**Technical Memorandum**

**Post-construction Vegetation Monitoring and Invasive Species Treatment for the Lakeview III Wetland Enhancement Project (2024)**

Prepared by WSP USA for Audubon Great Lakes/National Audubon Society

July 2024

# 1 Introduction/Background

Audubon Great Lakes/National Audubon Society (Audubon) and Lakeview III Wetland Enhancement Project (Enhancement Project) partners, such as the Great Lakes Commission and Ducks Unlimited (DU), received funding through the National Oceanic and Atmospheric Administration (NOAA)/Great Lake Regional Partnership to restore approximately 180 acres of freshwater coastal wetlands within the Lakeview Wildlife Management Area (WMA) in Jefferson County, New York (see Figure 1). The Lakeview WMA is 3,461 acres and supports a variety of habitats including wetlands, fields, shrubland, woodlands, and a natural barrier beach. The WMA supports wildlife habitat management and wildlife-related recreation including hiking, paddling, fishing, birdwatching, hunting, and trapping. The WMA has over 3 miles of trails, four canoe and kayak launches, two viewing platforms, and an observation tower (NYSDEC 2023).

Cattail species is the primary vegetation cover within the Enhancement Project site's emergent wetland habitat (*Typha* spp.), which occurs as large, dense stands. There is localized variation in plant species including scattered and occasional trees, shrubs, and herbaceous plants other than cattail. In 2024 a few distinct areas continue to contain the invasive species common reed (*Phragmites australis*; Phragmites; see Figure 1). The Enhancement Project was designed to increase the diversity, function, and ecological productivity of the Lakeview WMA by creating and expanding channels within the marsh system, expanding existing open water areas, and creating new potholes. While the areas outside the construction areas remain predominantly emergent cattail marsh, this restoration effort successfully enhanced and created open water habitat and increased connectivity through the process of "channeling and potholing." This effort aimed to improve spawning and nursery habitat for northern pike and other fish. Seven potholes with associated channels were expanded or created according to the drawings prepared by DU. Habitat mounds were created in the periphery of the expanded or created potholes from spoils of the pothole excavations (see Figure 2).

WSP USA, Inc. (WSP) was tasked with sampling and monitoring both the baseline (e.g., pre-Project) and post-construction conditions within the Project Area. The Project Area is defined in the design drawings prepared by DU. The Enhancement Project also involved the treatment of invasive Phragmites at the Lakeview WMA in 2023. This memo summarizes the 2024 post-construction vegetation sampling and anticipated Phragmites control efforts.

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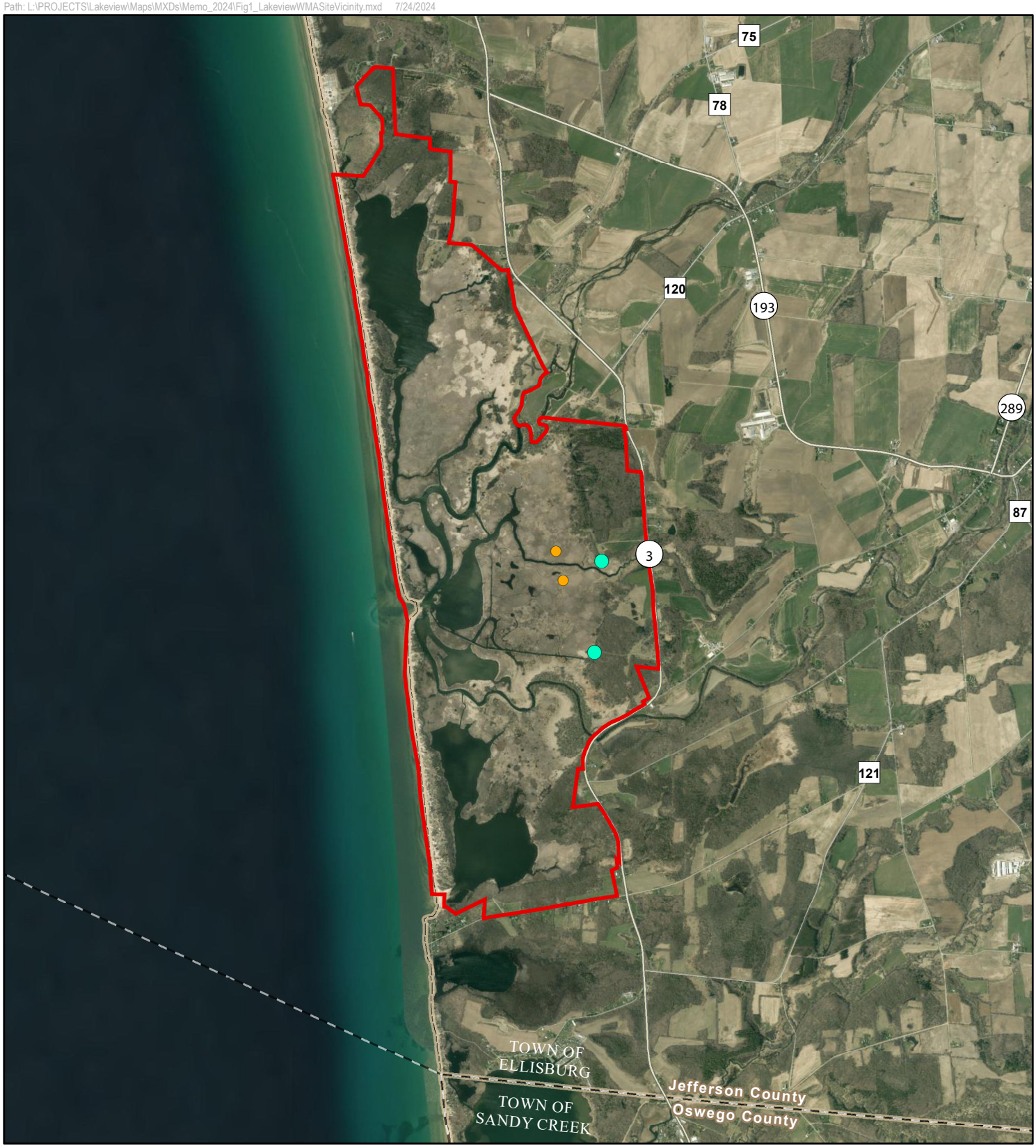



Kayak Access
Phragmites Observed in 2024
State Route
County Road
Lakeview WMA Boundary

0 1 2 Miles

**DATA SOURCES:**
ESRI 2021; WSP 2024.

Figure 1
**Lakeview Wildlife Management Area and Vicinity**
Lakeview III Wetland Enhancement Project
Ellisburg, Jefferson County, NY

# 2 Vegetation Monitoring: Purpose and Overview

The first year of vegetation sampling was conducted in 2023 prior to the construction of the Enhancement Project, and the second year of sampling was conducted in 2024 after construction of the Enhancement Project. The 2024 sampling focused on the created and expanded potholes and the areas surrounding the potholes. The vegetation surveys were conducted to:

- Characterize the baseline (pre-construction) vegetation community composition in the Project Area targeted for pothole expansion/creation;
- Determine the potential for rare or protected vegetation species to be impacted by the Enhancement Project; and
- Identify changes in post-construction vegetation community composition.

The 2023 pre-construction monitoring effort occurred on July 31 and August 1 and 2, 2023 (WSP 2023). The 2024 post-construction survey took place on June 26 and 27, 2024. Both monitoring efforts occurred during the height of the growing season (i.e., between late June and early August). Both quantitative and qualitative methods were used to complete the surveys across the Project Area, including transect- and meander-based surveys, with purposeful biasing to where the Enhancement Project design indicated construction to occur and to specifically sample areas that could contain plant species other than cattail and Phragmites. The combination of survey methods used within the construction areas provided useful summary information on species composition and, therefore, a Project Area-wide assessment. The monitoring of native vegetation communities has contributed to the initial documentation of changes in habitat structure by the Enhancement Project and the potential change in the use of the Project Area by wildlife.

# 3 Sampling Methods

For the 2023 pre-construction monitoring, two wetland biologists used kayaks to traverse larger channels and reach the closest accessible points to each of the seven pothole areas in the Project Area. From there, the survey team walked to each designed pothole area. For the 2024 post-construction monitoring, the channels that were created as part of the Enhancement Project permitted the biologists to kayak directly to each sampling area. As anticipated in 2023, sampled areas required adjustments in 2024 to meet the similarity of sampling equivalence in post-construction conditions.

## 3.1 Transect Surveys

Vegetation transect sampling focused on species identification, percent cover, and abundance of all vegetation species encountered. For the 2023 pre-construction monitoring, WSP established two transects for each of the seven pothole areas, totaling 14 transects for the Project Area pre-construction (see Figure 2). For each pothole area, one transect was placed within the area to be excavated (transects P1 through P7), and one transect was placed across a proposed habitat mound (spoils from the pothole excavation) in the periphery (transects M1 through M7). During the 2024 post-construction monitoring, the habitat mound transects (M1 through M7) were revisited and sampled. WSP also checked each pothole transect (P1 through P7), but after construction, those areas became deeper, open water with virtually no emergent vegetation present at this relatively early juncture. To provide more meaningful monitoring data, a second mound transect (S1 through

S7) was established in a previously unsampled habitat mound around each pothole (see Figure 2). As such, 14 transects were sampled in 2024, including seven that were sampled in 2023.

Each transect was 50 feet in length. A 3-foot by 1.5-foot quadrat was placed at 10-foot intervals along each transect beginning at the transect's starting point. Six quadrats were collected along each transect (alternating between the right and left sides of the transect line). Each plant species within the sample quadrat was identified and a percent cover (1% to 100%) was visually estimated and recorded.

Relative abundance across the sample quadrats was calculated as the total cover across all sample quadrats, weighted against the percent cover of other plant species recorded. Species frequency was calculated as the percentage of the total sample quadrats in which a given species was detected. The relative abundance of different wetland plant indicator categories observed for each transect (e.g., obligate [OBL], facultative [FAC], and upland species) was also recorded.

## 3.2 Meander Surveys

Meander surveys were conducted as a method for rapidly assessing species composition within given areas. These surveys would improve chances of identifying species distributed in localized patches or distributed across an area but in low numbers (e.g., rare to uncommon in frequency). This method supplemented the transect-quadrat approach by covering more lateral areas potentially containing microhabitats, including areas of slightly higher or lower surface elevations. Qualitative meander surveys maximize the area covered within each pothole area.

One of the two field biologists conducted each meander survey for a duration of 15 minutes. Meander survey locations did not overlap with any sample transects. In 2023 and 2024, two meander surveys were completed for each of the seven pothole areas totaling 14 meander surveys each year. For the 2023 pre-construction monitoring, WSP conducted one meander survey in each of the seven excavation areas and seven meander surveys in the habitat mound areas (see Figure 2).

For the 2024 post-construction monitoring, seven of the 14 meander surveys completed in 2023 were conducted in the same areas in 2024, specifically the meander surveys in habitat mound areas. However, there was little utility in conducting meander surveys within the seven pothole meander areas, as these areas were now deeper, open water with virtually no emergent vegetation present. A control meander area was established in the undisturbed area adjacent to each habitat mound meander area (see Figure 2). The control meander areas may be useful in any future vegetation monitoring efforts to compare the vegetation composition that develops within the habitat mounds with adjacent areas outside of the Project footprint. One of the meander areas that was anticipated to be a habitat mound was outside the perimeter of the actual habitat mound in post-construction conditions; this meander area was surveyed in 2024 as a control meander area and renamed to Meander CM3 (see Figure 2). Otherwise, the boundaries of each pothole and habitat mound area generally aligned well with the Enhancement Project design.

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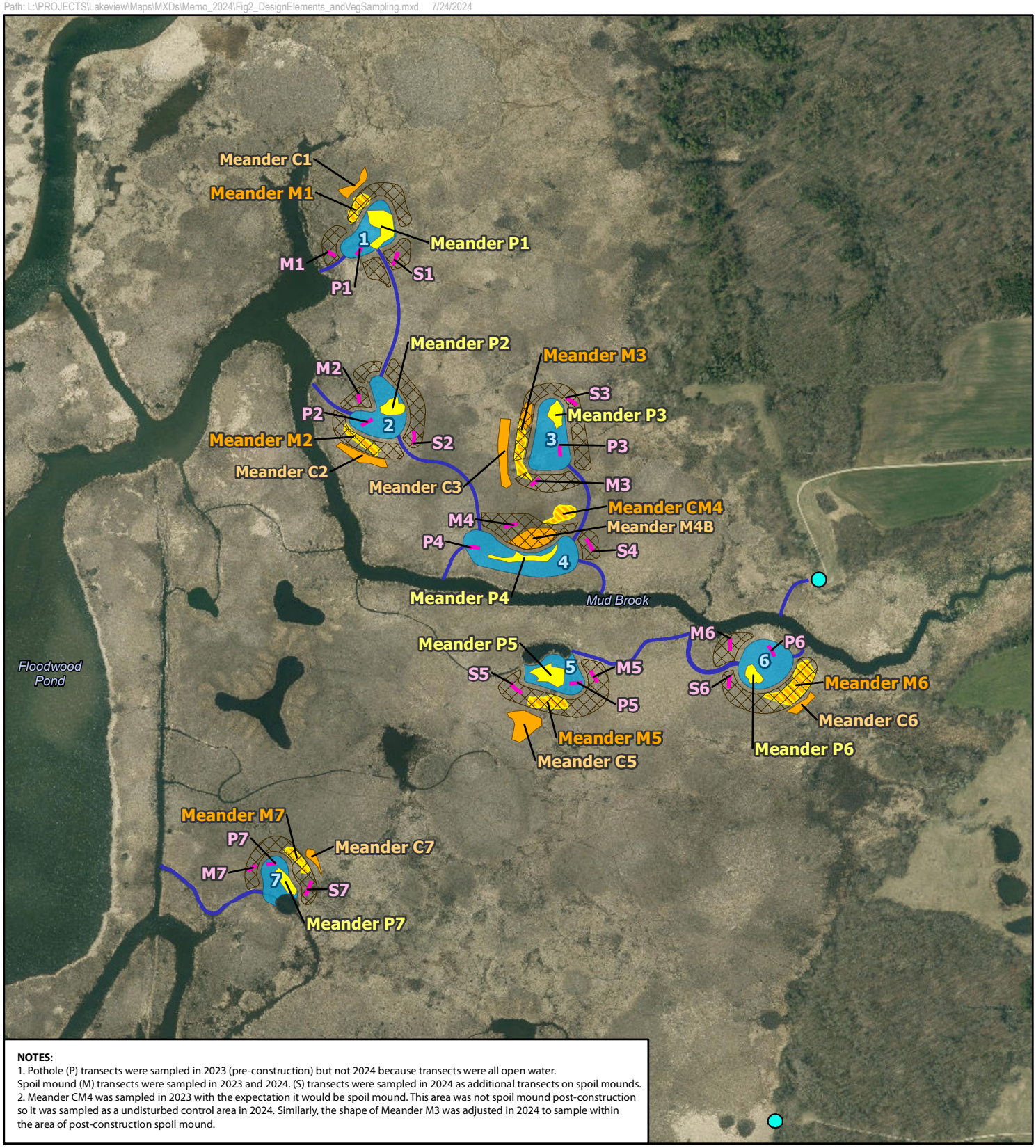


**NOTES**:
1. Pothole (P) transects were sampled in 2023 (pre-construction) but not 2024 because transects were all open water.
Spoil mound (M) transects were sampled in 2023 and 2024. (S) transects were sampled in 2024 as additional transects on spoil mounds.
2. Meander CM4 was sampled in 2023 with the expectation it would be spoil mound. This area was not spoil mound post-construction so it was sampled as a undisturbed control area in 2024. Similarly, the shape of Meander M3 was adjusted in 2024 to sample within the area of post-construction spoil mound.


Kayak Access
Sampling Transect
Constructed Channels
Meander Survey - 2023
Meander Survey - 2023 and 2024
Meander Survey - 2024
Constructed Potholes
Constructed Spoil Piles

N

0 500 1,000 Feet

**DATA SOURCES**:
ESRI 2021; WSP 2024.

Figure 2
**Vegetation Sampling Locations 2023 (Pre-construction) and 2024 (Post-construction)**
Lakeview III Wetland Enhancement Project
Ellisburg, Jefferson County, NY

### 3.3 Incidental Wildlife Observations

While conducting vegetation sampling, the WSP field biologists recorded incidental wildlife observations. While not a focus of the monitoring effort, WSP documented incidental observations made during the 2023 and 2024 fieldwork efforts.

## 4 Results of Pre-construction and Post-construction Vegetation Sampling/Monitoring (2023 and 2024)

### 4.1 Transect Surveys

In 2023 WSP biologists recorded 33 species across the 84 quadrats comprising the 14 transects sampled during pre-construction and baseline monitoring (six quadrats per transect). In comparison, WSP recorded 30 species across the 84 sample quadrats that comprised the 14 habitat mound transects sampled during 2024 post-construction monitoring.

In pre-construction conditions, narrow-leaf cattail (*Typha angustifolia*) had the highest relative cover by far, representing 64% cover across all quadrats (see Table 1). Other relatively abundant/common species included bluejoint grass (*Calamagrostis canadensis*; 9% cover), purple loosestrife (*Lythrum salicaria*; 5% cover), and eastern marsh fern (*Thelypteris palustris*; 3% cover). In post-construction conditions, unvegetated areas were more abundant than the percent cover of all plant species combined; unvegetated areas represented 73% cover across all quadrats. Bluejoint was the plant species with the highest relative percent cover of the 30 species, with 7% cover across all quadrats (see Table 1). Narrow-leaf cattail decreased to 5% ground cover in post-construction conditions. Other relatively abundant/common species in post-construction conditions included purple loosestrife (5% cover) and spotted touch-me-not (*Impatiens capensis*; 3% cover). Invasive Phragmites represented 2% cover across the 84 pre-construction sample quadrats but was not detected in the 84 post-construction sample quadrats (see Table 1). See Attachment A for photos taken within survey areas in 2023 and 2024.

In pre-construction conditions, narrow-leaf cattail was also the most frequently encountered plant species in sampled areas, present in 100% of the 84 pre-construction sample quadrats (see Table 1). Other frequently encountered species included purple loosestrife, water smartweed (*Persicaria amphibia*), hooded skullcap (*Scutellaria galericulata*), and bluejoint grass. In post-construction conditions, bluejoint grass was the most frequently encountered plant species, present in 92% of the 84 post-construction sample quadrats (see Table 1). The presence of narrow-leaf cattail decreased to 83% in the sample quadrats in post-construction conditions. Other frequently encountered species included purple loosestrife (present in 77% of sample quadrats), eastern marsh fern (37%), spotted touch-me-not (36%), and hooded skullcap (31%).

Phragmites was observed in 5% of the pre-construction quadrats (all in the habitat mound transect located north of pothole 4; see photo 7 in Attachment A) and 0% of the post-construction quadrats (see Table 1 and Figure 2).

**Table 1 Relative Percent Cover and Frequency for Plant Species Recorded along Monitoring Transects at Lakeview WMA prior to Enhancement Project Construction (August 2023) and after Project Construction (June 2024)**

| Common Name | Scientific Name | Relative Percent Cover (%)[1] | | Frequency (%)[2] | |
|---|---|---|---|---|---|
| | | Pre-construction | Post-construction | Pre-construction | Post-construction |
| Unvegetated | *N/A* | 2.68 | 73.43 | 35.7 | 100.0 |
| Bluejoint | *Calamagrostis canadensis* | 9.09 | 7.46 | 51.2 | 91.6 |
| Narrow-Leaf Cattail | *Typha angustifolia* | 64.26 | 5.22 | 100.0 | 83.1 |
| Purple Loosestrife | *Lythrum salicaria* | 5.27 | 4.63 | 59.5 | 77.1 |
| Spotted Touch-Me-Not | *Impatiens capensis* | 0.40 | 2.59 | 9.5 | 36.1 |
| Hooded Skullcap | *Scutellaria galericulata* | 1.85 | 1.00 | 52.4 | 31.3 |
| Eastern Marsh Fern | *Thelypteris palustris* | 3.04 | 0.93 | 31.0 | 37.3 |
| Tufted Yellow-Loosestrife | *Lysimachia thyrsiflora* | 0.27 | 0.66 | 8.3 | 19.3 |
| Water Smartweed | *Persicaria amphibia* | 1.63 | 0.53 | 54.8 | 14.5 |
| Nodding Burr-Marigold | *Bidens cernua* | - | 0.49 | - | 16.9 |
| Common Marsh Bedstraw | *Galium palustre* | 0.03 | 0.37 | 2.4 | 13.3 |
| Reed Canary Grass | *Phalaris arundinacea* | 0.57 | 0.30 | 1.2 | 1.2 |
| Unidentified Sedge | *Carex sp.* | 1.42 | 0.29 | 3.6 | 9.6 |
| Duck-Potato | *Sagittaria latifolia* | 0.83 | 0.25 | 9.5 | 8.4 |
| Marsh Bellflower | *Campanula aparinoides* | 1.10 | 0.25 | 22.6 | 8.4 |
| Dock-Leaf Smartweed | *Persicaria lapathifolia* | - | 0.20 | - | 4.8 |
| Purple Marshlocks | *Comarum palustre* | 0.58 | 0.19 | 8.3 | 7.2 |
| Unidentified Goldenrod | *Solidago sp.* | - | 0.18 | - | 1.2 |
| Devil's-Pitchfork | *Bidens frondosa* | 0.06 | 0.18 | 1.2 | 7.2 |
| Swamp Smartweed | *Persicaria hydropiperoides* | - | 0.16 | - | 3.6 |
| Bog Yellowcress | *Rorippa palustris* | - | 0.13 | - | 4.8 |
| Swamp Milkweed | *Asclepias incarnata* | 0.17 | 0.13 | 6.0 | 7.2 |
| Cut-Leaf Water-Horehound | *Lycopus americanus* | 0.17 | 0.12 | 7.1 | 2.4 |
| Broad-Fruit Burr-Reed | *Sparganium eurycarpum* | 0.27 | 0.08 | 4.8 | 1.2 |
| Bulblet-Bearing Water-Hemlock | *Cicuta bulbifera* | 0.13 | 0.06 | 9.5 | 1.2 |
| Marsh Horsetail | *Equisetum palustre* | 0.40 | 0.05 | 7.1 | 2.4 |
| Curly Dock | *Rumex crispus* | - | 0.02 | - | 1.2 |
| Three-Way Sedge | *Dulichium arundinaceum* | - | 0.02 | - | 1.2 |
| River-Bank Grape | *Vitis riparia* | - | 0.02 | - | 2.4 |
| Deer-Tongue Rosette Grass | *Dichanthelium clandestinum* | - | 0.01 | - | 1.2 |
| Red Maple | *Acer rubrum* | - | 0.01 | - | 2.4 |
| Common Reed | *Phragmites australis* | 2.02 | - | 4.8 | - |
| Lakebank Sedge | *Carex lacustris* | 1.25 | - | 8.3 | - |
| European Frogbit | *Hydrocharis morsus-ranae* | 0.83 | - | 6.0 | - |
| Uptight Sedge | *Carex stricta* | 0.63 | - | 7.1 | - |
| Green Arrow-Arum | *Peltandra virginica* | 0.38 | - | 8.3 | - |
| White Meadowsweet | *Spiraea alba* | 0.28 | - | 2.4 | - |
| Swamp-Loosestrife | *Decodon verticillatus* | 0.17 | - | 8.3 | - |
| Virginia St. John's-Wort | *Hypericum virginicum* | 0.07 | - | 2.4 | - |
| Sensitive Fern | *Onoclea sensibilis* | 0.06 | - | 1.2 | - |
| Cottongrass Bulrush | *Scirpus cyperinus* | 0.05 | - | 2.4 | - |
| Fraser's St. John's-Wort | *Hypericum fraseri* | 0.02 | - | 1.2 | - |

**Table 1 Relative Percent Cover and Frequency for Plant Species Recorded along Monitoring Transects at Lakeview WMA prior to Enhancement Project Construction (August 2023) and after Project Construction (June 2024)**

| Common Name | Scientific Name | Relative Percent Cover (%)[1] | | Frequency (%)[2] | |
|---|---|---|---|---|---|
| | | Pre-construction | Post-construction | Pre-construction | Post-construction |
| American Burr-Reed | *Sparganium americanum* | 0.01 | - | 1.2 | - |
| Purple-Leaf Willowherb | *Epilobium coloratum* | 0.01 | - | 1.2 | - |
| **Total** | | **100.00** | **100.00** | **-** | **-** |

Notes:
[1] Relative percent cover is calculated as the total cover out of the 84 quadrats sampled each year, weighted against the percent cover of other plant species recorded in the sample quadrats.
[2] Frequency is calculated as the percentage out of the 84 quadrats sampled each year where a given species was detected.

In pre-construction transects, 25 of the 33 plant species recorded had a wetland indicator status of OBL in the northcentral and northeast regions of the country, while the other eight species recorded had a wetland indicator status of facultative wetland (FACW). Overall, the 14 transects had a very high percent cover of OBL wetland species, averaging approximately 95% cover (see Table 2). Approximately 3% of the sampled area pre-construction was unvegetated (typically surface water or mud).

In contrast, the percent cover of the unvegetated area was considerably higher in the Project Area after construction (see comparison photos in Attachment A). The 14 transects sampled during the post-construction survey event were all located on spoil mounds created from excavating the potholes, which covered existing vegetation and created unvegetated areas. At the time of the surveys, plants were pioneering onto the piles and starting the process of revegetation. Transects P1 through P7 were nearly entirely open water with no or trace emergent vegetation present, although submerged vegetation and algae were common. For the 14 transects located on habitat mounds that were sampled post-construction, approximately 73% of the sampled area was unvegetated soil or mud (see Table 2) while approximately 22% cover consisted of OBL wetland species. Along the 14 habitat mound transects sampled in 2024, 18 of the 30 plant species had an OBL wetland indicator status, seven species had a FACW wetland indicator status, and approximately five species were classified as FAC species (more general species that may occur in wetland or upland habitats) in the northcentral and northeast region of the country.

**Table 2 Percent Cover by Wetland Indicator Status for Plant Species Recorded along Monitoring Transects at Lakeview WMA prior to Enhancement Project Construction (August 2023) and after Project Construction (June 2024)**

| | Obligate Wetland Species Percent Cover (%) | | Facultative Wetland Species Percent Cover (%) | | Unvegetated Percent Cover (%) | |
|---|---|---|---|---|---|---|
| Transect ID | Pre-construction | Post-construction | Pre-construction | Post-construction | Pre-construction | Post-construction |
| M1 | 93.5 | 25.5 | 0.0 | 3.3 | 9.3 | 71.2 |
| M2 | 90.8 | 6.3 | 0.0 | 0.3 | 11.2 | 93.3 |
| M3 | 95.0 | 29.8 | 0.0 | 2.7 | 5.0 | 67.5 |
| M4 | 61.2 | 16.8 | 46.5 | 2.7 | 0.0 | 80.2 |
| M5 | 98.3 | 38.2 | 5.3 | 3.5 | 1.2 | 58.0 |
| M6 | 100.7 | 33.0 | 12.7 | 21.4 | 1.3 | 45.4 |
| M7 | 98.3 | 15.8 | 5.0 | 0.8 | 1.5 | 83.3 |
| S1 | N/A | 21.7 | N/A | 2.5 | N/A | 75.8 |
| S2 | N/A | 20.8 | N/A | 0.5 | N/A | 78.7 |
| S3 | N/A | 15.5 | N/A | 0.8 | N/A | 83.7 |
| S4 | N/A | 20.5 | N/A | 0.5 | N/A | 79.0 |
| S5 | N/A | 29.2 | N/A | 7.0 | N/A | 63.8 |
| S6 | N/A | 13.0 | N/A | 12.8 | N/A | 74.2 |
| S7 | N/A | 24.3 | N/A | 3.7 | N/A | 69.3 |
| **Habitat Mound Transect Average** | **91.1** | **22.2** | **9.9** | **4.5** | **4.2** | **73.1** |
| P1 | 93.7 | N/A | 4.2 | 0.0 | 3.0 | >90% |
| P2 | 101.3 | N/A | 0.0 | 0.0 | 0.3 | >90% |
| P3 | 102.0 | N/A | 4.5 | 0.0 | 0.0 | >90% |
| P4 | 90.2 | N/A | 11.0 | 0.0 | 1.8 | >90% |
| P5 | 98.7 | N/A | 7.8 | 0.0 | 0.2 | >90% |
| P6 | 107.3 | N/A | 2.3 | 0.0 | 0.0 | >90% |
| P7 | 95.8 | N/A | 0.7 | 0.0 | 4.5 | >90% |
| **Pothole Transect Average** | **98.4** | **Submerged vegetation present** | **4.4** | **0.0** | **1.4** | **>90%** |

Note:
Due to the potential for species to occupy the same space at different heights, percent cover of species within a sample quadrat at times summed to more than 100%.

In pre-construction conditions, sampled pothole transects and habitat mound transects (per design) were generally similar in species composition and exhibit predominance of wetland species. Conditions were markedly different in post-construction conditions because pothole areas became deep water areas with scarce vegetation, by design and intended function. The areas covered by habitat mounds were largely unvegetated and the vegetation community was just starting to re-establish in these areas. While many of the previously observed species are recruiting back onto the habitat mounds, the higher elevations of these areas are more likely to facilitate the recruitment of FAC species.

## 4.2 Meander Surveys

During pre-construction surveys in 2023, WSP biologists recorded a total of 40 species during the 14 meander surveys in the Project Area (one meander survey in each of the seven pothole areas to be excavated and one within areas of proposed habitat mounds; see Figure 2). During the 2024 post-construction surveys, the biologists recorded 41 species across the 14 meander surveys conducted that year (one meander survey within each of the created habitat mounds and one control meander survey in the area adjacent to the mound where vegetation was not noticeably impacted by the construction activity; see Figure 2). A total of 32 plant species were recorded across the seven meander areas on habitat mounds, and 33 species were recorded in the seven unimpacted control meander areas. In post-construction conditions, very few plant species remained within the 2023 pothole meander survey areas. Photos 10 and 14 in Attachment A demonstrate the dramatic change in pothole areas between pre-construction and post-construction conditions.

Across all habitat mound and control meander areas, 27 species were detected during meander surveys in both 2023 and 2024. Thirteen species were recorded in post-construction sampling that were not observed during pre-construction sampling. Species expected to become established on the habitat mounds post-construction include specialist pioneering species. In general, the species detected on the habitat mounds were also detected in adjacent control areas. Eleven species were recorded in pre-construction conditions that were not detected in post-construction conditions. These species are typically uncommon species that had been detected in one location within one meander area in 2023.

During the post-construction meander surveys, seven species were detected during 10 to 14 of the total 14 meander surveys; these species were widespread at the site. Fourteen species were detected during three to nine of the 14 meander surveys. Twenty plant species were detected during only one or two of the 2024 meander surveys; these species were not frequently encountered. Table 3 presents the full list of plant species recorded within the 2024 meander surveys in both pre-construction and post-construction conditions and indicates the meander surveys during which they were detected.

Twenty-four of the 41 species detected during 2024 meander surveys were also detected during transect surveys, while the other 17 species were only detected during meander surveys. Species that were only detected during meander surveys included several woody species that were more frequently observed in the control areas than on the habitat mounds (e.g., black willow [*Salix nigra*], silky dogwood [*Cornus amomum*], speckled alder [*Alnus incana*], and white meadowsweet [*Spiraea alba*]*).*

**Table 3 Presence of Plant Species Recorded within 2024 Meander Survey Areas at Lakeview WMA prior to Enhancement Project Construction (August 2023) and after Project Construction (June 2024)**

| Common Name | Scientific Name | Habitat Mound Meander Areas | | | | | | | Control Meander Areas | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | M1 | M2 | M3 | M4b | M5 | M6 | M7 | C1 | C2 | C3 | CM4 | C5 | C6 | C7 |
| American Water-Plantain | *Alisma subcordatum* | | | 2 | | | | | | | | | | 2 | |
| Bittersweet Nightshade | *Solanum dulcamara* | 2 | 1 | | | | | | | | | | | | |
| Black Willow | *Salix nigra* | 1, 2 | | | | | | | | 2 | | | | | |
| Bluejoint | *Calamagrostis canadensis* | 1, 2 | 1, 2 | 1, 2 | 2 | 1, 2 | 1, 2 | 1, 2 | 2 | 2 | 2 | 1, 2 | 2 | 2 | 2 |
| Bog Yellowcress | *Rorippa palustris* | 2 | 2 | | | | | | | | | | | | |
| Broad-Fruit Burr-Reed | *Sparganium eurycarpum* | 2 | | | | 2 | 2 | 1 | 2 | | | | | | |
| Broad-Leaf Cattail | *Typha latifolia* | | | | | | | 1 | | | | | | | |
| Bulblet-Bearing Water-Hemlock | *Cicuta bulbifera* | | | | | 1 | | | | | | | | 2 | |
| Common Buttonbush | *Cephalanthus occidentalis* | | 2 | | | | | | | | | | | | |
| Common Marsh Bedstraw | *Galium palustre* | 2 | 2 | | 2 | 2 | 2 | | 2 | | | | | | |
| Common Reed | *Phragmites australis* | | | | | | | | | | | 1, 2 | | | |
| Cottongrass Bulrush | *Scirpus cyperinus* | 1 | | | | 1 | | | | | | | | | |
| Curly Dock | *Rumex crispus* | | | | | | | | | | | | | 2 | |
| Cut-Leaf Water-Horehound | *Lycopus americanus* | | | | | | | | | 2 | | | | | |
| Devil's-Pitchfork | *Bidens frondosa* | | | | | 2 | | | | | | | | | |
| Dock-Leaf Smartweed | *Persicaria lapathifolia* | | 2 | | 2 | | | | | | | | | | |
| Duck-Potato | *Sagittaria latifolia* | | 2 | 1, 2 | | 2 | 1, 2 | 2 | | | 2 | | | 2 | 2 |
| Eastern Marsh Fern | *Thelypteris palustris* | 1, 2 | 1, 2 | 1, 2 | 2 | 1, 2 | 1, 2 | 1, 2 | | 2 | 2 | 1, 2 | 2 | 2 | 2 |
| European Frogbit | *Hydrocharis morsus-ranae* | | | | | | 1 | | | | | | | | |
| Flatleaf Bladderwort | *Utricularia intermedia* | | | 1 | | | | | | | | | | | |
| Fraser's St. John's-Wort | *Hypericum fraseri* | | | | 2 | | | | | | | 2 | | | 2 |
| Glossy False Buckthorn | *Frangula alnus* | | | | | | | | | | | | | 2 | |
| Green Arrow-Arum | *Peltandra virginica* | 1 | | 1, 2 | | 1 | | 1 | | | 2 | 1, 2 | 2 | 2 | 2 |
| Hedge False Bindweed | *Calystegia sepium* | | | | 2 | | | | | | | | | | |
| Hooded Skullcap | *Scutellaria galericulata* | 1, 2 | 1, 2 | 1, 2 | 2 | 1 | 1, 2 | 2 | 2 | 2 | | 1, 2 | 2 | | |

**Table 3 Presence of Plant Species Recorded within each Meander Survey Area at Lakeview WMA prior to Enhancement Project Construction (August 2023) and after Project Construction (June 2024)**

| Common Name | Scientific Name | M1 | M2 | M3 | M4b | M5 | M6 | M7 | C1 | C2 | C3 | CM4 | C5 | C6 | C7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lakebank Sedge | *Carex lacustris* | 1 | | 1 | | | 1 | 1 | 2 | | 2 | 1 | | 2 | |
| Marsh Bellflower | *Campanula aparinoides* | | | 1, 2 | 2 | | 1 | 1, 2 | | | | 1, 2 | 2 | | |
| Marsh Horsetail | *Equisetum palustre* | | | | | 2 | | 1, 2 | | | 2 | 2 | 2 | 2 | 2 |
| Marsh Vetchling | *Lathyrus palustris* | | | | | | | | 2 | | | | 2 | | |
| Narrow-Leaf Cattail | *Typha angustifolia* | 1, 2 | 1, 2 | 1, 2 | 2 | 1, 2 | 1, 2 | 1, 2 | 2 | 2 | 2 | 1, 2 | 2 | 2 | 2 |
| Nodding Burr-Marigold | *Bidens cernua* | 2 | | | 2 | 2 | | | | | | | | | |
| Purple Loosestrife | *Lythrum salicaria* | 1, 2 | 1, 2 | 1, 2 | 2 | 1, 2 | 1, 2 | 1, 2 | 2 | 2 | 2 | 1, 2 | 2 | 2 | 2 |
| Purple Marshlocks | *Comarum palustre* | | | 1, 2 | | | 2 | | | | 2 | 1, 2 | | | |
| Red Maple | *Acer rubrum* | | | | | | | 2 | | 2 | | | | | |
| Red Osier Dogwood | *Cornus sericea* | | | 1 | | | | | | | | | | | |
| River-Bank Grape | *Vitis riparia* | | 2 | | | | | | | 2 | | | | | |
| Sensitive Fern | *Onoclea sensibilis* | | 1, 2 | 1 | | 1 | 2 | | 2 | 2 | | | 2 | | |
| Silky Dogwood | *Cornus amomum* | | | 2 | | | 2 | | | | 2 | 2 | | | |
| Single-Vein Sweetflag | *Acorus calamus* | | | | 2 | | | | | | | | | | |
| Small-Spike False Nettle | *Boehmeria cylindrica* | | | | | | | | | 2 | | | | | |
| Speckled Alder | *Alnus incana* | | | | | | 1, 2 | | | | | | | 2 | |
| Spotted Touch-Me-Not | *Impatiens capensis* | 1, 2 | | | 2 | 2 | 1, 2 | 2 | 2 | 2 | | 1 | | 2 | 2 |
| Swamp Milkweed | *Asclepias incarnata* | | | 1 | | 1 | | 2 | | | | | | | 2 |
| Tufted Yellow-Loosestrife | *Lysimachia thyrsiflora* | 2 | 1, 2 | 1 | 2 | | 1 | | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Unidentified Sedge | *Carex sp.* | | | 1 | | | | | | | | | | | |
| Virginia St. John's-Wort | *Hypericum virginicum* | | | | | | | 1 | | | | | | | |
| Water Horsetail | *Equisetum fluviatile* | | | 1 | | 1 | | | | | | | | | |
| Water Smartweed | *Persicaria amphibia* | 1, 2 | 1, 2 | 2 | | 2 | 1, 2 | 1, 2 | 2 | 2 | 2 | 1, 2 | 2 | 2 | 2 |
| White Meadowsweet | *Spiraea alba* | | | | | 1 | 1 | | | | | 2 | 2 | 2 | |

Notes: Planned habitat mounds meander areas (M1, M2, M3, CM4, M5, M6, and M7) were surveyed in 2023 and 2024. Control meander areas (C1, C2, C3, C5, C6, and C7) were surveyed post construction in 2024. The area containing meander area CM4 was left undisturbed and was not used as a habitat mound, so it was sampled as a control area in 2024 and a new meander area within the actual habitat mound by pothole 4 (Meander Area M4b) was sampled in 2024. Meander results from pre-construction surveys within planned pothole areas are presented in the pre-construction vegetation monitoring memo (WSP 2023).

Key:

1 = Detected within the meander area during pre-construction surveys (2023)

2 = Detected within the meander area during post-construction surveys (2024)

## 4.3 Incidental Wildlife Observations

WSP field biologists recorded several incidental vertebrate wildlife species while conducting vegetation sampling in the Project Area in 2023 and 2024 including 34 bird species, two reptile species, and three amphibian species. Two of the bird species detected are listed as threatened in New York State, and two are New York Species of Special Concern (see Table 4).

**Table 4 Incidental Wildlife Species Detected within or in the Vicinity of the Project Area at Lakeview WMA prior to Enhancement Project Construction, August 2023**

| Taxon | Common Name | Scientific Name | Species Status in New York State |
|---|---|---|---|
| Birds | Canada Goose | *Branta canadensis* | |
| | Wood Duck | *Aix sponsa* | |
| | Mallard | *Anas platyrhynchos* | |
| | Mourning Dove | *Zenaida macroura* | |
| | Virginia Rail | *Rallus limicola* | |
| | Killdeer | *Charadrius vociferus* | |
| | Ring-billed Gull | *Larus delawarensis* | |
| | Caspian Tern | *Hydroprogne caspia* | |
| | American Bittern | *Botaurus lentiginosus* | Species of Special Concern |
| | Least Bittern | *Ixobrychus exilis* | Threatened |
| | Green Heron | *Butorides virescens* | |
| | Great Blue Heron | *Ardea herodias* | |
| | Osprey | *Pandion haliaetus* | Species of Special Concern |
| | Northern Harrier | *Circus cyaneus* | Threatened |
| | Belted Kingfisher | *Megaceryle alcyon* | |
| | Red-bellied Woodpecker | *Melanerpes carolinus* | |
| | Hairy Woodpecker | *Picoides villosus* | |
| | Great Crested Flycatcher | *Myiarchus crinitus* | |
| | Eastern Kingbird | *Tyrannus tyrannus* | |
| | Blue Jay | *Cyanocitta cristata* | |
| | Black-capped Chickadee | *Poecile atricapillus* | |
| | Tree Swallow | *Tachycineta bicolor* | |
| | Purple Martin | *Progne subis* | |
| | Marsh Wren | *Cistothorus palustris* | |
| | Gray Catbird | *Dumetella carolinensis* | |
| | Veery | *Catharus fuscescens* | |
| | American Robin | *Turdus migratorius* | |
| | Cedar Waxwing | *Bombycilla cedrorum* | |
| | American Goldfinch | *Spinus tristis* | |
| | Chipping Sparrow | *Spizella passerina* | |
| | Song Sparrow | *Melospiza melodia* | |
| | Swamp Sparrow | *Melospiza georgiana* | |
| | Red-winged Blackbird | *Agelaius phoeniceus* | |
| | Common Yellowthroat | *Geothlypis trichas* | |
| Reptiles | Eastern Garter Snake | *Thamnophis sirtalis* | |
| | Painted Turtle | *Chrysemys picta* | |
| Amphibians | American Toad | *Anaxyrus americanus* | |

**Table 4 Incidental Wildlife Species Detected within or in the Vicinity of the Project Area at Lakeview WMA prior to Enhancement Project Construction, August 2023**

| Taxon | Common Name | Scientific Name | Species Status in New York State |
|---|---|---|---|
| | Green Frog | *Lithobates clamitans* | |
| | Northern Leopard Frog | *Lithobates pipiens* | |

# 5 Phragmites Treatment Activities

WSP's subcontractor, The Tree Doctor, was contracted to complete two rounds of Phragmites herbicide treatments during pre- and post-construction. Prior to Project construction, Tree Doctor staff applied herbicide to Phragmites via foliar spray on September 6, 7, 11, and 12, 2023. Certified pesticide applicators applied a Round-up custom aquatic approved glyphosate-based product (U.S. Environmental Protection Agency [EPA] No. 524-343) mixed with a 1% concentration of LI 700 as a surfactant. A certified pesticide applicator with a NYSDEC aquatic application category certification was on site during treatments. Six Phragmites patches totaling approximately 11.5 acres were treated in 2023. Two interior stands of Phragmites that were not readily accessible were not treated.

A second round of Phragmites treatments was originally scheduled to occur before this technical memorandum was written, therefore, since the treatment activity has not occurred, it is not reported herein. Due to scheduling issues, the timing of the grant deadline, and what is known regarding the relative effectiveness of a second round of treatments, it was determined that the funding for this Project could be used more effectively by treating Phragmites within the Project Area outside the timing of this Project. Herbicide treatments later in the growing season have demonstrated greater efficacy than treatments occurring in June and July. Through collaborative discussions, NYSDEC has indicated that they will complete the Phragmites treatments later in 2024 or in 2025. This Project will support future Phragmites treatments by purchasing the herbicide that will be used for the treatments in advance.

# 6 Summary

The Enhancement Project is designed to increase the diversity, function, and ecological productivity of the predominantly cattail wetland at Lakeview WMA, including increasing fish passage into, and use of, interior marsh habitats. Seven potholes and associated channels were expanded and created in late 2023, as per DU's design. In early August 2023 and in late June 2024, WSP sampled the pre-Project baseline vegetation community and post-construction vegetation community within the potholes and habitat mounds of the Project Area, using a combination of sampling transects and timed meander surveys. Narrow-leaf cattail was overall the predominant species encountered during pre-construction surveys, with little unvegetated area. The pre-construction results documented the presence of 43 OBL and FACW plant species in the baseline areas (combining data from all 2023 transects and meander areas). In post-construction conditions, vegetation cover was observed to be substantially lower compared to 2023. This is directly related to the activity of the Enhancement Project for providing open

channels and interior pools for enhancement of a broader array of ecological functions. The reduced cover is also expected. The lower vegetation cover is related to expansion of open water habitat (e.g., potholes) and due to the relatively recent placement of the habitat mounds. This year (2024) provides a glimpse of the first growing season post-construction.

The post-construction surveys documented the presence of 41 plant species across the 2024 transects and meander areas combined that were located on the habitat mounds (totaling 14 transects and seven meander areas). These 41 species included 25 OBL wetland species, 11 FACW species, and six FAC species. A total of 33 species (20 OBL, 9 FACW, and 4 FAC species) were detected in the seven control meander areas in areas unimpacted by the Enhancement Project. The majority of species were detected on both the habitat mounds and in the control areas.

The 2023 and 2023 vegetation monitoring conducted by WSP successfully provided data associated with baseline conditions during pre-construction surveys and documented the changes in the vegetation community within the construction areas during post-construction surveys. The benefit of combining survey methods was to provide abundance data via the sampling transects and the opportunity to encounter a larger number of plant species via larger meander survey search areas. The data collected from transects and meander surveys will be informative for any post-Project vegetation monitoring in the future, such as comparing the vegetation composition that develops within the habitat mounds with adjacent areas outside of the Enhancement Project's footprint.

# 7 References

New York State Department of Environmental Conservation (NYSDEC). 2023. Website – Lakeview Wildlife Management Area. Accessed at: https://www.dec.ny.gov/outdoor/9328.html. Accessed on November 17, 2023.

WSP USA, Inc. (WSP). 2023. Pre-construction Vegetation Monitoring and Invasive Species Treatment for the Lakeview III Wetland Enhancement Project (2023).

**Attachment 1: Site Photos from the Lakeview III Wetland Enhancement Project**

Photo 1. Meander M1 pre-construction: Location within the meander survey exhibiting typical dominance of narrow-leaf cattail with scattered purple loosestrife. This meander area was sampled prior to and after project construction. Photo taken August 1, 2023.

Photo 2. Meander M1 post-construction. Cattail, bluejoint grass, and other plants are recruiting to the habitat mound. Pothole 1 is visible beyond the habitat mound; one of seven potholes created or expanded as part of the Enhancement Project. Photo taken June 27, 2024.

Photo 3. Transect M2 pre-construction: Sample quadrat with visible narrow-leaf cattail, duck potato, and purple loosestrife. This transect was monitored prior to project construction and after construction. Photo taken August 1, 2023.

Photo 4. Transect M2 post-construction: Location within the transect exhibits typical re-colonization of the spoil piles, with scattered cattail and swaths of unvegetated soil. Photo taken June 27, 2024.

**Attachment 1: Site Photos from the Lakeview III Wetland Enhancement Project**

Photo 5. Transect M3 post-construction: This transect was monitored prior to and after project construction. This area has relatively strong vegetation recruitment, primarily cattail. Photo taken June 27, 2024.

Photo 6. Transect S3 post-construction: New monitoring transect located on the habitat mound on northeast side of created pothole 3 (pothole visible on left side). Vegetation recruitment thus far is relatively low in this area. Photo taken June 27, 2024.

Photo 7. Transect M4 pre-construction: Sample quadrat with mature Phragmites intermixed with narrow-leaf cattail. Transect M4 and meander M4 (later named CM4) were the areas sampled in 2023 where Phragmites was detected. Photo taken August 1, 2023.

Photo 8. Transect M4 post-construction: Part of the existing Phragmites patch has been covered by the habitat mound. The majority of the Phragmites patch persists to the east of Transect M4. Photo taken June 27, 2024.

**Attachment 1: Site Photos from the Lakeview III Wetland Enhancement Project**

Photo 9. Transect P5 pre-construction: Sample quadrat with narrow-leaf cattail intermixed with a relatively high amount of bluejoint grass. Transect P5 was excavated as part of the Enhancement Project. Photo taken July 31, 2023.

Photo 10. Pothole 5 post-construction: Wetland plants, predominantly narrow-leaf cattail, were excavated during construction to create the pothole. During the 2024 vegetation sampling the area was open water with virtually no plants to record for Meander P5 or Transect P5. Photo taken June 27, 2024.

Photo 11. Meander P6 pre-construction: Pothole meander area dominated by narrow-leaf cattail. This area was excavated during Enhancement Project construction and became open water. Photo taken August 1, 2023.

Photo 12. Meander C6 post-construction: This control meander area is adjacent to the constructed spoil pile and Meander M6. The vegetation within Meander C6 is similar to pre-construction conditions: narrow-leaf cattail intermixed with other wetland plants. Speckled alder stands are present near pothole 6 (visible on left). Photo taken June 26, 2024.

**Attachment 1: Site Photos from the Lakeview III Wetland Enhancement Project**

Photo 13. Meander P7 pre-construction: south end of the meander area looking south across the existing pothole. Photo taken August 2, 2023.

Photo 14. Pothole 7 post-construction: The existing pothole was expanded during construction. Habitat is now open water with only trace emergent plants to record for Meander P7 or Transect P7. Photo taken June 26, 2024.

Photo 15: Meander CM4: This area was indicated as a habitat mound in the Project design but was not actually impacted by construction. Cattail still dominates but there were a variety of other wetland plants (e.g., meadowsweet and marsh fern are visible in the photo). The persisting Phragmites patch is visible in the background on the left side. Photo taken June 27, 2024.

Photo 16. Pothole 5 channel: WSP biologists kayaking along one of the new channels created as part of the Enhancement Project, located east of Pothole 5. The recently created system of potholes and channels greatly improved site accessibility compared to pre-construction conditions. Photo taken June 27, 2024.