Stony and Celeron Islands Herpetofauna Baseline Assessment

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Introduction

Project Description

In 2014 Herpetological Resource and Management (HRM) was contracted by Environmental Consulting and Technology (ECT) as part of a grant from the Friends of the Detroit River to evaluate Stony and Celeron Islands for restoration targeting amphibians and reptiles. The natural habitat on both islands has become degraded over the last decade due to erosion as well as invasive vegetation and restoring these unique Great Lakes ecosystems is warranted. Results of the assessment are intended to assist in guiding restoration actions to be taken on Stony and Celeron Islands as well as help to evaluate the success of restoration efforts. Overall amphibian and reptile presence, represented age class, spatial distribution, and relative abundance can be important tools in identifying the need for, and success of, habitat restoration.

Site Descriptions

Stony Island

Stony Island is an uninhabited 52-acre island located in the Lower Detroit River in the township of Grosse Ile. Historically the island was owned by a dredging company. While the Livingston Shipping Channel was being excavated during the early 1900's, construction buildings and equipment as well as dozens of homes were located on the island. The construction of limestone dikes protected the island from current and wave action, allowing two large wetland areas to form. These areas, known as the lower and upper bays, currently support abundant wildlife including spawning grounds for pike as well as the Detroit River's largest Great Blue Heron rookery, containing over 200 nests (Photos 7-8). A portion of the upper bay dike as well as the shoal that protects the lower bay wetlands have been reduced to below the current water level from decades of

erosion. With these structures reduced or absent, wave action from the Detroit River continues to further erode the island shoreline.

Celeron Island

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 a State 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 natural state and currently supports many species of flora and fauna. 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.

Methods

To determine herpetofauna species that may currently occur on the islands, a historical review was conducted utilizing 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 Stony Island in 2005 and Celeron Island in 2006-2007.

On May 20, 2014 HRM conducted habitat assessment targeting herpetofaunal on Stony and Celeron Islands within the delineated proposed restoration areas. 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. No specimen vouchers were taken; however, photographs were taken when possible to document site conditions and species observed.

Results

Historically seven species are known for Stony Island including 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*), and Northern Map Turtle (*Graptemys geographica*) (Table 1). Ten species are known historically for Celeron Island including Bullfrog (*Rana cataesbeiana*), Eastern American Toad, Mudpuppy, Eastern Fox Snake, Eastern Garter Snake, Northern Brown Snake, Northern Water Snake, Eastern Snapping Turtle (*Chelydra serpentine serpentine*), Midland Painted Turtle (*Chrysemys picta marginata*), and Northern Map Turtle (Table 2). Based on current conditions, both islands have the potential to support these amphibian and reptile species historically known (Tables 1-2)

Three species of herpetofauna were observed during HRM's assessment including Eastern Garter Snake (Photo 13), Northern Map Turtle, and Eastern American Toad (Photo 14). Weather conditions were appropriate at the time of HRM's survey for conducting surveys for target species. Eastern Garter Snakes and Eastern American Toads were present on both islands and a Northern Map Turtle was observed in the Detroit River near the Celeron Island shoreline. Stony Island has the potential to support additional species of herpetofauna not observed historically or during recent site assessments including Bullfrog, Green Frog (*Rana clamitans*), Gray Treefrog (*Hyla chrysoscelis/H. versicolor*), Buter's Garter Snake (*Thamnophis butleri*), Eastern Spiny Softshell Turtle (*Apalone spinifera spinifera*), Eastern Snapping Turtle, Midland Painted Turtle, and Musk Turtle (*Sternotherus odoratus*) (Table 1). Potential amphibian and reptile species for Celeron Island include Green Frog, Gray

Treefrog, Northern Spring Peeper (*Pseudacris crucifer crucifer*), Wood Frog (*Rana sylvatica*), Butler's Garter Snake, Eastern Spiny Softshell Turtle, and Musk Turtle (Table 2).

At the time of this assessment the Detroit River water level was the highest seen in decades and severe erosion along both island shorelines was observed (Photos 1-2). Based on the site visits, overall habitat on both islands is degraded and large portions are dominated by invasive species. *Phragmites* occurs in dense stands along coastal wetlands and a majority of island shorelines (Photos 3-4). Upland habitat on Stony Island is dominated by an understory of garlic mustard and Celeron Island is dominated by thimbleweed (Photos 5-6). Currently both proposed restoration areas lack sufficient habitat features required to support healthy populations of several by amphibian and reptile species.

Discussion and Recommendations

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). Amphibians and reptiles in Michigan live in a variety of community types with supporting habitat features. These animals are constrained by their physiology to occupy specific areas that provide these key features. When considering restoration, these habitat features and structures are critical for encouraging colonization and maintaining populations.

Basking structures – Areas where amphibians and reptiles can warm themselves to regulate their body temperature. Amphibians and reptiles can warm themselves on or under sun-exposed rocks and logs or in gaps in the vegetation canopy where the sun shines. It is equally

important that structurally diverse areas of vegetation and substrates that provide shade or cooler temperatures are adjacent to basking areas.

Hibernacula – Places to hibernate in the winter, typically a protected area. Depending on the species, a hibernaculum can range from a dry, abandoned mammal burrow, to a burrow under thick leaf litter on the forest floor, to a submerged substrate in a pond, lake, or stream.

Nesting and egg laying sites –Turtles and many snakes lay shelled eggs and typically require well-drained, moist soils on a south-facing slope for their nests. Frogs and most salamanders lay eggs submerged in water, often attached to branches or aquatic vegetation.

Stony Island

Erosion along the island shoreline has removed much of the emergent and submergent aquatic vegetation as well as large woody debris. These habitat components serve as basking sites, cover from predators and attachment sites for eggs, and are critical for many amphibians and reptiles. Historically the Detroit River supported large expanses of limestone with breaks and gaps which allowed Mudpuppies and several fish species to utilize the area. Restoring these offshore areas will improve opportunities for several species of fish and wildlife. Stony Island has potential for the addition of hibernacula and nesting structures (Photo 9). Clearing near shore areas of shrubby vegetation would create additional marsh habitat where these structures would be ideal (Photo 10). Created marsh would also benefit from adding woody debris. Dikes along Stony Island predominantly include large rocks and filling in these structures with smaller material would likely allow easier movement for turtles (Photos 11-12). Most of the aquatic and terrestrial habitats are dominated by invasive species, which are shifting the plant communities, shading nesting habitat, considerably altering the overall landscape , and decreasing the availability and function of the area for amphibians and reptiles. High nest predation in the region has been known to occur due in large

part to an overabundance of mesopredators, particularly raccoons. Population control and removal should be considered to lower predation risk, and is particularly effective on islands. Based on the known and potential herpetofauna species for Stony Island, historical review, and HRM's recent survey, the following recommendations are made:

- Providing basking logs to aid in thermoregulation of reptiles as well as provide structure and cover for snakes, turtles, fish, amphibian larvae, and aquatic macroinvertebrates.

- Place small multi-branched limbs in near shore habitat to provide adherence points for amphibian eggs and cover during mating. These structures also provide refugia for small fish, amphibians, young snakes, and turtles.

- Create terrestrial nesting areas both on the island and on surrounding shoals.

- Optimize the shoal to provide flat basking structures for reptiles. Provide small gravel and cobble in locations where potential nesting of turtles can be integrated to prevent turtles from being trapped.

- Create Mudpuppy refugia as well as breeding, nesting, and nursery sites.

- Remove invasive species with emphasis on *Phragmites* and control overpopulated mesopredators such as raccoons.

- Develop a management plan to maintain these areas, especially turtle nesting areas.

- Provide interpretative signage regarding the importance of healthy balanced ecosystems and the role that amphibians and reptiles play.

Celeron Island

Severe erosion has resulted in the loss of the protective beach that once connected the north and south islands. Exotic and invasive plants (both aquatic and terrestrial) dominate much of the landscape. Dense areas of *Phragmites* are present which restrict the movement of amphibians and reptiles between land and open water habitat, thus reducing their ability to optimally thermoregulate.

On Celeron Island nesting opportunities for turtles are absent. Creating sandy areas in conjunction with clearing areas of *Phragmites* will likely create suitable nesting habitat for turtles on the island. Based on the known and potential herpetofauna species for Celeron Island, historical review, and HRM's recent survey, the following recommendations are made:

- Providing basking logs to aid in thermoregulation of reptiles as well as provide structure and cover for snakes, turtles, fish, amphibian larvae, and aquatic macroinvertebrates.

- Place small multi-branched limbs in open water marsh located between the two islands to provide refugia for small fish, amphibians, and turtles. These structures also provide adherence points for amphibian eggs and cover during mating.

- Restore barrier beach connecting north and south portions of the island to reduce loss of wetland and increase turtle nesting and shorebird opportunities.

- Create nesting areas on island, shoals, and barrier beach. Optimize the shoal to provide flat structures for reptiles to bask. Provide small gravel and cobble in locations where potential nesting of turtles can be integrated to prevent turtles from being trapped.

- Create Mudpuppy refugia as well as breeding, nesting, and nursery sites.

- Remove invasive species with emphasis on *Phragmites* and control overpopulated mesopredators such as raccoons.

- Develop a management plan to maintain these areas, especially turtle nesting areas.

- Provide interpretative signage regarding the importance of healthy balanced ecosystems and the role that amphibians and reptiles play.

Conclusion

Stony and Celeron Islands historically supported diverse communities of amphibians and reptiles. Restoration efforts including the addition of critical habitat structures will likely improve current conditions of these sites, allowing them to once again sustain rich assemblages of herpetofauna and provide habitat for other various wildlife. The Detroit River Watershed does support some

uncommon and sensitive species and restoration in the area is essential to the long-term viability of the ecosystem. The Detroit River is listed as an Area of Concern (AOC) by the United States Environmental Protection Agency (EPA) and creating amphibian and reptile habitat on Stony and Celeron Islands will be valuable step toward the removal of the loss of fish and wildlife habitat beneficial use impairment (BUI).

Maps

Map 1. Herpetofauna habitat recommendations for Stony Island.

Map 2. Herpetofauna habitat recommendations for Celeron Island

Map 3. Historical and recent herpetofauna observations on Stony Island.

Map 4. Historical and recent herpetofauna observations on Celeron Island.

Tables

Table 1. Stony 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	Source	Observed May 20, 2014	Potential
Bullfrog	*Rana catesbeiana**				X
Eastern American Toad	*Bufo americanus americanus***	X	Herpetoloical Resource and Management (HRM)	X	
Green Frog	*Rana clamitans**				X
Gray Treefrog	*Hyla chrysoscelis/ versicolor*				X
Mudpuppy	*Necturus maculosus maculosus*	X	U.S. Fish and Wildlife Service		X
Butler's Garter Snake	*Thamnophis butleri*				X
Eastern Fox Snake	*Pantherophis gloydi*	X	HRM, Michigan Natural Features Inventory (MNFI)		X
Eastern Garter Snake	*Thamnophis sirtalis sirtalis*	X	HRM	X	
Northern Brown Snake	*Storeria dekayi dekayi*	X	HRM		X
Northern Water Snake	*Nerodia sipedon sipedon*	X	HRM		X
Eastern Spiny Softshell Turtle	*Apalone spinifera spinifera*				X
Eastern Snapping Turtle	*Chelydra serpentina serpentina*				X
Midland Painted Turtle	*Chrysemys picta marginata*				X
Musk Turtle	*Sternotherus odoratus*				X
Northern Map Turtle	*Graptemys geographica*	X	HRM		X

Table 2: 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	Source	Observed May 20, 2014	Potential
Bullfrog	*Rana catesbeiana**	X	HRM		
Eastern American Toad	*Bufo americanus americanus***	X	HRM	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	U.S. Fish and Wildlife Service, University of Michigan		X
Butler's Garter Snake	*Thamnophis butleri*				X
Eastern Fox Snake	*Pantherophis gloydi*	X	HRM, MNFI		X
Eastern Garter Snake	*Thamnophis sirtalis sirtalis*	X	HRM	X	
Northern Brown Snake	*Storeria dekayi dekayi*	X	HRM		X
Northern Water Snake	*Nerodia sipedon sipedon*	X	HRM		X
Eastern Spiny Softshell Turtle	*Apalone spinifera spinifera*				X
Eastern Snapping Turtle	*Chelydra serpentina serpentina*	X	HRM		X
Midland Painted Turtle	*Chrysemys picta marginata*	X	HRM		X
Musk Turtle	*Sternotherus odoratus*				X
Northern Map Turtle	*Graptemys geographica*	X	HRM	X	

Photos

Photo 1. Evidence of erosion on Celeron Island in the Detroit River

Photo 2. High water levels in the Detroit River causing erosion on Celeron Island and increased sediment loads in the river

Photo 3. HRM crew conducting a habitat assessment and herpetofauna survey through tall stands of *Phragmites* on Celeron Island

Photo 4. Interior wetland of Celeron Island dominated by *Phragmites* and turbid water.

Photo 5. Understory dominated by thimbleweed on Celeron Island

Photo 6. Understory dominated by garlic mustard on Stony Island

Photo 7. Great Blue Heron Rookery on Stony Island

Photo 8. Great Blue Heron Rookery on Stony Island

Photo 9. Potential upland site for addition of hibernacula and nesting structures on Stony Island

Photo 10. Shrub vegetation predominantly nonnative invasives located near the shoreline on Stony Island. Clearing of this area will likely improve the coastal marsh habitat

Photo 11. Dikes with riprap on Stony Island which can serve as a trap for turtles who come on land.

Photo 12. Large rocks along riprap dikes on Stony Island. Filling in portions of these dikes with smaller gravel and cobble will facilitate easier movement of herpetofauna including turtles.

Photo 13. Eastern Garter Snake observed on Stony Island.

Photo 14. Eastern American Toad observed on Stony Island.

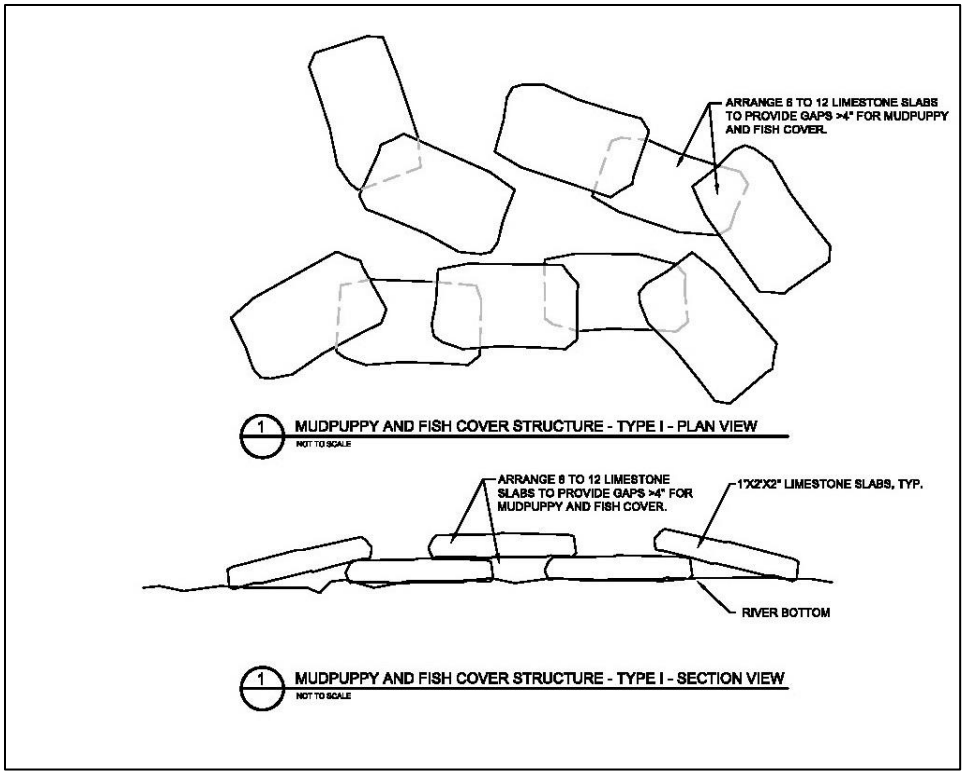

Photo 15. HRM design depicting large, flat limestone structures that can provide optimal habitat for Mudpuppy as well as cover for multiple fish species.

Photo 16. Rock habitat structures such as these can serve as nurseries for young Mudpuppies, but also as refugia for adults.

Photo 17. Northern Map Turtles basking on a fallen log. Adding structures such as this to Stony and Celeron Islands is recommended as basking sites are often a limiting factor for aquatic turtles.

Photo 18. Large felled trees placed along shoreline habitat can provide opportunities for basking. Multi-branched limbs serve as adherence points for amphibian eggs and cover during mating as well as refugia for small fish, amphibians, young snakes, and turtles.

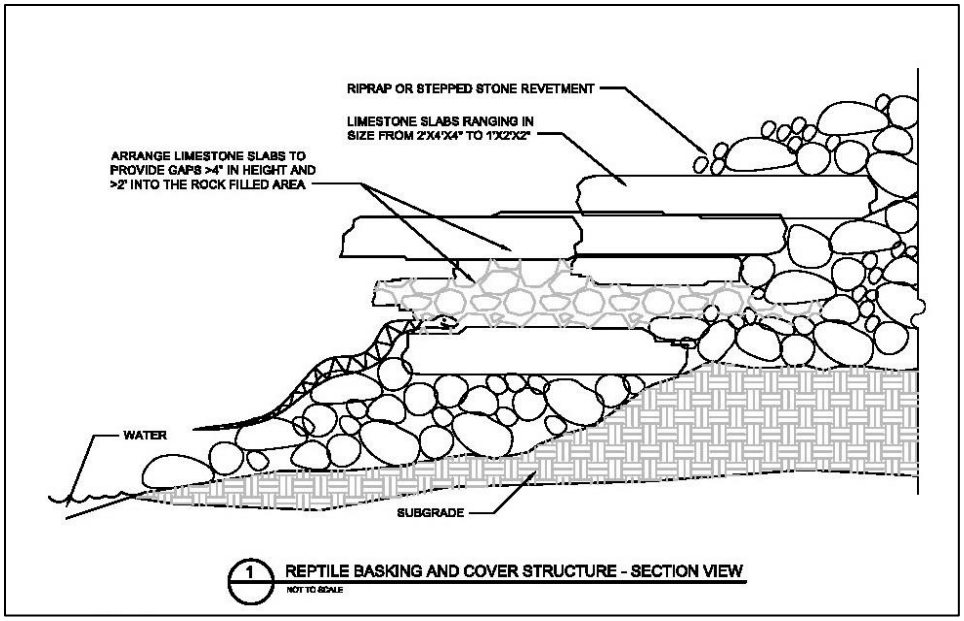

Photo 19. HRM design depicting reptile basking and cover structures.

Photo 20. Large flat rocks incorporated into shoreline restoration not only reduce erosion but also provide critical basking habitat for reptiles.

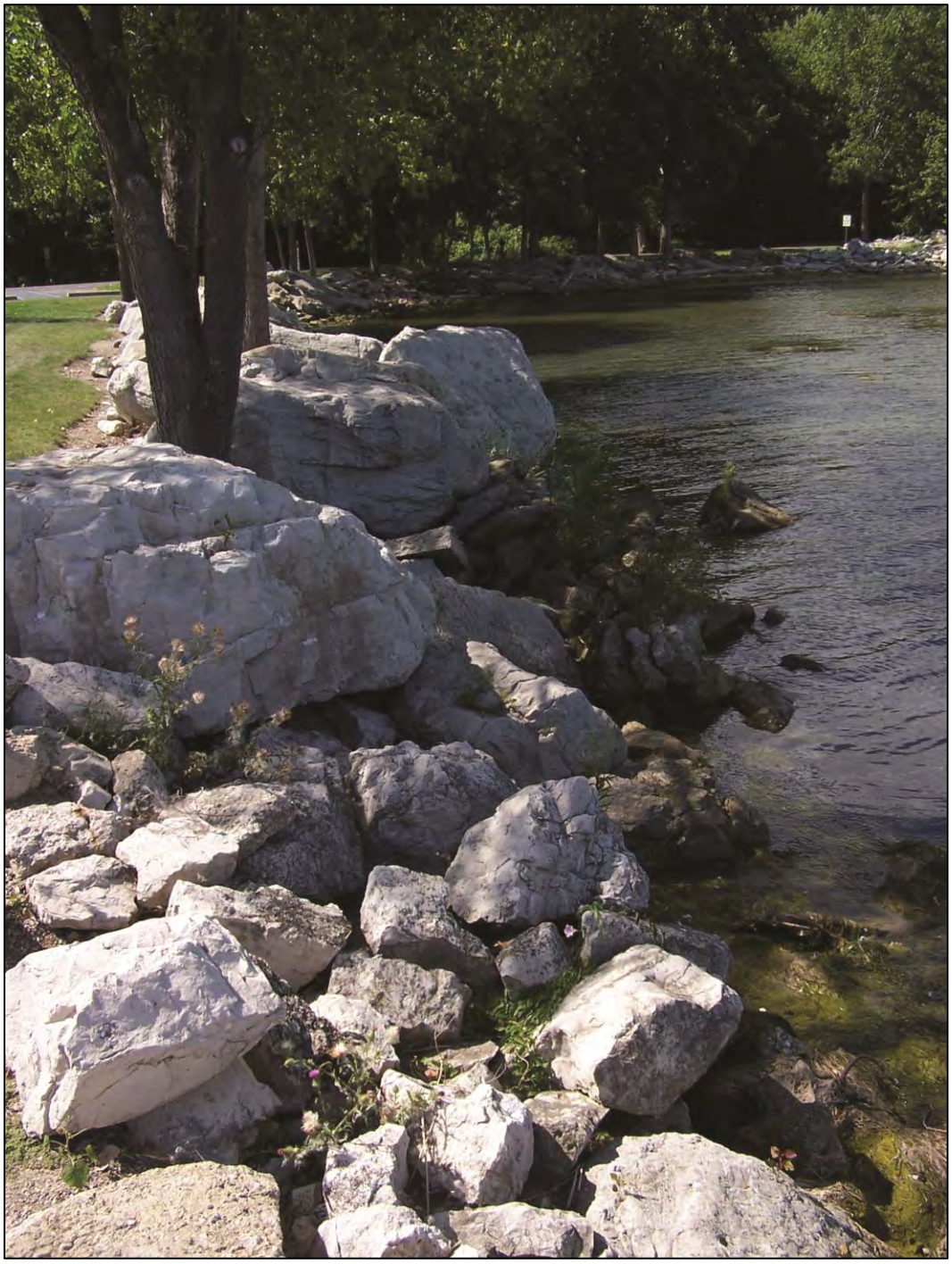

Photo 20. Natural stone riprap shorelines can provide protection from erosion as well as critical basking and refugia habitat for reptiles and other wildlife species.

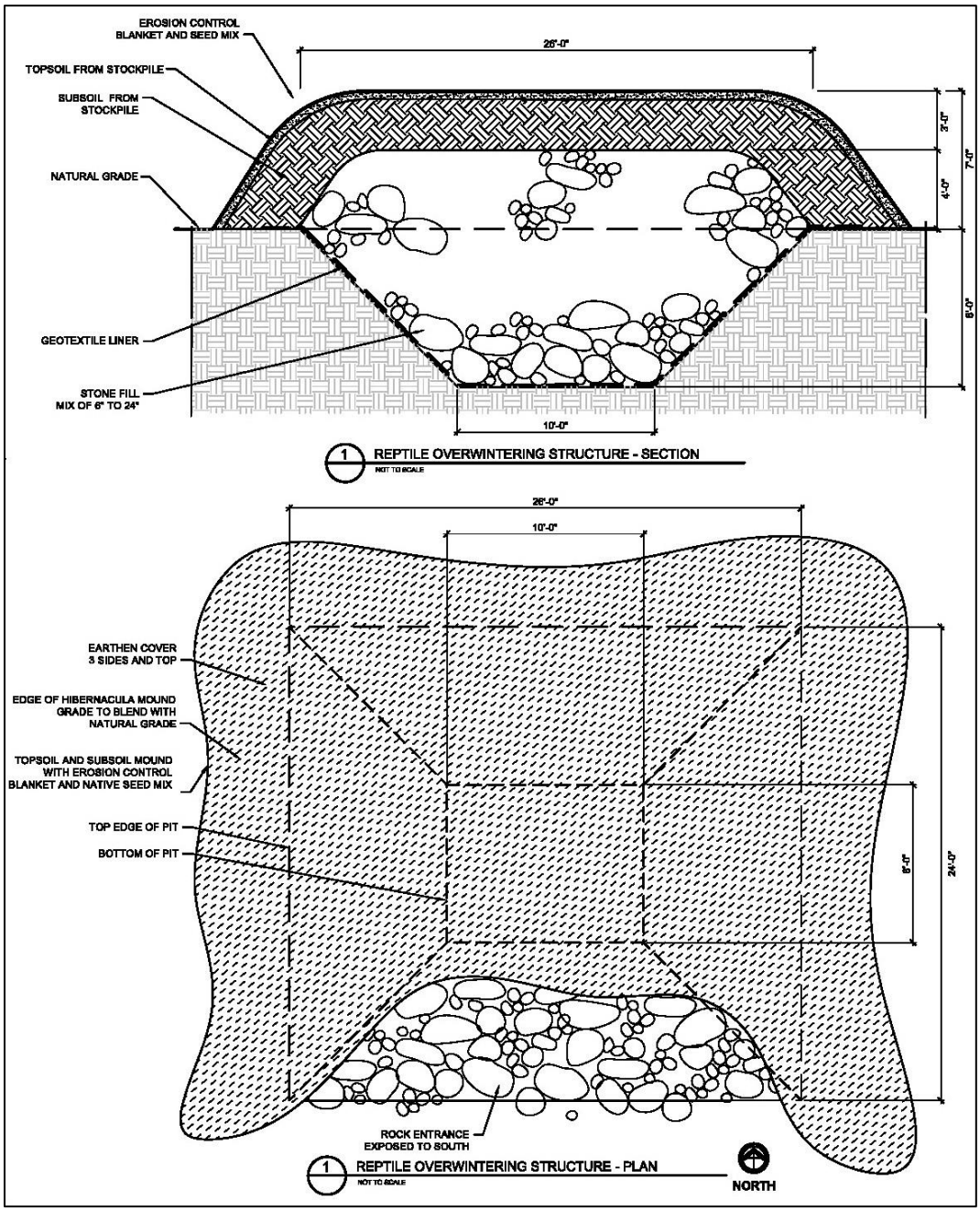

Photo 21. HRM design depicting a hibernaculum structure.

Photo 22. Hibernacula such as this one that is under construction can be created using simple materials such as logs and riprap.

Photo 23. Once completed, hibernacula provide critical overwintering habitat as well as refugia for throughout the year.

Appendix

Herpetofaunal Species Profiles

Mudpuppy

Mudpuppies are large, entirely aquatic salamanders. They are easily recognized by their large size (up to 1.5 feet long) and large external gills just behind the head (Harding 1997). Small Mudpuppies might resemble the larvae of other salamanders, but have only four toes on each foot instead of five. In Southeast Michigan, this species is the only amphibian which normally inhabits the open water of large lakes and rivers, spending most of its time hiding under flat rocks. They are highly carnivorous and are often caught by fishermen, even in winter. Because of their unique appearance and unjustified reputation as predators of game fish, they are often killed when captured, even though they are harmless. Mudpuppies breed in fall, entering shallow water as the temperatures cool, but do not nest until the following spring. Females require moderately shallow water with plenty of large, flat rocks on the bottom beneath which they can deposit their eggs. Mudpuppies are the obligate host species for the larvae of the Salamander Mussel (*Simpsonaias ambigua*), a State Endangered species (Michigan Natural Feature Inventory 2010).

Eastern Spiny Softshell Turtle

This large species is easily identified by its smooth shell and long, pig-like nose. They occur in rivers, large lakes, and impoundments throughout southern portions of the Lower Peninsula where sandy or muddy bottoms are preferred. Although this species will bask, much of the time they remain buried in shallow substrate where their characteristic snorkel-like nose and long neck are used to obtain oxygen which they can also absorb through cloacal and throat linings. Males are much smaller than females and typically reach maturity between 5 to 9 inches, while females can grow as large as 19 inches. This species consumes aquatic insects, snails, amphibians, and fish

although crayfish are reported to be a favorite food item. Populations of this species have declined or become extirpated in some parts of Michigan due to water pollution as well as heavy exploitation by humans (Harding and Holman 1990).

Northern Water Snake

This species inhabits the edges of permanent wetlands or riparian zones of rivers, where it hunts small fish and amphibians, keeping prey populations healthy by culling the sick and weak. This species has been documented repeatedly feeding on the invasive Round Goby, making them a potentially important species in the control of this exotic fish that competes with native fisheries. Recognized by its pattern of dark blotches and saddles on a gray background, this species is often assumed to be a water moccasin (a venomous species not found in Michigan) and thus is killed. It is also wrongfully accused of impacting game fish populations. When disturbed, Water Snakes flee to the water and dive to the bottom. Females give birth to dozens of live young in late summer (Harding 1997).

Butler's Garter Snake

This species, which is less common than the Eastern Garter Snake, can be identified by the stout body and small head that is barely wider than the neck as well as distinct yellow or orange stripes on a dark black, brown, or olive-brown background. This species prefers to inhabit wet meadows and prairies, lake edges, and other moist grassy places. Large populations are also known to occur in vacant urban lots containing patches of vegetation as well as riprap structures along the shore lines of large water bodies. The most common prey item of this snake is earthworms; however, they will also consume leeches and small amphibians. Females give birth to 4 to 20 live young in late July or August (Harding 1997).

Eastern Fox Snake

Eastern Fox Snakes have a small range restricted to areas along and adjacent to the shores of Lake Huron and Lake Erie (Harding 1997). They are a State Threatened species in Michigan (Michigan Natural Feature Inventory 2010), and are listed as Endangered in Canada. A large species, Fox Snakes require grassland habitat that is rarely mowed or burned, and often prefer to shelter and overwinter in adjacent riprap or similar habitat. Although they spend much of their time in uplands feeding on small mammals, they are very strong swimmers, and it is not uncommon for them to use waterways to travel significant distances. Despite their size, these snakes are often preyed upon by large raptors and medium-sized mammals. In the fall, Fox Snakes enter hibernacula, which sometimes include communal sites, and do not emerge until mid-April or May. Breeding occurs in spring, and eggs are laid in June or July, hatching about two months later. Fox Snakes are often senselessly killed because they are mistaken for Copperheads (*Agkistrodon contortrix*, a U.S. species not present in Michigan), because of the orange head, or rattlesnakes because they will vibrate their tail against dry vegetation when threatened, producing a loud buzz.

Northern Map Turtle

Named for the complex pattern of lines on the shell the Northern Map Turtles are typically found in flowing water, and can be seen basking high on logs only to jump in at the slightest threat. Males and females are dramatically different in size at maturity, with males reaching six inches and females growing to more than ten inches. While this is primarily to allow the females to carry large clutches of eggs, it has resulted in other differences. Males feed on insects while females use their enlarged jaws to crush snails, clams, and mollusks such as zebra mussels This occurs in habitats with good water quality which support a diverse assemblage of invertebrates. Females take at least ten years to reach maturity, while males can reach maturity in as little as three (Harding 1997).

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