Celeron Island Amphibian and Reptile Pre-Construction Report

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Executive Summary

In 2014, Herpetological Resource and Management, LLC (HRM) was contracted by Environmental Consulting & Technology, Inc. (ECT) to conduct baseline studies and assist in habitat restoration targeting amphibians and reptiles on Celeron Island. Work was funded through grants to Friends of the Detroit River (FODR) from the National Oceanic and Atmospheric Administration (NOAA). An analysis of historic herpetofauna records, with a preliminary survey and habitat assessment was conducted in 2014 to identify habitat restoration targets. Several opportunities were identified for improving amphibian and reptile habitat and later incorporated into the overall restoration of Celeron Island. Pre-construction monitoring was conducted in 2017 to establish baseline data of species richness, abundance and distribution. The results of these surveys will be used to help evaluate wildlife response. Significant findings from these assessments included:

- A total of seven species of herpetofauna including three amphibians and four reptiles were documented within the island area.
- One species, Green Frog was officially documented for the first time on the Island.
- Based on current conditions and historic records, an additional seven species may occur on Celeron Island.

The Celeron Island restoration project will contribute to restoring lost habitats and degraded fish and wildlife populations within the Detroit River. These actions will help address measures needed for the removal of Beneficial Use Impairments and ultimately delisting this region as an Area of Concern.

Introduction

The Detroit River is an important international channel that links Lake St. Clair and the Upper Great Lakes to Lake Erie. Over 100 years of development have degraded the river by eliminating areas of suitable fish and wildlife habitat and introducing various sources of pollution to the system. As a result, the Detroit River is one of 43 contaminated sites designated as an Area of Concern (AOC) under the 1987 Great Lakes Water Quality Agreement. Listed among the multiple Beneficial Use Impairments (BUIs) is the loss of fish and wildlife habitat. The river historically supported extensive areas of coastal marsh with shorelines covered by beds of emergent and submergent aquatic vegetation. Urbanization in the watershed resulted in the loss of more than 90% of the river's coastal wetlands (United States Environmental Protection Agency 1996). A majority of the remaining wetland habitat is found on the river's islands, which support a considerable amount of suitable habitat for resident and migratory fish and wildlife. Recently, several groups and agencies from both United States and Canada have spearheaded efforts to conduct restoration that will contribute to the removal of BUIs on the Detroit River and aid in the overall delisting as an AOC.

Celeron Island, in the lower Detroit River, was selected as a potential opportunity for restoration in the AOC and, beginning in 2013, a project was developed to explore habitat improvement options for the island. The habitat in the island area has become degraded over the last twenty years due to erosion and restoring this unique Great Lakes ecosystem was identified as a high priority. In 2014, Herpetological Resource and Management (HRM) was contracted by Environmental Consulting & Technology, Inc. (ECT) as part of work funded by the Friends of the Detroit River (FODR) with a grant provided by the National Oceanic and Atmospheric Administration (NOAA) to evaluate Celeron Island for restoration opportunities targeting amphibians and reptiles. An initial site visit and rapid habitat assessment was conducted in May 2014

and recommendations were provided to assist in guiding restoration actions to be taken on the island area (Mifsud 2014). These recommendations were incorporated into a larger scale restoration project, proposed to begin in 2018. Through additional funding provided by NOAA, comprehensive pre-construction monitoring was conducted by HRM in summer 2017. Surveys focused on recording overall amphibian and reptile presence, represented age classes, spatial distribution, and relative abundance, which will be important tools in evaluating the post-restoration wildlife response. This report includes work conducted to date, with focus placed on results and discussion from the 2017 pre-construction monitoring.

Site Description

Celeron Island is an uninhabited 68-acre island located in the Lower Detroit River at the mouth of Lake Erie in the township of Grosse Ile. The island is now part of a State of Michigan Game Area, but historically a summer cottage was located on the north end of the island and a perimeter road existed until the early 1970's. The island has since reverted back to a more natural state. The island is separated into two portions by a large enclosed bay in the center of the island with a single entrance on the western side. High water levels in recent decades coupled with erosion from river current and wave action has left much of the island shoreline washed away as well as a large portion of the central wetland (Photos 1). The interior of this portion supports coastal marsh, deciduous forest, and forested wetland habitats (Photos 2-5). For this project, HRM's efforts were focused on the southern part of the island complex.

Methods

Prior to initiating surveys on Celeron Island, a historical review was conducted in early 2014 to determine herpetofauna species that may currently occur on the islands. Several data sources were utilized including museum collection records, Michigan Department of Natural Resources Wildlife,

Fisheries, and Parks and Recreation Divisions (MDNR), United States Fish and Wildlife Service USFWS), Michigan Natural Features Inventory (MNFI) records, HerpNet, and the Michigan Herp Atlas Project. Additionally, historical data was utilized from previous HRM surveys conducted on the island in 2006 and 2007. In May, 2014 HRM conducted a rapid site assessment targeting herpetofaunal habitat on Celeron Island. Time constrained ground searches were utilized to assess both aquatic and terrestrial habitat, and identify potential restoration opportunities targeting amphibians and reptiles. Emphasis was placed on potential nesting, foraging, basking, and overwintering sites.

Pre-construction monitoring of Celeron Island was initiated in summer 2017 and HRM conducted surveys on July 11 and 25, 2017, and August 3, 16, and 31, 2017. Objectives were to assess the overall diversity, relative abundance, represented age classes, and spatial distribution of amphibians and reptiles for later comparison to post construction findings. Methods to detect herpetofauna included visual encounter surveys using time-constrained meander ground searches which included the investigation of potential basking and nesting areas, as well as turning over natural and artificial cover (logs, boards, debris, etc.).

Site conditions were recorded for each survey event using a Kestrel 3000 pocket weather meter. During all of HRM's surveys on Celeron Island, no voucher specimens were collected but photographs were taken when possible. All survey activities were in accordance with HRM's Scientific Collector's and Threatened and Endangered Species permits issued by the State of Michigan.

Each positively identified amphibian and reptile was recorded in the database. The following data were collected for each record: (1) species, (2) gender of each individual (when possible), (3) behavior of each individual, and (4) reproductive condition of each individual (if it can

be determined). Observation locations were recorded using Trimble® Juno SB GPS Units, which record the location to U.S. Environmental Protection Agency (EPA) Tier II National Geospatial Data Spatial Standards, and were mapped using ArcMap® software. Control points were obtained during every survey to confirm spatial accuracy and equipment functionality.

Results

Based on a review of the several databases described above and data from previous assessments conducted in 2006 and 2007, ten species are historically known to occur on or near Celeron Island. These species include Bullfrog (*Rana catesbeiana*), Eastern American Toad (*Bufo americanus americanus*), Mudpuppy (*Necturus maculosus maculosus*), Eastern Fox Snake (*Pantherophis gloydi*) , Eastern Garter Snake (*Thamnophis sirtalis sirtalis*), Northern Brown Snake (*Storeria dekayi dekayi*) , Northern Water Snake (*Nerodia sipedon sipedon*) , Eastern Snapping Turtle (*Chelydra serpentina serpentina*), Midland Painted Turtle (*Chrysemys picta marginata*), and Northern Map Turtle (*Graptemys geographica*) (Table 1). Three species of herpetofauna were observed during the rapid habitat assessment in 2014 including Eastern Garter Snake, Northern Map Turtle, and Eastern American Toad.

2017 pre-construction monitoring resulted in the documentation of seven species including Bullfrog, Eastern American Toad (Photo 6), Green Frog (*Rana clamitans*), Eastern Garter Snake (Photo 7), Northern Brown Snake (Photo 8), Eastern Snapping Turtle, and Northern Map Turtle (Photo 9) (Table 1, Map 3). The island has potential to support seven additional species of herpetofauna not observed historically or during recent assessments including Gray Treefrog (*Hyla chrysoscelis/H. versicolor*), Northern Spring Peeper (*Pseudacris crucifer crucifer*), Wood Frog (*Rana sylvatica*), Butler's Garter Snake (*Thamnophis butleri*), Eastern Spiny Softshell Turtle (*Apalone spinifera spinifera*), Midland Painted Turtle, and Musk Turtle (*Sternotherus odoratus*) (Table 1).

Discussion

Amphibians and reptiles are recognized as key bioindicators (gauges of environmental health), due in part to their high sensitivity to environmental pollutants and habitat disturbance. Their presence, richness, and distribution are important metrics for determining the health of natural communities (Cooperrider, Boyd et al. 1986; Welsh and Droege 2001; Guilfoyle 2010). Documenting the herpetofaunal diversity and habitat usage on Celeron Island is an effective way to assess the overall ecosystem health of the island.

Initial field work conducted by HRM on Celeron Island in 2014 focused on assessing habitat conditions and restoration opportunities. Findings of this one-day rapid assessment resulted in fairly low detection of herpetofauna with three species observed. Objectives of the pre-construction monitoring in 2017 were placed on determining amphibian and reptile relative abundance and spatial distribution. During this period, a higher diversity was observed with several species documented throughout the assessment area. Detection rate as well as species diversity and spatial distribution may have been affected by the atypically high water levels that have been observed in the Detroit River in recent years as well as overall low precipitation during HRM's active survey period. Surveys were limited to summer months between July and September, which likely affected detection rates. For example, Mudpuppies have been identified as potentially present offshore of Celeron Island based on historical records and available habitat; however due to the timing of surveys targeted trapping was not conducted as it is outside of the active season.

Among the six species of amphibian and reptile observed on Celeron Island, one species, Green Frog, has not been previously documented. This generalist species is relatively common in the Great Lakes region and tolerant of moderate to poor habitat conditions; however its

colonization on the island indicates there is potential for additional species to disperse to Celeron Island and establish new populations.

Based on HRM's surveys of Celeron Island in 2014 and 2017, the herpetofauna habitat on the island can be considered moderate. Given the relatively small size of Celeron Island and its isolated location, it is expected to have an overall lower diversity compared to communities in mainland habitats. Although there are multiple opportunities for improving the area for amphibians and reptiles as described below, Celeron Island does support some features that are beneficial for local herpetofauna. The interior of the island contains abundant sources of woody debris, which provide critical cover and refugia for a number of species. Numerous individuals of some species including Eastern American Toad and Northern Brown Snake were found directly under debris (Photos 10-11). The interior portions of the island also support multiple vernal pools, which provide critical habitat for amphibian breeding and development as well as seasonal foraging grounds for a range of wildlife species. Eastern American Toad metamorphs were observed throughout the 2017 assessments, indicating that amphibians are currently using these habitats to successfully reproduce (Photo 12). These habitats should be protected to ensure that amphibians and reptiles on the island can fulfill their seasonal needs.

Several rare and sensitive amphibians and reptiles known to historically occur on or near Celeron Island were not observed during HRM's 2017 assessments. The Eastern Fox Snake is a State Threatened species whose range lies entirely within the Great Lakes basin where it is found in coastal marshes and other near shore habitats. While no recent observations of this species have been recorded directly on Celeron Island, Fox Snakes are documented in the surrounding area as close as Lake Erie Metropark directly adjacent to Celeron Island to the west. Their strong swimming

ability and tendency to travel long distances over water indicate the species is capable of colonizing Celeron Island, if suitable habitat is present.

As previously discussed, Mudpuppies were not directly observed during HRM's 2017 assessments; however, they are known to occur in the Detroit River. This aquatic salamander, which has been elevated to Special Concern in Michigan, should remain a major target for herpetofauna restoration and monitoring. Mudpuppies are the obligate host to the state Endangered Salamander Mussel (*Simposonais ambigua*), making it an integral component of this aquatic ecosystem. The species has been documented by HRM just upstream of Celeron Island as recently as April 2017. Mudpuppy trapping was not conducted during this project due to the lower probability of capture and increased risk of bycatch mortalities, particularly turtles. Currently, little habitat within the near-shore areas of the island is available. Aquatic habitat features designed for use by Mudpuppies for nesting, breeding, and refugia purposes have been proposed. This project and monitoring will also contribute to larger scale research and restoration work targeting Mudpuppies that has been recently initiated within the Detroit River and surrounding Great Lakes region (Craig, Mifsud et al. 2015; Herpetological Resource and Management 2016).

Severe erosion has significantly degraded shoreline habitat on Celeron Island. The erosion has created conditions that make it difficult or nearly impossible for some herpetofauna to move between the river and the island. The wave action and high water levels in recent years have also eliminated the protective beach that once connected the north and south islands.

Between the steep shorelines and loss of sandy beach habitat, turtle nesting opportunities appear to be very limited on Celeron Island. The largest areas suitable for nesting are currently restricted to small sections of sandy shoreline on the eastern side of the island with some limited habitat also present on the western side (Photo 13). During HRM's 2017 assessments, limited

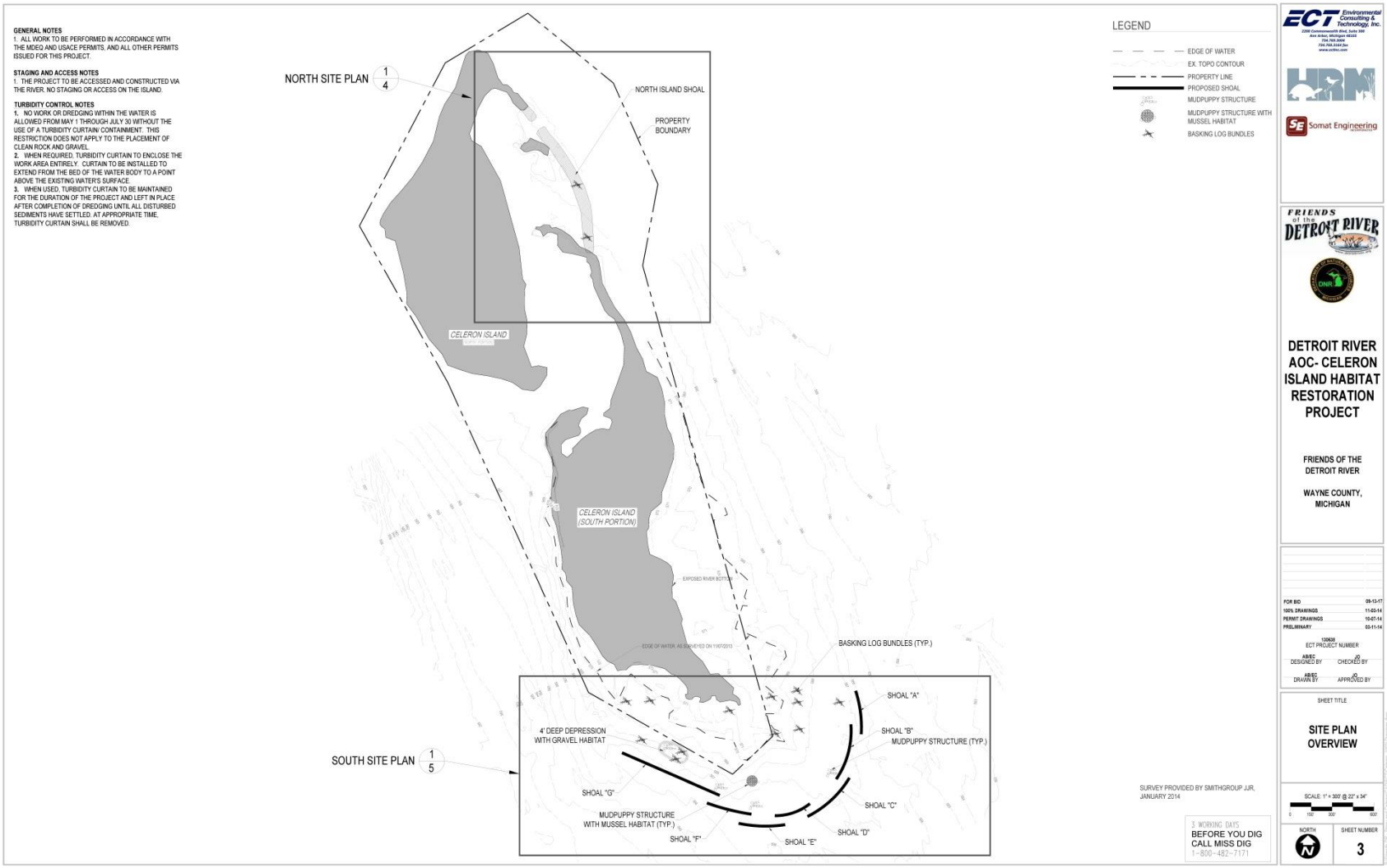
evidence of turtle nesting activity was observed with only one Snapping Turtle nest documented. Raccoons are known to be present on the island and are problematic nest predators of turtles and birds. Given the low number of predated nests it is likely that if significant turtle nesting activity was present, higher numbers of predated nests would be observed as well.

Conclusion

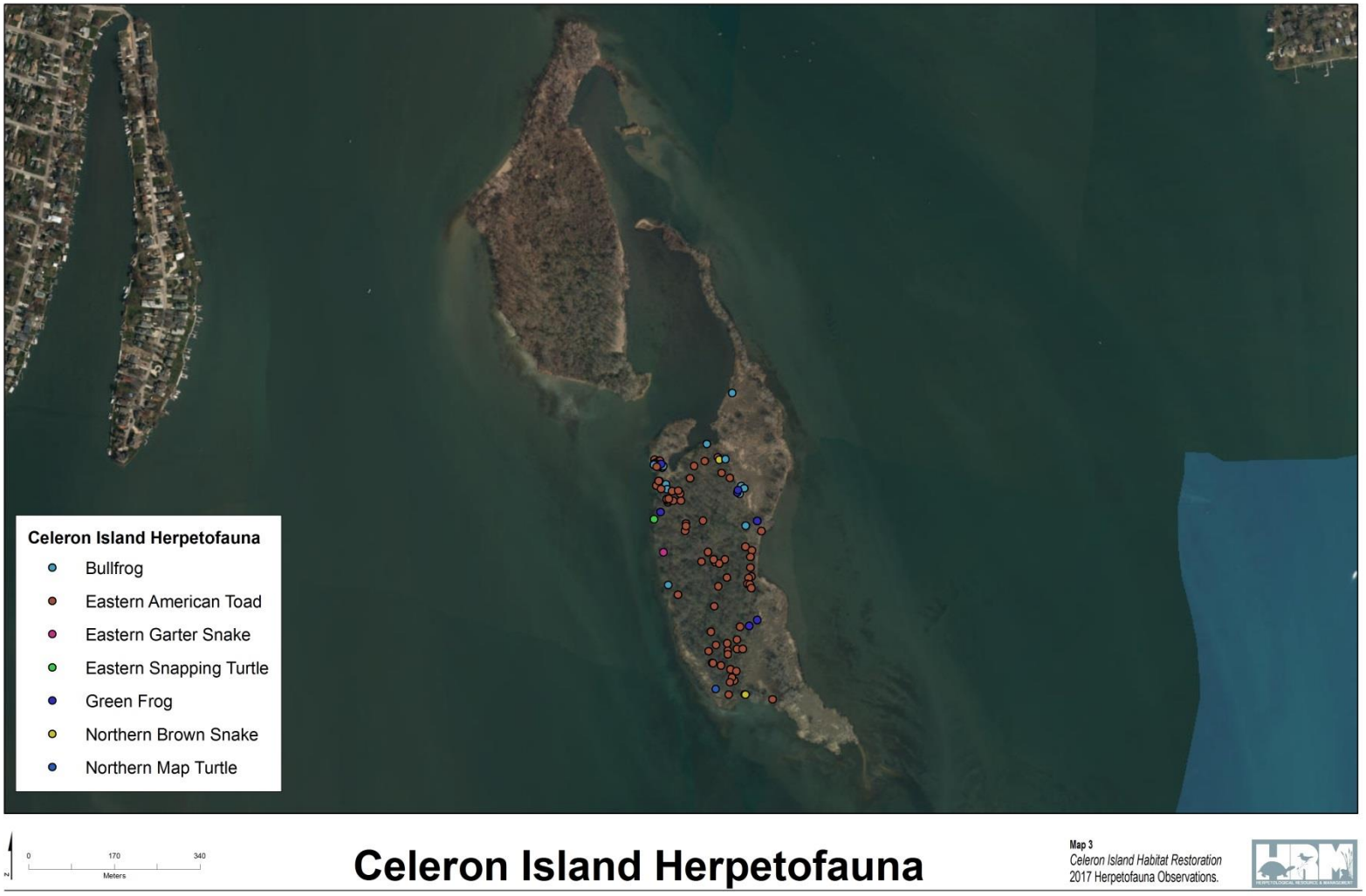
The Detroit River Watershed supports a number of rare and sensitive species and restoration in the area is essential to the long-term viability of the region's ecological function. The natural communities of Celeron Island are currently degraded and available herpetofauna habitat is considered moderate in quality. The island historically supported diverse communities of amphibians and reptiles and though several species are currently present, overall richness has decreased from historic levels and population size and spatial distribution is limited. Proposed restoration measures targeting amphibians and reptiles will likely aid in increasing the overall ecosystem function of the island. This work will also be a valuable step toward the removal of the loss of fish and wildlife habitat beneficial use impairment.

Maps

Map 1. Historic observations of herpetofauna found on Celeron Island prior to 2017 pre-restoration monitoring.



Map 2. Celeron Island restoration plans including habitat structures targeting amphibian and reptile species. (Credit: Environmental Consulting and Technology)



Map 3. 2017 Celeron Island Herpetofauna observations. Surveys were limited to the southern island based on project focus area.

Tables

Table 1: Celeron Island herpetofauna species historically recorded, source of historical observation, species observed during HRM's most recent survey, and herpetofauna that were not observed recently but may potentially occur on the island. **Rana (=Lithobates) ** Bufo (=Anaxyrus)*

Common Name	Species Name	Historically Observed	Observed 2014	Observed 2017	Potential
Bullfrog	*Rana catesbeiana**	X[1]		X	
Eastern American Toad	*Bufo americanus americanus***	X[1]	X	X	
Green Frog	*Rana clamitans**			X	
Gray Treefrog	*Hyla chrysoscelis/ versicolor*				X
Northern Spring Peeper	*Pseudacris crucifer crucifer*				X
Wood Frog	*Rana sylvatica**				X
Mudpuppy	*Necturus maculosus maculosus*	X[3]			X
Butler's Garter Snake	*Thamnophis butleri*				X
Eastern Fox Snake	*Pantherophis gloydi*	X[1, 2]			X
Eastern Garter Snake	*Thamnophis sirtalis sirtalis*	X[1]	X	X	
Northern Brown Snake	*Storeria dekayi dekayi*	X[1]		X	
Northern Water Snake	*Nerodia sipedon sipedon*	X[1]			X
Eastern Spiny Softshell Turtle	*Apalone spinifera spinifera*				X
Eastern Snapping Turtle	*Chelydra serpentina serpentina*	X[1]		X	
Midland Painted Turtle	*Chrysemys picta marginata*	X[1]			X
Musk Turtle	*Sternotherus odoratus*				X
Northern Map Turtle	*Graptemys geographica*	X[1]	X	X	

1.Herpetological Resource and Management (HRM)

2. Michigan Natural Features Inventory (MNFI)

3. U.S. Fish and Wildlife Service (USFWS

Photos

Photo 1. Evidence of erosion on Celeron Island in the Detroit River observed during HRM's 2014 assessment.

Photo 2. Coastal marsh habitat located on the shoreline of Celeron Island during HRM's 2017 assessments.

Photo 3. Deciduous forest habitat on Celeron Island during HRM's 2017 assessments.

Photo 4 . Forested habitat on Celeron Island during HRM's 2017 assessments.

Photo 5. Forested wetland habitat on Celeron Island during HRM's 2017 assessments.

Photo 6. Eastern American Toad observed on Celeron Island during 2017 HRM's assessments.

Photo 7. Eastern Garter Snake observed on Celeron Island during 2017 HRM's assessments.

Photo 8. Northern Brown Snake observed on Celeron Island during 2017 HRM's assessments.

Photo 9. Deceased Northern Map Turtle observed on Celeron Island during 2017 HRM's assessments.

Photo 10. Eastern American Toad found under woody debris on Celeron Island.

Photo 11. Northern Brown Snake found under woody debris on Celeron Island.

Photo 12. Eastern American Toad metamorph observed on Celeron Island, indicating amphibian breeding habitat is present.

Photo 13. Suitable turtle nesting habitat on Celeron Island is limited to small portions of sandy shoreline like this one.

References

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