission should be obtained from nature center staff prior to entering the grounds and surveying areas off the established trails.

Our data mining efforts discovered many previous observations of our targeted

species at Sarett. Wuepper's *Birds of Berrien County* reports a Yellow Rail (*Coturnicops noveboracensis*) on 5 May 1972 (Figure 4) and a King Rail from 30 May 1997 (Wuepper, 2001). An American Bittern was seen on 28 April 2001 (Reinoehl, 2001). A migrant Marsh Wren was recorded on 17 April 1999 (Reinoehl, 1999). The MNFI Biotics Database contains an element occurrence for a local Great Blue Heron Rookery based on a 1976 observation (MNFI Biotics Database).

MNFI staff conducted a foot survey through the several marshes along the elevated boardwalk the evening of 12 May 2005. Several attempts to attract our target species by playing taped calls were unsuccessful. A lone Sora did respond to the calls just before nightfall. The Great Blue Heron Rookery was not located.

Our survey here was limited due to time and budgeting constraints. Considering the many previous sightings of wetland obligates and the wide variety of suitable habitat available, we recommend additional survey work at Sarett. Future efforts should concentrate on Marsh Wren, American Bittern and King Rail (due to site fidelity). The area is too dry (2005) for both Least Bittern and Common Moorhen which prefer deep water environs.



Figure 4. A Yellow Rail was observed at Sarett Nature Center in Berrien County on 5 May 1972. However, this did not establish an element occurrence due to the lack of information regarding behavior.

Sarett Nature Center (northern unit) – MNFI conducted a kayak survey along the Paw Paw River to the northern unit of the nature center during the late afternoon of 12 May 2005. This area of the nature center is a fine example of Southern Wet Forest, an outlier of a more southerly forest type. An unpublished survey from 1992 found two American Bitterns in the

buttonbush swamp along the Paw Paw River just east of I-196 (unpublished report, 1992). A pair of Prothonotary Warblers, a true bird of the Southern Wet Forest was observed during an earlier MNFI survey further upstream on the Paw Paw (Biotics Database, 1992).

Our 12 May survey detected a pair of Prothonotary Warblers taking food into a cavity of a tree located in mid-stream of the river (Figure 5). This represents a new element occurrence for breeding activity of this species in the northern unit. A survey of the buttonbush swamp failed to yield any target species, however a new element occurrence was established for box turtle (*Terrepenne carolina carolina*).

A large time and energy investment is involved in a kayak or canoe survey, and this

area is not a prime location for most of our target species. Therefore, the buttonbush swamp is not worth revisiting. However, it might be worthwhile to support or conduct more specific work in the area, such as additional Yellowcrowned Night Heron and Prothonotary Warbler surveys, species strongly associated with Southern Wet Forests.



Figure 5. A pair of Prothonotary Warblers nested in a cavity in this tree in the middle of the Paw Paw River during the spring/summer of 2005.

3b) Brown Sanctuary – this site is owned and managed by Sarett Nature Center, and is located just downstream from the nature center proper on the Paw Paw River. Among the many habitat types found here is the large City of David marsh adjacent to the river (Figure 6). Depending on water levels, many varieties of wetland species can be found here. From Benton Center Road, travel west on Euclid Road to Wood Street; west on Wood Street to the parking area at bend of road. Follow the twotrack west to the marsh. An unpublished report from a 1992 site survey mentions that Marsh Wrens nest here (unpublished report, 1992). The MNFI Biotics Database contains a 2002 element occurrence for Prothonotary Warbler in the City of David Marsh (MNFI Biotics Database).

MNFI zoologists conducted a foot survey of the City of David Marsh on the morning of 12 May 2005. Our route began on the west side of the marsh near the old mill, and proceeded in a counterclockwise direction around to the river. Con-specific taped calls were played at several locations along the route. Two male Marsh Wrens were heard singing among the great bulrush (*Scirpus validus*) and common bur reed (*Sparganium eurycarpum*) emergent marsh. Five Sora and two Virginia Rails also responded to the taped calls. Several varieties of sandpipers (Scolopacidae), and a Great Blue Heron were also observed. Nesting was confirmed for Rose-breasted Grosbeak (*Pheucticus ludovicianus*). Prothonotary Warblers were not detected.

A narrow strip of broad-leaf cattail (*Typha latifolia*) extends from the mill around to the south. This is not adequate enough for American Bittern, Common Moorhen, or Least Bittern. No further survey work is required. However, the small patches of reed canary grass (*Phalaris arundinacea*) and common reed (*Phragmites communis*) should be monitored closely



Figure 6. Giant burweed (*Sparganium eurycarpum*) and bulrush (*Scirpus sp.*) predominate at Sarett Nature Center's City of David Marsh along the Paw Paw River in Berrien County. Marsh Wren (*Cistothorus palustris*) responded to taped playback calls from this area during 12 May 2005 foot survey of the area.

3c) Airport Marsh - this site is located at the Southwest Michigan Regional Airport in Benton Harbor and can only be accessed upon approval of the airport manager. Our data mining efforts yielded only one documented element occurrence of our target species from the site. Ten Marsh Wrens were heard, and one active nest located on 6 June 2002. This dense, cattail (*Typha sp.*) marsh grades into sedge (*Carex sp.*) meadow to the northeast. There is very little open water in the marsh (Figure 7).

MNFI staff conducted a foot survey of the marsh on the evening of 11 May 2005. A series of taped playback calls were played along several points along a meandering route. Three Marsh Wrens responded to taped calls, which updated an element occurrence from 2002. Two Sora and three Virginia Rails also responded. Wilson Snipe (*Gallinago delicata*), Sandhill Crane (*Grus canadensis*), Sedge Wren, and Common Nighthawk (*Chordeiles minor*) were among the highlights from our point counts. The dense cattail marsh is large enough to support American Bittern breeding activities. Future survey work is recommended to confirm the presence of this species



Figure 7. Cattails (Typha spp.) grade to sedge (Carex spp.) meadow at Airport Marsh in Berrien County.

4) Lower Kalamazoo River Backwaters -

these well-protected, fertile wetlands were created by the barred river mouth of the Kalamazoo River (Albert, 2003). In essesence, these backwaters represent an estuary in a drowned river mouth, surrounded by developed land. In addition to the forested river plain located upstream, our survey concentrated on four sites in the lower reaches of the backwaters.

4a) Wade's Bayou – this extensive cattail (*Typha spp.*) dominated area is easily accessible from the waterfront in Douglas. Migrating flocks of Caspian Tern, Common Tern, and Forster's Tern (*Sterna fosteri*) are common springtime occurrences, but breeding evidence is undocumented. Black Tern, Virginia Rail, Sora, and Sandhill Crane are regular summer visitors (Chartier and Ziarno, 2004).

4b) Schultz Park – this small park at the end of 66th Street offers excellent views of Wades Bayou.

4c) Hacklander Landing – this Michigan DNR boat launch provides access to Morrison Bayou, and is an excellent spot to listen for crepuscular bird choruses. The abundant cattail marshes are good for Marsh Wren, Virginia Rail, Sora, American Bittern and Least Bittern when water levels are high. Black Terns have historically nested in the marsh directly across the river from the landing (Chartier and Ziarno, 2004). Also, a King Rail was detected (seen and heard) in the area in 1993 (Ibid, 2004).

4d) Morrison Bayou – essentially a southern channel of the Kalamazoo River, which reconnects with the main channel at Hacklander Landing. This area contains extensive cattail

(*Typha sp.*) marsh habitat. Common Moorhen and Marsh Wren are common here. (Brewer et al, 1991).

The MNFI Biotics Database contains element occurrences for Black-crowned Night-Herons (Nycticorax nycticorax) and Black Terns based on 1997 observations, and Prothonotary Warbler from sightings in 1974-1986 (MNFI Biotic Database). MNFI zoologists conducted a canoe survey of the lower Kalamazoo River bottomlands on 17 May 2006. (Figure 8). The survey ranged from the 57th Street (Old Allegan Road) access point in New Richmond to the municipal boat launch in Douglas, a length of some 6-7 river miles. Although the area is best surveyed by shallow-draft boat or canoe the many rivulets, menders, and sandbars make navigating very difficult at times. Con-specific taped playback calls were played, and point counts conducted at several points along a meandering route.



Figure 8. MNFI conducted a canoe survey of the lower Kalamazoo River on 17 May 2006. The meanders and many sandbars along the lower Kalamazoo River make navigating difficult at times.

Several Marsh Wrens responded to calls or were heard singing from several locations in monotypic cattail habitat. This established a new Element Occurrence for this species at this site. Two male Prothonotary Warblers were detected in suitable habitat in the forested river bottoms upstream, and thus updated an element occurrence first established by Russ Schipper in the mid-1970s (MNFI Biotic Database). Four Common Terns, three Caspian Terns, and two Bald Eagles (*Haliaeetus leucocephalus*) were observed foraging overhead during the day. Sora and Virginia Rails also responded to taped playback calls. Breeding was confirmed for Purple Martin (*Progne subis*), Cliff Swallow (*Petrochelidon pyrrhonota*), Red-tailed Hawk (*Buteo jamaicensis*), and Sandhill Crane. Redheaded Woodpeckers were observed entering and exiting tree cavities at several locations.

The riverine habitat extending along the Lower Kalamazoo River offers breeding opportunities for many wetland-obligate species (Figure 9). From forested river bottoms in the upper reaches of the floodplain to the extensive cattail-dominated marshes near the inlet to the Kalamazoo Lake, there is an endless variety of suitable habitats.

It would require 2-3 days to effectively survey the entire extent of the lower Kalamazoo River. We covered the area in 1- 1/2 days and missed a large part of it. Additional work is needed in the Hacklander Landing area to confirm Black Tern nesting and the presence of American Bitterns. Morrison Bayou needs more survey work for Common Moorhen, Least Bittern and King Rail.

The presence of exotics could become an issue. Several Brown-headed Cowbirds were observed throughout the entire river bottom in every habitat type. Brown-headed Cowbirds are brood parasites, laying eggs in the nests of some 200 or more different species, leaving the nest owner to rear the young (Elphick et al, 2001). Extensive stands of purple loosestrife (*Lythrum salicaria*) are found throughout the marsh. Control efforts should be implemented, if not already underway.



Figure 9. "Open" cattail (*Typha spp*.) habitat along the lower Kalamazoo River is suitable for Least Bitterns (*Ixobrychus exilis*) and Common Moorhens (*Gallinula chloropus*).

5) Grand River Bayous – where tributary rivers enter the Great Lakes, a transition zone from stream to lake forms within which water level, sedimentation, erosion and biological processes are partially controlled by lake level fluctuations (Albert, 2003). These "transition zones" can extend several miles upstream forming extensive wetlands as a result. The Grand River has an extensive transition zone affected by Lake Michigan water levels. Potawatomi Bayou and Bruce Bayou are such tributaries to the Grand River with excellent marsh systems. MNFI zoologists conducted canoe surveys throughout the Grand River transition zone on 18-19 May 2005. Our surveys concentrated on six sites: Lloyd Bayou, Bruce Bayou, Hofma Preserve/Pottawattomie Bayou, Dermo Island, Indian Channel, and Stearns Bayou.

We were unable to locate any historic records of our target species during our data mining efforts. MNFI's Biotic Database did not contain any element occurrences for our wetland obligates. Our survey efforts established a new element occurrence for Marsh Wren in the Grand River Bayous. And, other than a lone Caspian Tern, no other target species were observed during our two-day survey.

5a) Lloyd Bayou – the mouth of Lloyd Bayou lies approximately one mile south of the Village of Spring Lake and extends for one mile to the northeast. We conducted a foot survey on 19 May 2005 in the emergent cattail (*Typha x glauca*) marsh found in the upper reaches where MI-104 crosses the bayou. A Michigan DNR public boat launch located near the bridge allows

easy access to the marsh. Playing of conspecific taped calls failed to yield any targeted wetland obligates. No additional survey work is recommended.

5b) Bruce Bayou - within the Grand Haven State Game Area, this site is best accessed from the Michigan DNR boat launch at the southern end of 132nd Avenue, approximately ³/₄ mile south of Leonard Street. One Marsh Wren was observed among the emergent marsh of broadleaf cattail (Typha latifolia), giant burweed (Sparganium eurycarpum) and bulrush (Scirpus sp.) adjacent to open water. Several Sandhill Cranes were also observed in the area. The emergent marsh complex seems suitable for Least Bittern, American Bittern, Common Moorhen, and Least Bittern (Figure 10). Additional survey work is strongly recommended to confirm the presence of these species.



Figure 10. "Wet" cattails along the Grand River could be suitable for Least Bittern or Common Moorhen during years of high water levels.

5c) Hofma Preserve/Pottawattomie Bayou – An inlet of the lower Grand River, Pottawattomie Bayou is protected within the Hofma Park and Preserve, a 400-acre holding of woodlands and marsh operated by the Ottawa County Parks and Recreation Commission. Over five miles of earthen trails and raised boardwalk leads through a variety of habitat types (Figure 11). The preserve is located approximately three miles southeast of Grand Haven at the end of Sleeper Street in Grand Haven Township, ³/₄ miles east of 168th Street.

Pottawattomie Bayou's long narrow configuration and partial detachment from Lake Michigan protects the area from the erosive forces of wind and waves. This results in deep deposits of organic materials (muck and peat) at the wetland margins. The stream flowing through the bayou occupies a shallow channel often choked with curly leaf pondweed (Potamogeton crispus), Eurasian milfoil (Myriophyllum spicatum), coontail (Ceratophyllum demersum) and other submergents. The extensive emergent marsh is dominated by broad-leaf cattail (Typha latifolia), hardstem rush (Scirpus acutus), softstem bulrush, (Scirpus validus) and arrow arum (Peltandra virginica).

Many sightings of wetland obligates have been recorded here because the boardwalk

accessing the marsh allows for close-up observations. An American Bittern was observed in the marsh on 28 April 1996 (Reinoehl, 1996). A Black Rail was heard in the marsh on 10 June 1988 and remained on territory until 9 July 1988. No mate was observed and the record was listed as probable (Brewer et al, 1991) (Sweetman, 2000). Sora, Virginia Rail, and Sedge Wrens are common summer residents (Chartier and Ziarno, 2004).

MNFI zoologists conducted a foot survey along the boardwalk on the evening of 18 May 2005. Con-specific taped calls were played from various points along the boardwalk. Our efforts failed to yield any of our targeted species. Two Virginia Rail and several Sedge Wrens were heard. The area has a wide variety of suitable wetland habitats and additional survey work is highly recommended.



Figure 11. The boardwalk leading into Pottawattomie Bayou at Hofma Park Preserve near Grand Haven, Michigan.

5d) Dermo Island – this wetland complex lies on a depositional island in the Grand River approximately two miles east of Grand Haven. Although once connected to the mainland, the area is currently accessible only by boat. The soils are mainly Houghton and Adrian muck to 4 feet. Broad-leaf cattail (*Typha latifolia*) dominates the emergent marsh. The site was surveyed as part of a day-long canoe float 19 May 2005. Four Marsh Wren males were seen and heard along the south side of the island. A lone Caspian Tern was observed foraging overhead but no nesting activity was detected. Our survey was cut short due to rain in the early afternoon. No further survey is recommended. **5e) Indian Channel** – located approximately three miles southeast of Grand Haven between the main channel of the Grand River and the mouth of Dermo Bayou. The entire site lies within the Grand Haven State Game Area. Surveyed as part of a day-long canoe float 19 May 2005. Dense broad-leaf cattails (Typha latifolia) mixed with purple loosestrife (Lythrum salicaria) and common reed (Phragmites australis) throughout. Other emergents include arrow arum (*Peltandra virginica*), and giant burweed (Sparaganium eurycarpum). No target species were detected during our survey. Breeding confirmed for Downy Woodpecker (Picoides pubescens) and Brown Thrasher (Toxostoma rufum). Additional survey work is not recommended. However, the invasive nature of purple loosestrife (*Lythrum salicaria*) and common reed (Phragmites australis) poses a serious problem and control efforts should be addressed.

5f) Stearns Bayou/Clark Corners Area -

MNFI staff conducted a canoe survey in the Clark Corners/Stearns Bayou area of the Grand Haven State Game Area on the evening of 18 May 2005. Our efforts concentrated on the vast cattail (*Typha sp.*) marsh to the northeast of the boat launch. Taped con-specific playback calls of American Bittern, Least Bittern, King Rail, Virginia Rail, Sora, and Marsh Wren were played at several points along a meandering route. We also conducted point count surveys at each stop. Two Marsh Wren, eight Sora and two Virginia Rails responded to the recordings. Several Common Nighthawks, two Sedge Wrens and a Great-horned Owl (*Bubo virginianus*) were also observed.

The tall, dense, cattails along the open water have high potential for Common Moorhen, King Rail and Least Bittern. Additional survey work is recommended to confirm the presence of these species.

6) Lower Muskegon River/Muskegon State Game Area – Extensive, fertile wetlands extend several miles upstream on the Muskegon River behind the drowned river mouth of Muskegon Lake. This widespread area follows the floodplain and vast bottomlands of the lower Muskegon River, and has been used as a nesting

area by Yellow-headed Blackbirds (*Xanthocephalus xanthocephalus*), American Bittern, Least Bittern, Prothonotary Warblers, and Marsh Wren. Virginia Rails and Sora, as well as other wetland-obligates also nest here (Sweetman, 2000).

Zimmerman and Van Tyne (1959) report the presence of Yellow-headed Blackbirds in *A Distributional Check-list of The Birds of Michigan*. Prothonotary Warblers have been observed in the deciduous woods bordering the upper river by Chartier and Ziarno (2004) and by Russ Schipper during a 1999 canoe survey (MNFI Biotic Database). Black and Smith (1994) mention Yellow-crown Night-Heron, Marsh Wren, while Byrne reports Least Bittern in the area. The MNFI Biotic Database contains site element occurrences for a Great Blue Heron Rookery (1978), Marsh Wren (1995) and Prothonotary Warbler (1999) (MNFI Biotic Database).

MNFI zoologists conducted canoe floats on 24-25 May 2005, covering both the north and south channels of the lower Muskegon River. Specific attention was given to the lower reaches of the river in the area east and west of the US-31 Causeway. Portions of this area west of the bridge make up the Consumers Power Wildlife Area. Yellow water-lily (*Nuphar advena*), arrow arum (*Peltandra virginica*), giant burweed (*Sparganium eurycarpum*), water smartweed (*Polygonum amphibian*), and cattails (*Typha sp.*) are the dominant emergents in the muck soils.

New element occurrences were established for Least Bittern and Black Tern (confirming Black Tern nesting by locating two nests) in the area just to the east of the causeway. The nests were situated on exposed mudflats amidst a dense colony of arrow arum (Peltandra virginica) and water smartweed (Polygonum amphibian) (Figure 12). Eight Marsh Wrens were detected in the vast cattail marshes throughout the river bottoms, and two Prothonotary Warblers were observed in the deciduous woodlands upriver, which updated existing element occurrences for these species. The Great Blue Heron rookery, last observed in 1978, is still active with 2 nests detected. In addition, breeding was confirmed for Redheaded Woodpecker (carrying food into nest cavity) and Eastern Kingbird (Tyrannus

tyrannus). We also established a new element occurrence for Blandings Turtle (*Emys blandingii*) in the north channel of the Muskegon River.

Additional survey work is needed in the lower reaches of the river near the US-31 causeway. The extent of Black Tern breeding activity needs to be determined, and breeding confirmed for Least Bittern. Also, information is needed on the small Great Heron Rookery located to the north of the Mill Iron Road put-in spot. Two nests were detected, but the full extent of the rookery needs to be determined and spatially defined (i.e., GPS point gathered). There are some pockets of purple loosestrife (*Lythrum salicaria*) and common reed throughout the entire survey area; these should be monitored.



Figure 12. Black Tern nest on exposed mudflat among arrow arum (*Peltandra virginica*) and water smartweed (*Polygonum amphibian*) along the lower Muskegon River 24 May 2005.

7) White River Marsh – we focused on the bottomlands and marshes of the lower White River. Similar to conditions at Kalamazoo Lake and Muskegon Lake, White Lake and the White River marsh is an example of a drowned river mouth barred by large sand dunes which have partially cut off riverine flows. As a result, vast wetlands extend for several miles upstream on the White River.

MNFI zoologists conducted a canoe survey of the bottomlands and marshes of the lower White River transition zone on 26 May 2005. We put-in at the Happy Mohawk Canoe Livery at the end of Weesies Road, just west of the confluence of Carleton Creek and the White River. The 3-4 mile float ended at the municipal boat launch on Business 31 in downtown Whitehall. We played con-specific taped playback calls for American Bittern, Least Bittern, King Rail, and Marsh Wren, and conducted point counts at various points along a meandering route.

Our survey began in the deciduous woodlands upriver where the influence of Lake Michigan is negligible, and hardwood forest extends to the stream's edge. Russ Schipper observed Prothonotary Warblers in 1991 along the forested stream just upriver from our launch site (MNFI Biotic Database). We failed to locate any Prothonotary Warblers during our survey.

Five Marsh Wrens were detected in the extensive cattail marshes in the lower reaches of the river. Here, a nearly solid expanse of broadleaf cattail (*Typha latifolia*) with pockets of giant burweed (*Sparganium eurycarpum*) and willow (*Salix sp.*) offers an excellent brood environment for this wetland-obligate. Heme marsh conditions exist at many areas in the lower reaches as well. Three Marsh Wrens were within 300 meters of the fishing pier at the municipal boat launch in downtown Whitehall, updating an existing element occurrence based upon observations from 2002 and 2003 (MNFI Biotic Database) (Figure 13).

Although we failed to locate rails, herons or bitterns, we established a new element occurrence for Blandings Turtle (*Emys blandingii*) in the upper marsh. Several Barn Swallow (*Hirundo rustica*) nests were observed under the US-31 bridge crossing the White River.

The extensive cattail habitat and Heme conditions is highly suitable for Least Bittern, Common Moorhen and American Bittern. We recommend additional survey work for the lower reaches of the river, forgoing the long canoe float. Also, the extensive stands of purple loosestrife (*Lythrum salicaria*) throughout the marsh seriously threaten the suitable habitat of marsh nesting birds. Management should address woody encroachment and purple loosestrife control measures.



Figure 13. Three Marsh Wrens were observed within 300 meters of the fishing pier at the municipal boat launch in downtown Whitehall. This updated an element occurrence based upon observations from 2002 and 2003.

Manistee Subsection

8) Flower Creek Marsh – this meandering, drowned river mouth is located on private property near the Muskegon/Oceana County line. Travel west 4.5 miles on Meinert Road to Lehman Road. Go north 0.75 miles to Flower Creek Road; go west to the end of Flower Creek Road to the Charles Cain residence. Permission to access the site was kindly granted by Mr. Cain.

The lower reaches of Flower Creek support a dense cover of wetland vegetation. Reed canary grass (*Phragmites arundinacea*) is dominant among scattered stands of broad-leaf cattail (*Typha latifolia*), giant burweed (*Sparganium eurycarpum*), softstem bulrush (*Scirpus validus*), and various sedges (*Carex spp.*).

MNFI zoologists conducted a canoe survey of the lower reaches of the marsh on 27 May 2006. All attempts with taped playback calls failed to yield our targeted wetlandobligates. Two Great Blue Heron and four Sedge Wrens were noted. The negative results could possibly be explained by the extreme low water levels (Figure 14). The low water conditions hindered our progress upstream.

Considering the low water levels, high concentrations of reed canary grass, and patchy cattails, we do not recommend revisiting the lower marsh. Additional efforts should concentrate upstream, perhaps finding an access site from the north.

9) Stony Lake Marsh – located in southern Oceana County, this emergent marsh lies near the mouth of Stony Creek near the inlet to Stony Lake. This mosaic of shrub- and herbdominated communities extends upstream approximately 1 mile. Giant burreed (*Sparganium eurycarpum*) and broad-leaf cattail (*Typha latifolia*) dominate the emergent marsh, while the shrub swamp is dominated by speckled (tag) alder (*Alnus rugosa*), red osier dogwood (*Cornus stolonifera*) and lakeshore sedge (*Carex lacustris*). Purple loosestrife (*Lythrum* *salicaria*) and common reed (*Phragmites australis*) are abundant.

From the east, willows and shrubs grade to a large sedge meadow where several Sedge Wrens were observed. A sand and silt-laden stream meanders through the meadow, which eventually to the small cattail/giant burweed marsh.

We were unable to locate records for observations of our targeted species during our data mining process. There are no element occurrences for wetland birds at Stony Creek in the MNFI Biotic Database.

We conducted a canoe survey of the Stony Creek Marsh on 27 May 2006. Lake access was generously provided by a private land owner on the north side of the lake, which saved much time and effort. We failed to detect any of our targeted species during an extensive search of the marsh. However, four Virginia Rail and three Sedge Wrens responded to taped calls. A Bald Eagle was observed flying over the lake. Local landowners informed us that they often see a pair of eagles on the lake. Additional surveys are recommended as the site probably harbors Marsh Wren. The encroaching purple loosestrife (Lythrum salicaria) and common reed (Phragmites australis) should be monitored.



Figure 14. Low water conditions in the lower reaches of Flower Creek marsh, 27 May 2005.

10) Pentwater River State Game Area -

located just east of the Village of Pentwater in Oceana County, this barred, and drowned river mouth of the Pentwater River features a very productive Great Lakes marsh just upstream from Pentwater Lake. The marsh can be conveniently scoped and scanned from the Longbridge Road and Causeway just off Business Route 31. Habitat conditions change almost annually as the levels of Lake Michigan fluctuate. Softstem bulrush (*Scirpus validus*),

MNFI staff zoologists conducted a canoe survey of the marsh 01 June 2005. Three Marsh Wrens responded to taped playback calls in the west end of the marsh among the broadleaf cattails (*Typha latifolia*) and softstem bulrush (*Scirpus validus*) stands. No other target species were detected. Several Purple Martins were observed in flight over Pentwater Lake to the west. Two Sedge Wrens were heard singing broad-leaf cattail (*Typha latifolia*), tussock sedge (*Carex stricta*), and hybrid cattail (*Typha x glauca*) are common throughout the west end of the marsh where Heme conditions are prevalent. Drier cattail (*Typha spp.*) stands and high concentrations of reed canary grass (*Phragmites australis*) prevail further upriver. Chartier and Ziarno (2004) mention Sora and Marsh Wren sightings in the marsh. The Biotic Database contains one 2002 element occurrence (six singing males) for Marsh Wren. from the sedge meadow among the tussock sedge (*Carex stricta*).

We recommend additional survey work to confirm American Bittern and especially Least Bittern at the site end of the marsh (Figure 15). Purple loosestrife (*Lythrum salicarea*) and reed canary grass (*Phragmites australis*) are abundant and encroachment should be monitored.



Figure 15. Searching for Least Bittern nesting evidence at Pentwater State Game Area, 1 June 2005.

11) Pere Marquette State Game Area – this is a classic example of a barred drowned river

mouth, where near shore currents have effectively cutoff the flow of the Pere Marquette

River, creating Pere Marquette Lake behind the large dunes. The extensive marshes upriver attract a wide variety of wetland birds, the type and variety largely dependent on current water levels.

From the intersection of Old US-31 and Sixth Street in Ludington, go south on Old 31 for 1.5 miles to Conrad Road. The observation tower (Figure 16) on the southeast side of the Old-31/Conrad Road intersection is an excellent spot to scan and scope the marsh for wetland obligates such as Yellow-headed Blackbirds, (Black and Smith, 1994), Least Bittern, American Bittern, and various rails (Chartier and Ziarno, 2004). We were unable to locate any references to specific breeding records during our data mining process.

MNFI zoologists conducted a limited foot survey of the marsh on 2 June 2005. Two Marsh Wrens responded to taped calls played from the observation tower on Conrad Road. The birds were approximately 100m out from the tower. No other targeted species were detected. It is strongly advised to arrive early before traffic noise from Old US-31 becomes too loud.

This Great Lakes Marsh is dominated by a dense, monotypic stand of cattails (Typha spp.) with little open water. Purple loosestrife (Lythrum salicaria) and reed canary grass (Phragmites australis) are abundant throughout, with L. salicaria especially dense south of the river. We strongly suggest that "openings" be created through fire or mechanical means as part of the game area's management plan. This would improve habitat for Least Bittern, Common Moorhen, and American Bittern because the marsh is large enough to support these species. A control strategy for managing exotic encroachment should also be implemented. Due to time constraints we were unable to conduct a thorough survey of the site. A canoe float upriver would probably yield more results and also alleviate the traffic noise issue. if the water levels are high enough. Water levels were adequate this year with abundant Heme conditions in the west.



Figure 16. Looking southeast from the observation tower at Pere Marquette State Game Area. A new element occurrence for Marsh Wren was established among the dense cattail habitat.

12) Hamlin Lake Marsh – also called Sable River Marsh, Hamlin Lake is a barred drowned

river mouth, effectively cut off by the dunes of Big Sable Point. Protected, fertile marshland extends several miles inland along the Big Sable River. Part of this area is located within the Noordhouse Dunes National Wilderness Area administered by the United States Forest Service, and the only designated wilderness area in the Lower Peninsula.

From US-31 in northwest Mason County, travel west on Town Line Road 2.5 miles to Quarterline Road; travel north 2 miles to Nurnberg Road; travel west 3 miles and turn south on a Forest Service Road to the public boat launch at the upper reaches of Hamlin Lake.

Hamlin Lake marsh is a classic cattail (*Typha spp.*)-dominated Great Lakes marsh with 50:50 Heme conditions throughout. However, despite the excellent habitat, the site is not considered (i.e., documented) as an important birding location by leading field ornithologists in the state of Michigan.

MNFI field zoologists conducted a canoe survey of the upper reaches of Hamlin Lake marsh on 2 June 2006. Several point counts involving con-specific taped calls produced new element occurrences for American Bittern, Least Bittern, Marsh Wren, and Common Moorhen. Virginia Rail, Redshouldered Hawk, and Black-billed Cuckoo (*Coccyzus erythropthalmus*), were among the associate species observed. Two Bobolinks (*Dolichonyx oryzivorus*) were detected in a recently burned sedge meadow.

Hamlin Lake marsh was the most prolific site visited during the 2005 field season in terms of the diversity of targeted wetland obligates observed. The expansive cattail marsh and deep water conditions are especially favorable for Least Bittern, which nests in scattered colonies unlike the more solitary American Bittern. The results of our survey should be incorporated into site management plans. Additional survey work is recommended to confirm breeding activities of American Bittern and Common Moorhen. Intensive survey work to locate King Rail is also recommended. Although there are small patches of purple loosestrife (Lythrum salicaria) scattered throughout, exotic encroachment is not a major issue to date.

13) Manistee River State Game Area – The Manistee River State Game Area is situated where the Manistee River empties into Lake Manistee, and extends for several miles upstream on both sides of the river. It encompasses the fertile marshlands that extend upriver as a result of the drowned river mouth of the Manistee River. The SGA is located on both sides of M-55, 0.5 miles west of its junction with US-31. Several miles of accessible, diked impoundments are on both sides of the road.

The extensive cattail marshes found on the south side of M-55 have commonly produced Least Bittern, American Bittern, and Marsh Wren, especially to the east of the dike where it turns away from the Manistee River. King Rail has also been documented here, as well as Sora and Virginia Rail (Chartier and Ziarno, 2004). However, specific background information to substantiate breeding activity is non-existent.

MNFI staff zoologists conducted foot surveys along the dike road on the south side of M-55 on the evening of 2 June and the morning of 3 June, 2005 (Figure 17). We conducted five point counts in suitable habitat along the 1.5 mile dike during both surveys. A total of three Marsh Wrens responded to taped playback calls, which established a new element occurrence for this wetland obligate. A pair of Bald Eagles was observed perched in a nearby tree but a nest was not located. Two Common Nighthawks and three Sedge Wrens were also spotted.

Although this state game area is easily accessible by foot, it would be more productive to conduct a canoe survey for wetland obligates. It is important to establish element occurrences for American Bittern, Least Bittern, and Common Moorhen. Also, additional survey work for King Rail is recommended.

14) Portage Lake Marsh – some limited marsh habitat lies at the eastern-most end of Portage Lake. Beginning in the parking area off of M-22 just south of Onekama, MNFI zoologists conducted a foot survey of the marsh the morning of 3 June 2005. Dense, monotypic cattail (*Typha spp.*) grades to sedge (*Carex spp.*) meadow moving west toward the lake. Willow (*Salix spp.*) has encroached heavily on this site, and purple loosestrife (*Lythrum salicaria*) and

common reed (*Phragmites australis*) are abundant throughout. While Portage Lake is a prime location for spotting waterfowl and shorebirds (Chartier and Ziarno, 2004), we failed to locate any documented sighting of the target species during our data mining process. Our survey of 3 June failed to yield any responses to taped playback calls. Two Sedge Wrens were heard singing. Due to the limited size of this area, no further surveying is advised or recommended.



Figure 17. MNFI staff conducted a foot survey along the dikes at Manistee River State Game Area on 3 June 2005.

15) Bar Lake Marsh- located approximately 4.5 miles north of Manistee, the Bar Lake wetlands were identified as a "major ecological system" in the Michigan Dune Alliance's Eastern Lake Michigan Shoreline Plan (Michigan Dune Alliance, 2003). However, despite several attempts, we were unable to gain access to this private tract. The first impression of our ground survey suggested that woody encroachment is abundant and emergent marsh habitat is lacking here. Aerial photos and other expert information should be consulted to determine if revisiting this site in necessary.

16) Arcadia Marsh – approximately one mile southwest of Arcadia, Michigan, several creeks converge to form a vast sedge meadow. This wet flatland grades to marsh, mud flats and finally Arcadia Lake, a barred drowned river mouth on Bowens Creek. This marsh lies to the east where the M-22 causeway crosses Arcadia Lake, and is easily accessed by foot (Figure 18).

A typical Great Lakes marsh, change is continuous here as water levels determine habitat type. One year low water levels expose vast mudflats; the next year comes sedge (*Carex spp.*) and cattail (*Typha spp.*) marsh produced by the higher water. This dynamic environment results in one of the most important wetland areas in northwest Michigan. Historic records reflect this importance.

Chartier (1999) and Byrne (2000) report summer observations of American Bittern. Least Bittern, Marsh Wren, as well as Sora and Virginia Rail have also been observed (Chartier and Ziarno, 2004). Black and Smith (1994) report Black Tern breeding activity but fail to provide details. Prior to this report, no avian records (element occurrences) existed in MNFI's Biotic Database for Arcadia Marsh.

This site is easily scanned and scoped from the M-22 causeway. MNFI staff zoologists conducted a foot survey 3 June 2006. High water levels produced an abundance of cattail (*Typha sp.*), giant burweed (*Sparganium eurycarpum*) and various sedges (*Carex spp.*) in the marsh. 50:50 Heme marsh conditions exist throughout.

Three American Bittern, five Marsh Wrens, and one Least Bittern were either flushed

or responded to taped playback calls. One American Bittern was flushed from a dense strip of giant burweed along Bowens Creek. These specific observations represent new element occurrences in the MNFI Biotic Database. Three Great Egrets (*Ardea alba*) and six Common Ravens (*Corvus corax*) were also detected. Also, eighty-three Mute Swans (*Cygnus olor*) were observed on Arcadia Lake to the west.

Arcadia Marsh is one of the best birding areas in northwest Michigan, especially for wetland obligates. Additional surveys are not recommended. However, the site should be monitored for exotic encroachment as common reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), and reed canary grass (*Phragmites arundinacea*) are abundant. Also, the proximity to M-22 is a threat for car-related mortalities.



Figure 18. Looking east over Arcadia Marsh from M-22 causeway just south of Arcadia, Michigan, 3 July 2005.

17) Elberta Marsh/Betsie River SGA – The Betsie River State Game Area and Elberta Marsh are located just east of Elberta and south of Frankfort. The marsh is the result of a barred drowned river mouth of the Betsie River forming Lake Betsie. Barred drowned river mouths are a dominant wetland feature along the Lake Michigan shoreline in the Lower Peninsula where extensive dune features block off river flow into the lake. The reduced flow creates protected, very fertile wetlands (e.g., marsh) that often extend for miles up river. Fifty miles of the Betsie River is a state-designated Natural River from Grass Lake to its inlet at Lake Betsie.

MNFI staff zoologists surveyed along Elberta Marsh on foot the evening of 6 June 2006, and conducted a more extensive canoe survey the morning of 7 June 2006. Two Least Bittern were heard calling on 6 June near the Audubon Viewing Platform on the Betsie Valley River Trail near where the trail crosses M-22 in Elberta (Figure 19). These were unsolicited vocalizations, not responses to con-specific taped playbacks. These birds were calling from an area of "wet" cattails (*Typha spp.*), giant burweed (*Sparganium eurycarpum*), and bulrush (*Scirpus sp.*).

Two Least Bittern (presumably the same) and three Marsh Wrens responded to taped calls on 7 June from various points along a meandering canoe route throughout the marsh. In addition, four Virginia Rails responded to calls and several Sandhill Crane fledglings were noted during the canoe survey. Both the Least Bittern and Marsh Wren sightings represent new element occurrences for this location.

The many exposed mudflats and cattail mats present may serve as potential nesting "platforms" for Black Tern, although predator tracks (e.g., raccoon, mink) were prevalent throughout. Additional survey work is needed to monitor for Black Tern nesting potential during low water periods. Exotic encroachment is not an issue.



Figure 19. Location from which two Least Bittern were heard in Elberta Marsh at the Betsie River State Game Area on 7 June 2005.

18) Otter Creek (SBDNL) - This portion of the Sleeping Bear Dunes National Lakeshore (SBDNL) offers excellent opportunities to explore a wide range of habitats, including

marsh and cedar swamp within a short distance from Lake Michigan. An emergent cattail (*Typha spp.*) marsh is located just upstream on Otter Creek. It can be accessed on foot via a two track paralleling the creek, and starts near the trailhead for the Ptatte Plains Hiking Trail. From the intersection of M-22 and Esch Road, follow Esch Road west 1.3 miles to the parking area. Follow signs to the trailhead.

Historic information for our target species is scant for the site. Byrne (2001) reported a singing Marsh Wren on 3 July 2000 along the creek. Chartier and Ziarno (2004) report Least Bittern and Marsh Wren but provide little detail.

Two Virginia Rail and two Soras responded to taped calls during a foot survey

conducted by MNFI staff the morning of 7 June 2005. A Bald Eagle, Great Blue Heron as well as several wood warblers were also observed. As suggested by Francke and Graf (1994), the site lacks the dense stands of monotypic cattails preferred by Marsh Wren. The site is probably too small for American Bittern; however, very thick stands of bulrush (*Scirpus spp.*) and the deep water could provide adequate breeding conditions for Least Bittern. The area would be best surveyed by canoe/boat as the terrain and thick vegetation prevents easy access to the shoreline. Additional surveys are recommended.

Leelanau and Grand Traverse Peninsula Sub-section

19) Skegemog Lake State Wildlife Area -

much of the eastern shoreline of Lake Skegemog is protected as part of a state wildlife area, and as part of land preserves owned by private land conservancies such as the Grand Traverse Regional Land Conservancy. On 7 June 2005, MNFI staff conducted a limited survey of the southern end of the lake, accessing the site via the Skegemog Swamp Pathway, a foot trail meandering through conifer swamp, secondgrowth forest, northern fens and bogs. The trailhead is located off of County Road 597 just south of Schneider Road. A trail/boardwalk leads to a viewing platform overlooking the marsh and lake. We followed the trail through boreal swamp of tamarack (Larix laricina) and black spruce (Picea mariana), then through a northern white cedar (*Thuja occidentalis*) swamp before finally opening to cattail (Typha *sp.*) marsh and the open water of Lake Skegemog.

Historic records of our target species for this site are scarce. The MNFI Biotic Database contains an Osprey (*Pandion haliaetus*) nesting record during the late 1970s. Chartier and Ziarno (2004) report Common Loon and Bald Eagle breeding on Lake Skegemog, but fail to provide specifics. Our 7 June foot survey of the marsh failed to detect any targeted species. Prerecorded con-specific calls were played over the marsh from the observation platform but no wetland obligates responded. Contributions to the Michigan Breeding Bird Atlas II Program included possible breeding for Pileated Woodpecker (*Drycopus pileatus*), Purple Finch (*Carpodacus purpureus*), and Wilson Snipe.

Photo 20 looks from the observation platform in the marsh northwestward towards the lake. Small, isolated patches of cattails (*Typha sp.*) and sedges (*Carex sp.*) can be seen. The abundance of woody species present shows the natural encroachment of the marsh (Figure 20). The presence of exotic species was negligible.

Time constraints seriously limited our work in this area. Additional survey work is needed along the entire eastern shoreline of the State Wildlife Area. We strongly recommend a water survey (canoe/kayak/boat) beginning at the mouth of the Torch River to the southern reaches of the State Wildlife Area. Also, we strongly recommend monitoring the woody encroachment of the marsh in the southern end of the lake.

20) Petobego State Game Area – located between Elk Rapids and Traverse City on US-31, this tract consists of over 400 acres of public land, including Petobego Marsh and Petobego Pond. The extensive Petobego Marsh located on the westside of US-31 exhibits 50:50 Heme conditions throughout and is prime habitat for many wetland-obligate species. To the west of US-31 lies Petobego Pond, a northern wet meadow complex (including a northern fen) heavily influenced by Lake Michigan's fluctuating water levels. MNFI zoologists conducted two site surveys on 8 June 2005. A canoe survey took place from 0600-1100 throughout Petobego Marsh, and a foot survey of Petobego Pond from 1130-1300.

Despite an abundance of suitable habitat, documented reports of wetland-obligates are relatively few for Petobego State Game Area. Chartier and Ziarno (2004) list Black Tern, American Bittern, Least Bittern, Sora, and Virginia Rail as resident breeders, however no records exist in MNFI's Biotic Database supporting this. Black and Smith (1994) do not mention the site in their classic *Bird Finding Guide to Michigan*.

Dense, monotypic stretches of hybrid cattails (*Typha x glauca*) and bulrush (*Scirpus sp.*) dominate the area (Figure 21). We played taped playback calls and conducted several point counts following a clockwise route around the marsh. Five Marsh Wren and three Least Bittern responded to taped playback calls during the survey. The highly agitated, defensive behavior displayed by the Marsh Wrens suggested birds on territory. Four Black Terns were observed foraging over open water, and two Black Terns were detected defending an exposed mudflat although no nest was located. Other obligate species included Pied-billed Grebe (Podilymbus podiceps), Sora and Virginia Rail, the latter two responding to taped calls.

The foot survey of Petobego Pond was limited due to the deep muck (6"-2") which made traversing the wet meadow difficult. An extensive northern fen is also found here. Bluejoint grass (Calamagrostis Canadensis), bulrush (*Scirpus sp.*) and various sedges (*Carex spp.*) dominate the wet meadow, while spikerush (Eleocharis sp.), chairmaker's rush (Scirpus americanus), and smooth sawgrass (Cladium mariscoides) dominate the northern fen. Two Black Terns were observed foraging overhead in the direction of Lake Michigan. A lone Bald Eagle was observed perched in a tree, but no nest was located. Two Virginia Rails were the only obligate species to respond to the conspecific taped calls.

Additional survey work is needed for Petobego Marsh. Black Tern and American Bittern probably nest in the marsh and this needs to be confirmed. The abundance of Heme conditions and muskrat activity is favorable to Black Tern nesting, and the defensive behavior displayed by the two individual terns suggest a probable nesting attempt. The cattails and bulrush are dense and vast enough to support American Bittern and possibly King Rail. Revisiting Petobego Pond is not recommended.



Figure 20. Westward view from the observation tower at Skegemog Lake Wildlife Area, 7 June 2005. Note the woody encroachment in the marsh.

Presque Isle Sub-section

1) Cecil's Bay – this open embayment is located west of Mackinaw City and just east of Wilderness State Park in the northwestern Lower Peninsula. Open embayments are curving sections of shoreline exposed to the open lake. Wetlands are able to develop in these areas because wave height and energy are reduced by the shallow water and gently sloping bottom topography. Generally, where the shoreline is exposed to the full erosive forces of wind, waves and ice, wetland development is limited (Albert, 2003).

We conducted a foot survey of the area on the morning of 9 June 2005. We found a typical low-lake level wetland with a rocky shore. There is not much habitat for our target species. Some small patches of spikerush (*Eleocharis sp.*) bulrush (*Scirpus sp.*) and sedges (Carex spp.) are scattered throughout. Abundant woody encroachment includes willow (*Salix sp.*) and tamarack (*Larix laricina*). No further survey effort recommended.



Figure 21. Heme marsh among dense bulrush (Scirpus sp.) at Petobego Marsh, Petobego State Game Area, 8 June 2005.

2) French Farm Marsh/Lake – located in Emmet County, this State-owned property is part of the Mackinaw State Forest. Our survey concentrated on the shallow marsh at the north end of the lake. From Trails End Road, follow a two-track road for about a mile to the northern tip of the French Farm Lake. There are several access spots to the lake.

Historic records are scarce for the site. MNFI's Biotic Database contains Osprey and Common Loon nesting records for the years 1987-1995. Chartier and Ziarno (2004) report non-specific sightings of Common Loon, Black Tern and Caspian Tern.

Our 9 June 2005 canoe survey yielded several wetland-obligate species. Eight Black Terns were detected foraging over the marsh. The defensive behavior displayed by some of these birds eventually led us to an active nest with three eggs. This represents a new element occurrence for this species. Only Sora and Virginia Rail responded to the taped playback calls. One Caspian Tern was observed foraging overhead, and a lone Common Loon was heard calling to the south. Other wetland-obligate species included Pied-billed Grebe, Sandhill Crane, Bald Eagle, and Great-blue Heron. Several Wilson's Snipe were also observed.

This site is unsuitable for American Bittern, Common Moorhen, Least Bittern, and Marsh Wren due to the lack of expansive stretches of dense cattail (*Typha sp.*) and/or bulrush (*Scirpus sp.*) habitat. However, 50:50 Heme conditions and exposed mudflats provide excellent circumstances for Black Tern (Figure 22). Also, the sedge meadow in the upper reaches of the marsh may be suitable for Yellow Rail (*Coturnicops noveboracensis*). We suggest continued monitoring of the Black Tern breeding population, and additional surveys for Yellow Rail, for which there is no element occurrence on the west side of the lower peninsula. Other than a few scattered patches of common reed (*Phragmites australis*) exotics are not a problem.



Figure 22. Heme mash conditions at French Farm Marsh, 9 June 2005.

Future Efforts and Recommendations

The shorelines and coastal wetlands of Michigan provide important habitat for a number of rare and declining species of wetland birds, as well as numerous common species of wildlife. Continued surveys will not only add to our knowledge of this unique group of wetland birds, but will help to identify and prioritize sites for continued protection and management. We have learned from the first three years of work, for instance, that some rare bird species are in need of focused inventory effort. The King Rail was not recorded from any site during the first three years of this study, including the St. Clair Flats, considered to be Michigan's best remaining site for the species. Common Moorhen were observed at only three locations during the three-year period, indicating the possible need to upgrade from special concern to threatened. Additional systematic surveys to locate King Rail and Common Moorhen in Michigan are needed. In addition, more information on the rail is critical to the development of management strategies and future research is needed to assess the effects of various land management practices on rail populations. The Marsh Wren continues to be widely distributed being detected in the majority of our survey sites containing monotypic cattail habitat. Such information could be used to support removing the specie from the special concern list.

The survey work in 2005 located a total of five Least Bittern sites. While documented in

the literature, these sightings represent the first element occurrences in MNFI's Biotic Database for the specie on the west side of the Lower Peninsula. This is encouraging for this state threatened species and additional surveys may locate even more breeding sites. We were able to identify and document probable Least Bittern breeding sites such as Hamlin Lake marsh and Arcadia marsh. The lack of suitable habitat largely explains the dearth of Yellow Rails from this side of the state.

Based on these successful first few years of surveys and data collection, continued wetland bird inventories are strongly warranted. This report summarizes the third year of a project which was conceived to take four years to systematically cover the coastal wetlands of Michigan. It is hoped at the end of this project that most of the important coastal wetland bird breeding sites in Michigan will be identified and prioritized in terms of protection and management. Future efforts are planned for the Upper Peninsula along the Lake Superior shoreline and northern Lake Michigan. On occasion we were unable to dedicate the necessary time to adequately survey an area because of time constraints and the geographic distances between locations. However, we were able to conduct relatively good evaluations of each site in terms of quality and suitability of wetland bird habitat. We are confident in our recommendations and suggestions.

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Appendix I

Wetland Bird Data Form

MNFI BIRD SURVEY FORM

UP_____ L II. LOCATION INFORMATION Site Name______ Mgmt. Name______ Date_____ Surveyor(s)_____ Quad_____ Town/Range_____ Sec. 1/4 Sec_____ Directions/access POINT/TRANSECT #_____ II. BIRD LIST (list all birds observed) WITHIN 50 METERS 50 – 100 METERS OUTSIDE 100 METERS SPECIES SEEN HEARD SEEN HEARD HEARD SEEN

II. GENERAL SITE DESCRIPTION

Soil Type			Geolo	gy		
Potential habit	at for target species	present?	ĒS		SURE Comments	
If you ans	wered yes to the ab	ove, please rai	te the relativ	ve qu	ality of the site to the target species or group:	
☐IGH ☐ODERATE □W			OR Justification			
Evidence of di	EMENT CONSIDI	ERATIONS	Other th	reats	(e g ORV's excessive mt bike use etc.)	
Restorability of	of site			cais	(e.g. OKV s, excessive int. like use, etc.)	
Stewardship C	comments					
IV. ZOOLO V. SPECIES	GICAL INDICATO LIST(S)	OR SPECIES	S			

Ι.	TARGET	SPECIES/	'GROU

Appendix II

Wetland bird habitats and associated element occurrence map for the Southern Lake Michigan Lake Plain Sub-subsection.



Appendix III.

Wetland bird habitats and associated element occurrence map for the Manistee Subsection

Wetland bird habitats and associated element occurrence map for the Manistee Subsection





Data Sources:

U.S. Fish and Wildlife Service. circa 1980. National Wetland Inventory (NWI) database for Michigan. Scale 1:24,000.

MNFI, 2005. Biotics 4 database. The element occurrence database for the state of Michigan has been created by the Michigan Natural Features Inventory (MNFI) in Lansing, MI., using established Natural Heritage Methodology developed by the Association for Biodiversity Information (ABI) (now Natureserve) and The Nature Conservancy (TNC).

all to a						
lap #	Scientific Name	Common	Survey Site	Firstobs	Lastobs	Status
4	Drotonotorio oltrog	Prothonotony Warblor	Cleveland Creek	2002-06-13	2002-06-13	SC
	Protonotaria citrea	Prothonotory Warbler	White River	1000_06_21	1000_06_21	SC
2	Protonotaria citrea	Groat Plue Horon Pockery	Sand Creek	1988	1988-04	
3	Great Blue Heron Bookery	Great Blue Heron Bookery	Cushman Swamn	1978	1078	
4	Great Blue Heron Rookery	Great Blue Heron Bookery	Lidkey Swamp	1987	1989	
5	Great blue neron Rookery	March Wron	Pentwater River State Game Area	2002-07-19	2005-06-01	SC
6		March Wren	Pere Marquette State Game Area	2002 07 10	2000 00 01	SC
1			Thunder Lake	1008	2003-00-02	
8	Gavia immer	Common Loon Marab Wran	Hamlin Lake Marsh	2005-06-02	2005	SC -
9				1087	1087 07 01	90 80
10		Northern Harner	Hamlin Lake Marsh	2005-06-02	2005-06-02	
11		Common Moorbon	Hamlin Lake Marsh	2000 00 02	2000 00 02	SC SC
12	Gallinula chioropus	Common Woornen	Hamlin Lake Marsh	2005-00-02	2005-00-02	SC SC
13	Botaurus lentiginosus	American Billern Groot Blue Horon Bookory	Manistee Blacker Airport	1987	1987-04	
14	Great blue neron Rookery	March Wron	Arcadia Lake Marsh	2005-06-03	2005-06-03	SC
15			Arcadia Lake Marsh	2005-00-03	2005-00-00	
10		Least Dillem	Arcadia Lake Marsh	2005-00-02	2005-00-02	SC I
1/	Botaurus ientiginosus	American Billem	Renzonia	1986	1995-07-10	
18		Ospiey Legat Bittern	Elberta Marsh/Retsie Diver State Came Area	2005 06 06	2005 06 07	
19	Ixobrychus exilis	Least Billem	Elberta Marsh/Betsie River State Game Area	2005-00-00	2005-00-07	
20		Common Loon	Ruch Lake	1002	2003-00-00	
	Gavia immer		l ittle Dlatte I ake	1087	2002	
22	Gavia immer		Lille Lake	1080	1989	+
23	Gavia immer		Narada Laka	1000 06 20	1000 06 20	
24	Gavia immer		INALAUA LANG	1333-00-23	1333-00-23	



Lower Peninsula Ecoregion Data Source: Albert, D. A. 1995. Regional Landscape Ecosystems of Michigan, Minnesota, and Wisconsin: A Working Map and Classification (Fourth Revision: July 1994). Lansing, MI: Michigan Natural Features Inventory. Report number 1995-01. 250pp. GIS coverage approximate map scale 1:100,000.

Vegetation circa 1800 of the Manistee Subsection

Data Source:

Legend

Comer, P. J., D. A. Albert, H.A. Wells, B. L. Hart, J.B. Raab, D. L. Price, D. M. Kashian, P. A. Corner, and D. W. Schuen. 1995. Vegetation circa 1800 of Michigan. Michigan's Native Landscape: As Interpreted from the General Land Office Surveys 1816-1856. Michigan Natural Features Inventory. Lansing, MI. 78 pp. + digital map

SAVANNA/GRASSLAND

BEECH-MAPLE FOREST

OAK-HICKORY FOREST

PINE/OAK FORESTS

MUSKEG/BOG

NORTHERN HARDWOOD-CONIFER FOREST



Appendix IV.

Wetland bird habitats and associated element occurrence map for the Williamsburg, Traverse City and Cheboygan Sub-subsections.

Wetland bird habitats and associated element occurrence map the Williamsburg, Traverse City and Cheboygan Sub-subsection







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for ons							
							gend SAVANNA/GRASSLAND BEECH-MAPLE FORES NORTHERN HARDWOO OAK-HICKORY FOREST PINE/OAK FORESTS MUSKEG/BOG MARSH/WET PRAIRIE HARDWOOD SWAMP CONIFER SWAMP
					Data Sour Comer, P. circa 1800 Features I	Vegeta States Modeling States	DUNE ation circa Traverse (Sub-subse L. Hart, J.B. Raab, D. L. Price, D. N ive Landscape: As Interpreted from + digital map
	Firstobs	Lastobs	Status				
	1970 1960 1970 1985 2005-06-08 2005-06-08 1987 1982 1990 1989 1977 1991 1987 1976 1987 1976 1985 1986 1962 1985 1988	$ \begin{array}{r} 1970-00-01 \\ 1985-07-15 \\ 1970 \\ 1999 \\ 2005-06-08 \\ 2003 \\ 2003 \\ 2003 \\ 1990-07 \\ 1989-07 \\ 2003 \\ 1995-05-26 \\ 2002 \\ 1991 \\ 1982 \\ 1985 \\ 1995-05-26 \\ 2002 \\ 1991 \\ 1982 \\ 1985 \\ 1995-07-10 \\ 1997 \\ 1962 \\ 1995-07-10 \\ 1995-07-10 \\ 1995-07-10 \\ 1995-07-10 \\ 1997-07 \\ 2005-06-09 \\ 1993-07 \\ 2003 \\ 1996 \\ 1987 \end{array} $					
ı/Beaver Island	198 1983 1991 1998 1976 1998 2003 1987 1987 1987 1986-07-15 1987 1986-07-15 1987 1986 1980 1986 1962 1976 1988 1977 1991 1977 1991 1977 1991 1977 1991 1977 1995 1976	1987 1988 1995-07-10 1998-05-26 1976 1998-05-26 2003 2003 2003 1962 1987 1993-07-15 1987-06-02 1994 1992 1988 1962 1985 1994 1992 1985 1995-06-08 1985 1991 1985 1991 1985 1991 1985 1999-06-15 1991 1991 1991	T T T T SC T T T T T T T T T T T T T T T				
	1976 1981	1989-07-06 1989-07-06	T T		 		



Appendix V.

Bird species list for all sites sampled during 2005.