Ecological Surveys and Assessments to Facilitate Restoration Activities at the Salt River Marsh: Early Season Field Component

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Introduction

The Salt River and associated wetlands in Macomb County have been degraded by sedimentation and nutrient loading from non-point source pollution and encroachment by invasive common reed (*Phragmites australis*). The Salt River is connected to Lake St. Clair and riparian wetlands provide a variety of important services, including flood water retention, water quality maintenance, fish and wildlife habitat, and recreational opportunities. The U.S. Army Corps of Engineers along with several other partners, including the U.S. Environmental Protection Agency (U.S. EPA), Michigan Department of Environment Great Lakes and Energy (EGLE), and the Michigan Department of Natural Resources, has developed plans to restore portions of the Salt River Marsh occurring on State lands. Restoration is to be accomplished through excavation of sediments deposited within the marsh, as well as mats of common reed. The aim of restoration activities is to improve plant community composition and structure, and fish and wildlife habitat value.

Michigan Natural Features Inventory (MNFI) performed ecological survey work to describe baseline conditions within the project area. An understanding of the current conditions is needed to facilitate the permit application process, which is required for restoration implementation and to allow for future assessments of the success of restoration activities. MNFI performed early season field work, including herpetological surveys and the early season field visit for the habitat area delineation and characterization (community survey). This report describes the methods and preliminary results of the early season field work. An additional work plan and report will cover the late season field visit for the community surveys, field work for a stream assessment and macroinvertebrate survey, and a detailed report of methods and results for the herpetological, community, and stream surveys.

Methods

Herpetological Survey

Herpetological surveys were conducted to document presence of target herpetofaunal species, including rare, threatened, and endangered (RTE) species, and/or suitable habitat for these species within the project area. These include a state-listed snake species (i.e., *Pantherophis gloydi,* Eastern Fox Snake) that has been documented historically within five miles of the project area (Michigan Natural Features Inventory 2019), and six additional RTE species (i.e., *Necturus maculosus*, Mudpuppy; *Acris blanchardi*, Blanchard's Cricket Frog; *Rana palustris*, Pickerel Frog; *Clemmys guttata*, Spotted Turtle; *Emydoidea blandingii*, Blanding's Turtle; and *Regina septemvittata*, Queen Snake). We utilized area-constrained visual encounter surveys, auditory surveys, basking surveys, aquatic funnel trapping surveys, and limited artificial cover surveys (Figures 1 and 2) (Graeter et al. 2013) to survey for target amphibian and reptile species that have potential to occur within or immediately adjacent to the project area. Surveys were conducted from June 30 to July 14, 2019, with an additional site visit on June 8. Visual encounter, auditory, basking, andaquatic funnel trapping surveys were conducted in all three emergent marsh stands (stands 4, 7, 10) (Figures 3 and 4). Visual encounter, auditory, and artificial cover surveys were conducted in two of the three forested stands (stands 5, 8) (Figures 3 and 4). Sections of the Salt River (stands 1, 2, southern end of 3) also were visually inspected and surveyed on July 14 (Figures 3 and 4).

Habitat Area Delineation and Characterization (Community Survey)

We targeted six habitat stands (4-5, 7-10 in Figure 3) within which to conduct natural community and rare, threatened and endangered (RTE) plant species surveys. Within each stand, we conducted a floristic survey and characterized natural communities using composition, structure, and edaphic characteristics. Five State-listed plant species were detected in the MNFI Natural Heritage Database (Michigan Natural Features Inventory 2019) within five miles of (*Asclepias sullivantii*, Sullivant's milkweed; *Cardamina maxima*, large toothwort; *Carex lupuliformis*, false hop sedge; *Fraxinus profunda*, pumpkin ash; *Quercus shumardii*, Shumard's oak). With the

exception of *A. sullivantii*, for which suitable lakeplain prairie habitat is unlikely to exist within the project area, surveys were timed to detect and identify these species.

The early summer survey occurred during a single site visit on 25 June 2019. We conducted floristic surveys, generating a list of vascular plant species for each stand, using a modified timed meander search (TMS) procedure (Goff et al. 1982). The TMS procedure is used to develop a species accumulation curve to assess the completeness of surveys. The plant species observed within each habitat area were recorded on a field data sheet as they were encountered, using a randomly-patterned meandering route to allow for maximum coverage of variation within each habitat unit. The route at a particular habitat stand was complete when no new species were encountered with additional search efforts (best professional judgment was exercised in this case). Unknown species were collected and identified at a later time. Locations of collections were recorded with a GPS. Nomenclature followed Voss and Reznicek (2012) and were cross-checked for updates on the Michigan Flora webpage (Michigan Flora 2019). We also recorded data on the composition and structure of habitat stands, including the percent cover (within the following ranges: 0-10%, 10-25%, 25-50%, 50-75%, 75-90%, 90-100%) and dominant species within each vertical strata: Tree canopy (if present), subcanopy (if present), and ground layer vegetation.

Results

Herpetological Survey

Herpetological surveys within the project area have primarily been completed. Three visual encounter surveys, two auditory surveys, four nights of aquatic funnel trapping, and three artificial cover survey visits have been conducted. Basking surveys were conducted during visual encounter surveys and an additional basking survey was conducted along Salt River. An additional visual encounter survey and survey to check artificial cover objects will be conducted in early fall.

Herpetological surveys conducted to date within the Salt River Marsh project area have documented five common amphibian and reptile species (Table 1). These species were documented during visual encounter, auditory, and aquatic funnel trapping surveys (Table 1). Eastern American toads (*Bufo* [*Anaxyrus*] *americanus americanus*) were observed during visual encounter surveys in forest stands 5 and 8. Green frogs (*Rana clamitans melanota*) were the most common frog species observed in the project area and were documented in all three emergent marsh stands during visual encounter surveys, aquatic funnel trapping, and/or auditory surveys (heard at all survey locations). Eastern gray treefrogs (*Hyla versicolor*) were only documented during auditory surveys from two locations in stand 10 in the eastern portion of the marsh. Forty-five painted turtles (*Chrysemys picta*) and 12 eastern snapping turtles (*Chelydra serpentina serpentina*) were captured during aquatic funnel trapping in emergent stands 7 and 10, with only two recaptures and individuals of multiple sizes and age classes documented (Figure 5-7). Painted turtles also were observed in forest stand 8 during a visual encounter survey and in emergent marsh stand 10 during a basking survey.

No rare, threatened, or endangered amphibian or reptile species have been documented during herpetological surveys in 2019. Suitable wetland habitat for eastern fox snakes and Blanding's turtle appears to be available within the project area but potential for these species to occur in the project area may be fairly low given the limited habitat, landscape context and lack of available or suitable habitat surrounding the project area. Suitable habitat for mudpuppies may be available in the Salt River but this species was not targeted for surveys in 2019. Suitable habitat for Blanchard's cricket frog, pickerel frog, spotted turtle, and queen snake did not appear to be currently available or were so limited that these species likely have low potential for occurring within the project area. Complete and detailed results and discussion will be provided in the final report for late season surveys.

Habitat Area Delineation and Characterization (Community Survey)

We conducted surveys in four of the six targeted habitat stands on 25 June 2019. Lake levels in the Great Lakes and associated water bodies were at historical highs, including in Lake St. Clair (National Oceanic and Atmospheric Administration 2019). Combined with recent precipitation, this resulted in limited access to wetland areas. We conducted no surveys in one wetland and one upland area (habitat stands, 10 and 9, respectively in Figure 3). We will report species accumulation curves, complete species lists, and community descriptions with the final report for late season surveys.

We completed community surveys in stands 4, 5, 7, and 8 (Table 2). We conducted limited surveys in two wetland areas, accessing only the margins of the stands. Stand 4 was very flooded and we recorded only 10 species. It was heavily dominated by cattails (*Typha* spp.) and the invasive common reed (*Phragmites australis* subspp. *australis*), so we do not expect to document many additional species during subsequent surveys (Figure 8). We recorded 35 species in Stand 7. This stand was characterized by a less-flooded margin of sedge meadow, dominated by native blue-joint grass (*Calamagrostis candensis*) and tussock sedge (*Carex stricta*) (Figure 9), although cattails and common reed were abundant in most of this stand. Recent attempts to control common reed appear to have also affected large swaths of native vegetation, including blue-joint grass and tussock sedge. We recorded 83 plant species in Stand 5. This upland stand, in so far as the soils are mineral in origin and not noticeably saturated, was originally mapped as dry-mesic southern forest. After this visit, it was tentatively classified as a southern hardwood swamp as indicated by a canopy of silver maple (*Acer saccharinum*) and cottonwood (*Populus deltoides*). Oak leaf litter was common, however, no oak species were noted in the canopy. The understory was dominated by invasive shrubs common privet (*Ligustrum vulgare*) and Asiatic bittersweet (*Celastrus orbiculatus*). This stand is very accessible from the adjacent neighborhood, and we noted several leaf piles and other signs of recent anthropogenic disturbance. We documented 91 species in Stand 8. This stand was dominated by black oak (*Quercus velutina*) and wild black cherry (*Prunus serotina*), common dominants of early-successional dry-mesic southern forest. Patches of the subcanopy were dominated by hawthorne (*Cratageus crus gallii*), while others were dominated by gray dogwood (*Cornus foemina*) or staghorn sumac (*Rhus typhina*). Several ground layer species were observed, but the most common was roseate sedge (*Carex rosea*). No rare, threatened, or endangered plant species were observed during surveys. Suitable habitat exists for all target RTE plant species, but given the extent of anthropogenic disturbance and invasive species, the probability of encountering RTE plant species is low.

Figure 1. An example of aquatic funnel trap placement used during herpetological surveys. Photo by Yu Man Lee

Figure 2. An example of artificial cover placement used during herpetological surveys. Photo by Yu Man Lee

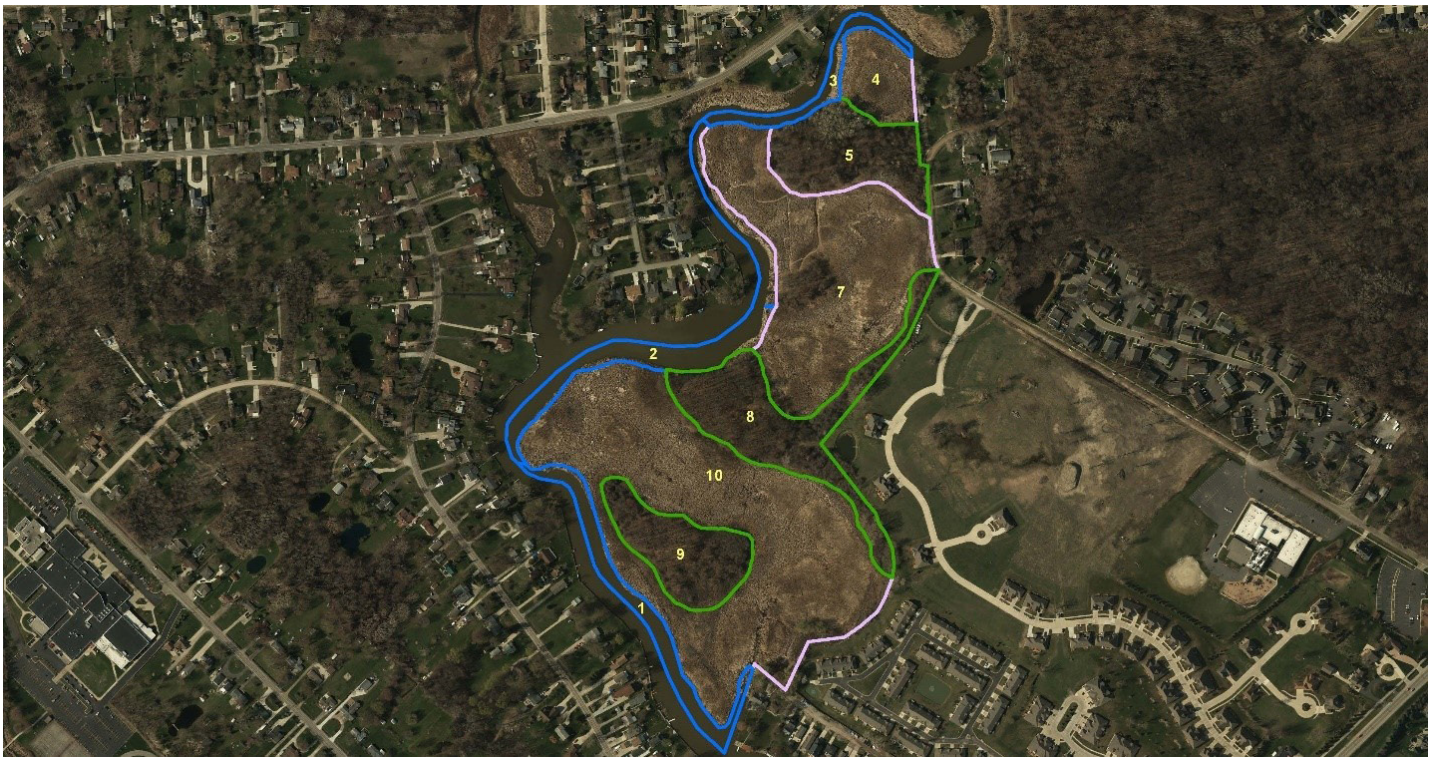

Figure 3. Habitat stands. Both dry-mesic southern forest (Stands 5,8,9) and emergent marsh (4,7,10) stands were targeted during community surveys. Stretches of Salt River (Stands 1-3) were not targeted during community surveys.

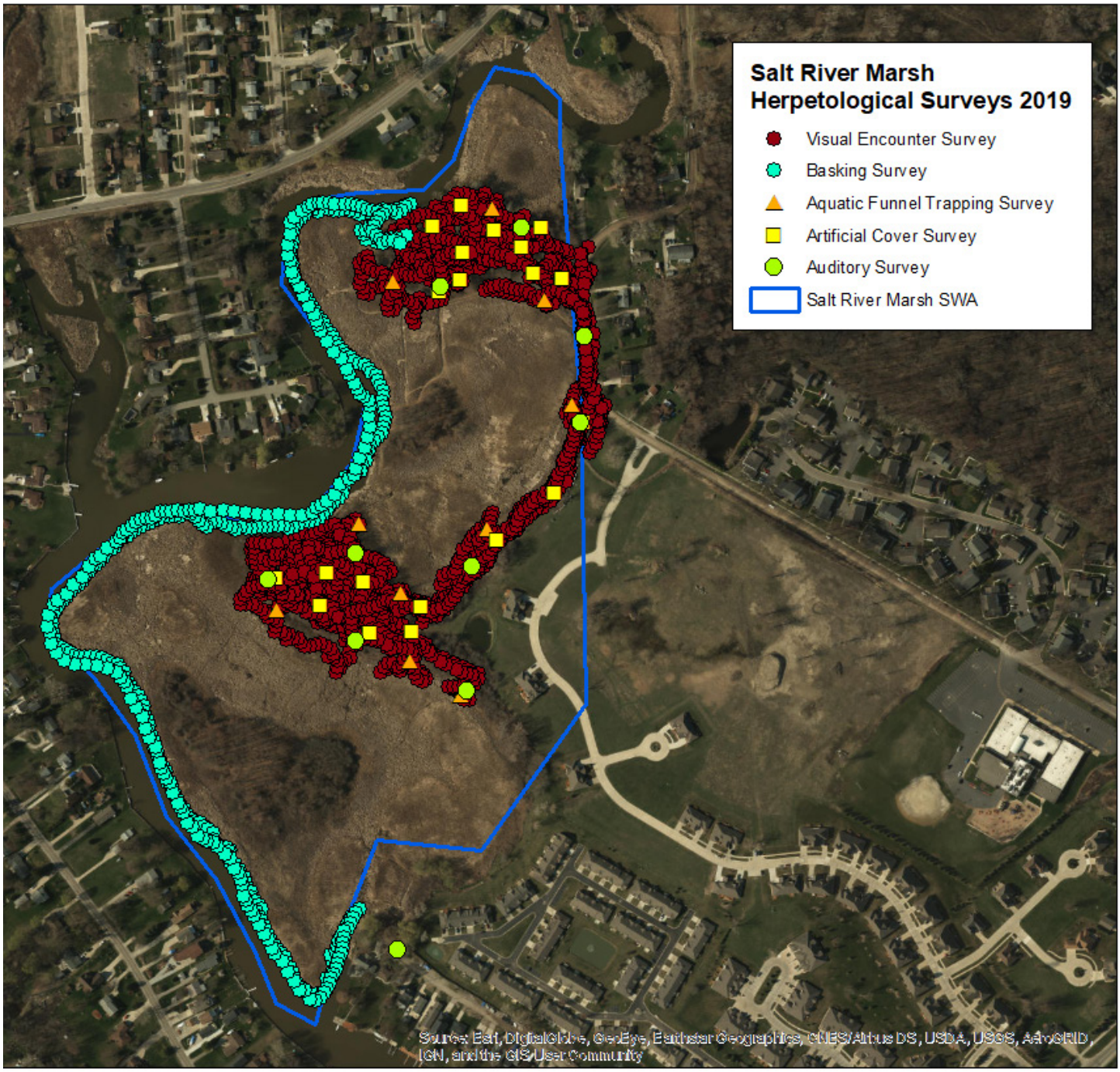

Figure 4. Herpetological survey effort.

Table 1. Summary of species observed during herpetological surveys conducted within the Salt River Marsh project area in 2019.

Common Name	Scientific Name	Survey Method(s) that Documented Species[1]	Stand(s) in which Species Observed
Eastern American Toad	*Bufo [Anaxyrus] americanus americanus*	V	5, 8
Green Frog	*Rana clamitans melanota*	V, A, T	4, 5, 7, 10
Eastern Gray Treefrog	*Hyla versicolor*	A	10
Painted Turtle	*Chrysemys picta*	T, V	7, 8, 10
Eastern Snapping Turtle	*Chelydra serpentina serpentina*	T	7, 10

[1]Survey methods: V = Visual encounter surveys; A = Auditory surveys; T = Aquatic funnel trapping surveys.

Figure 5. Painted turtle (*Chrysemys picta*) hatchling. Photo by Yu Man Lee.

Figure 6. Painted turtle (*Chrysemys picta*) sub-adult female. Photo by Yu Man Lee.

Figure 7. Eastern snapping turtle (*Chelydra serpentina serpentina*). Photo by Yu Man Lee.

Table 2. Preliminary results from early season community surveys in stand 4, 5, 7, and 8.

Habitat Stand	Start.Lat	Start.Long	End.Lat	End.Long	Community	Number of species observed	Canopy dominants
4	42.66775	82.77714	42.66775	82.77714	Emergent Marsh	10	-
5	42.6671	82.77725	42.66751	82.77835	Southern hardwood swamp	83	Silver maple (*Acer saccharinum*) Cottonwood (*Populus deltoides*)
7	42.6678	82.77898	42.66561	82.77681	Emergent Marsh	35	-
8	42.66561	82.77681	42.66475	82.78008	Dry-Mesic Southern Forest	91	Black oak (*Quercus velutina*) Wild black cherry (*Prunus serotina*)

Table 2. continued...

Habitat Stand	Subcanopy dominants	Ground layer dominants
4	-	Cattails (*Typha* spp.) Common Reed (*Phragmites australis*)
5	Common privet (*Ligustrum vulgare*) Asiatic bittersweet (*Celastrus orbiculatus*)	Japanese honeysuckle (*Lonicera japonica*) Swamp agrimony (*Agrimonia parviflora*) Path rush (*Juncus tenuis*)
7	-	Common Reed (*Phragmites australis*) Blue-joint grass (*Calamagrostis canadensis*) Tussock sedge (*Carex stricta*)
8	Hawthorne (*Crataegus* spp.) Gray dogwood (*Cornus foemina*) Staghorn sumac (*Rhus typhina*)	Roseate sedge (*Carex rosea*)

Figure 8. Stand four, flooded and dominated by cattails (*Typha* spp.) and the invasive common reed (*Phragmites australis* subspp. *australis*). Photo by Tyler Bassett.

Figure 9. Stand seven, margin of sedge meadow, dominated by native blue-joint grass (*Calamagrostis canadensis*) and tussock sedge (*Carex stricta*). Photo by Tyler Bassett.

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