Beneficial Use Impairment Removal Project

Niagara River Area of Concern
Marsh Anuran and Avian Population Monitoring
Year 2 (2015) Survey Report

January 21, 2016

Beneficial Use Impairment Removal Project

Niagara River Area of Concern
Marsh Anuran and Avian Population Monitoring

Year 2 (2015) Survey Report

January 21, 2016

Prepared for:
United States Fish and Wildlife Service (USFWS)
New York Field Office (NYFO)
3817 Luker Road
Cortland, NY 13045

New York State Department of Environmental Conservation (NYSDEC)
270 Michigan Avenue
Buffalo, NY 14203

Prepared by:
NewEarth Ecological Consulting, LLC
169 Watson Mill Road
Saco, ME 04072
207.286.3259

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

1.1 BACKGROUND

In 1987 the governments of the United States and Canada identified several areas within the Great Lakes region where environment degradation had occurred due to historic pollution and habitat destruction. The areas were identified and designated for remediation and restoration and referred to as Areas of Concern (AOC). Remedial Action Plans (RAPs) were developed for each AOC and each RAP identified beneficial use impairments (BUI) (i.e., negatively affected chemical, physical, and/or biological properties associated with the AOC) that required restoration or remediation in order to remove the impairment from the list of BUIs associated with AOCs. The 37-mile long Niagara River waterway, which flows from Lake Erie to Lake Ontario, was identified as one of the forty-three AOCs for the Great Lakes region. The Niagara River AOC (NR AOC) is divided into two portions, the New York portion located on the United States side of the river; and the Ontario portion located on the Canadian side of the river. On the U.S. side, the NR AOC extends from Smokes Creek at Buffalo Harbor north to the Niagara River's mouth at Lake Ontario (Figure 1).

The New York State Department of Environmental Conservation (NYSDEC) is currently funded by the United States Environmental Protection Agency (USEPA) to coordinate the Niagara River RAP. Because the Niagara River AOC is a binational AOC, the NYSDEC is coordinating technical assessments and regulatory efforts with the Canadian Niagara River RAP managers. A RAP was developed for the New York portion of the NR AOC (NYSDEC 1994), which identifies and provides the rationale and subsequent remediation plans for several BUIs. A 2012 addendum to the RAP (NR AOC Stage 2 Addendum) describes updated BUI-specific delisting criteria. Included in the delisting criteria for the "Degradation of Fish and Wildlife Populations" BUI, are assessments of 5-year trends in populations of sentinel native species representing the range of trophic levels within aquatic ecosystems (Filipski 2012). In February, 2012, the U.S. Fish and Wildlife Service (USFWS) New York Field Office (NYFO) was contacted by the U.S. Environmental Protection Agency (USEPA) Great Lakes National Program Office (GLNPO) to conduct population trend assessments for the Northern Leopard Frog (*Lithobates pipiens)*, American Toad (*Anaxyrus americanus*), Bullfrog (*Lithobates catesbeianus*), and several species of marsh birds (e.g. rails, bitterns, snipe, and grebes) within the NR AOC to support a determination of the status of the "Degradation of Fish and Wildlife Populations" BUI. The species of interest are sentinel native species that represent the mid-level food chain within the Niagara River aquatic ecosystem.

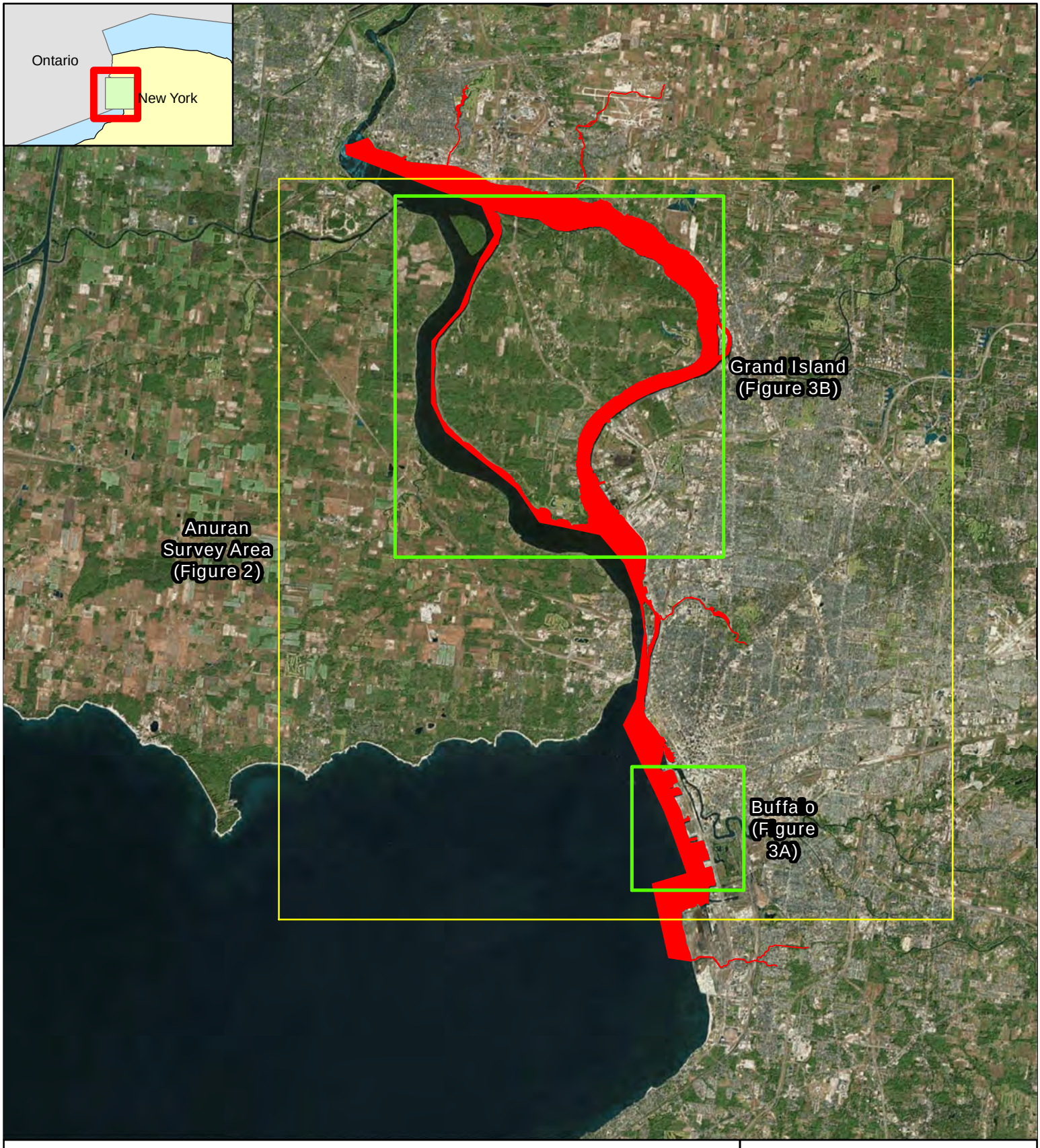
In February 2014, the NYFO and NYSDEC issued a Scope of Work for performance of NR AOC marsh anuran and avian population monitoring surveys (USFWS 2014). Following the criteria outlined in the Scope of Work, in April 2014 a Work Plan was developed, which identified the survey protocols to be used over a 5-year period (2014-2018) for assessing the "Degradation of Fish and Wildlife Populations" BUI within the NR AOC and is hereafter referred to as the "Work Plan" (NewEarth 2015). The Work Plan specifically identified methods used for conducting surveys to facilitate population trend assessments for sentinel native anuran species and focal marsh bird species known to occur in the NR AOC. Anuran species targeted for population trend

assessments include the northern leopard frog, American toad and the bullfrog. Targeted focal marsh bird species include Least Bittern (*Ixobrychus exilis*), Sora (*Porzana carolina*), Virginia Rail (*Rallus limicola*), King Rail (*Rallus elegans*), American Bittern (*Botarus lentiginosus*), Common Gallinule (*Gallinula galeata*), American Coot (*Fulica americana*), and Pied-billed Grebe (*Podilymbus podiceps*).

A brief summary of the methods used during the marsh anuran and avian monitoring effort are provided in Section 2.0 of this report. Results from the Year 2 monitoring effort are provided in Section 3.0, and a discussion of results is provided in Section 4.0. Appendices include photographs (Appendix A), the coordinate locations for survey points (Appendix B), and completed 2015 survey data forms and raw data for anurans (Appendix C), marsh birds (Appendix D), and marsh habitats (Appendix E).

1.2 STUDY AREA

This study focused on the New York portion of the NR AOC located on the U.S. side of the Niagara River and extending from Tifft Nature Preserve near Buffalo Harbor north to the mouth of the Niagara River at Lake Ontario (Figure 1).



Legend

- Upper Niagara River Area of Concern
- Marsh Bird Survey Locations
- Anuran Survey Locations

N

0 0.5 1 2 Miles

Figure 1. Anuran and Marsh Bird Survey Areas

Niagara River Area of Concern Marsh
Anuran and Avian Population Monitoring
Niagara and Erie Counties, NY

Prepared For:
US Fish and Wildlife Service
NY Department of Environmental Conservation

Prepared By:
NewEarth
ECOLOGICAL CONSULTING, LLC

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Date: 9/26/2014

Figure 1. Niagara River Area of Concern (New York Portion)

2.0 METHODS

All anuran and marsh bird surveys were conducted in accordance with the approved Beneficial Use Impairment Removal Project, Niagara River Area of Concern Anuran and Avian Population Monitoring Work Plan (Work Plan), 2014-2018 (NewEarth 2015). The Work Plan was adapted from a number of sources that are intensively involved in marsh monitoring efforts applicable to the Niagara River area, including the North American Amphibian Monitoring Program (NAAMP) - Protocol Description by Weir and Mossman (2005); the Marsh Monitoring Program (MMP) Annual Report, 1995-2003 by Crewe et al. (2005); the MMP Annual Report, 1995-2007 by Archer and Jones (2009), and the New York State Marsh Bird Monitoring Program Pilot Study by Yard et al. (2012).

Survey routes, point locations, field methodologies and field efforts were closely coordinated with, and based upon recommendations from, USFWS representative Amy Roe, and NYSDEC representatives Connie Adams, Jennifer Dunn, and Mark Filipski. The Work Plan should be referenced for additional details regarding the survey methodology used in this study.

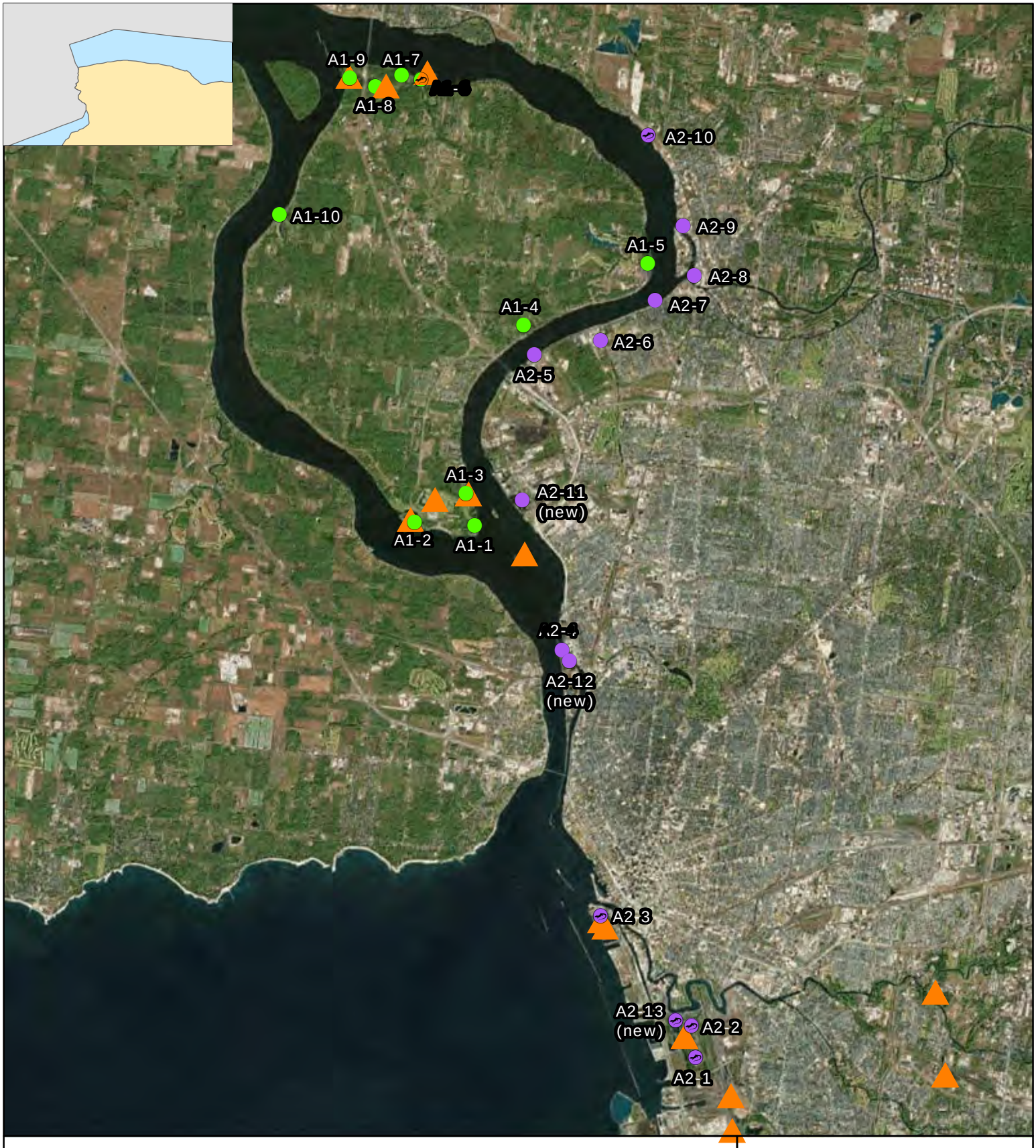
2.1 MARSH ANURAN SURVEYS

2.1.1 Survey Routes and Points

Survey routes and points were originally established using Google Earth™ software and ground-truthed to determine suitability during broad reconnaissance level surveys conducted on March 25-26 and April 17-18, 2014. Two survey routes with ten survey points per route were surveyed in 2014. However, based on the results of 2014 survey effort and additional reconnaissance of the general survey area, three survey points were added for the 2015 survey effort in order to capture potential habitat that had previously not been identified. As shown in Figure 2, the 2015 effort included 10 points on Route A1 and 13 points on Route A2. Points A2-11, A2-12, and A2-13 are new to the 2015 survey effort. The locations of several points surveyed in 2014 were also adjusted slightly for better access, but still target the original designated marsh area. Six of the ten survey points on Route A1, and three of the thirteen survey points on survey Route A2, are located near previously surveyed points established by NYSDEC as part of the Niagara River Marsh Monitoring Program (NR MMP) and included survey points: A1-2; A1-3; A1-6; A1-7; A1-8; A1-9; A2-1; A2-2; and, A2-3 (Figure 2).

Survey points were located based on recommendations from NYSDEC, availability of potentially suitable habitat, and in most cases spaced at least 800 meters (m) apart unless site conditions justified placing them closer; for example, in areas where background noise was impairing detectability. Points were situated along the edges of marsh habitat dominated by emergent vegetation (e.g. *Typha latifolia, Typha angustifolia, Carex lacustris, Hibiscus moscheutos),* and were located along the Niagara River or abutting tributaries within 800 m of the Niagara River. Latitude and longitude were recorded for each survey point using a handheld GPS receiver and each point was assigned a unique identification number which included the route number followed by the point number (e.g., the first survey point on the first survey route received the unique identifier A1-1).

Figure 2. Marsh Anuran Survey Route and Point Locations



Legend

- Route A1 Survey Point
- Route A2 Survey Point
- Marsh Monitoring Program Survey Point

N

0 0.5 1 2 Miles

Figure 2. Anuran Survey Locations

Niagara River Area of Concern Marsh Anuran and Avian Population Monitoring
Niagara and Erie Counties, NY

Prepared For:
US Fish and Wildlife Service
NY Department of Environmental Conservation

Prepared By:
NewEarth
ECOLOGICAL CONSULTING, LLC

Source: NewEarth Ecological Consulting, 2015; Esri, DigitalGlobe, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Date: 12/21/2015

2.1.2 Sampling Periods and Conditions

Previous survey efforts in 2014 included three sampling events that targeted expected peak vocalization periods for breeding amphibians. However, during the 2014 survey event amphibian calls were detected during April pre-survey site reconnaissance efforts prior to the first survey event in May. As a result, a fourth survey event was added to the 2015 survey effort to target these early-spring breeding activities. Additionally, while biologists were performing surveys on site in July 2014 for a separate project, several anuran species were detected at relatively high numbers later in the breeding season than anticipated. Therefore, the fourth survey event in 2015 was shifted from late-June until mid-July to capture this late-season activity. Since peak amphibian calling periods are strongly associated with temperature and precipitation (Archer and Jones 2009), visits were scheduled to occur during four separate events according to minimum night air temperatures above 41 °F for event 1, 50 °F (for event 2), and 63 °F (for events 3 and 4). Survey events were scheduled at least 15 days apart and were completed between mid-April and mid-July as shown in Table 1.

Table 1. 2015 Anuran Survey Dates and Temperature Ranges

Survey Event	Survey Dates	Temperature Range During Surveys
1	April 17-18	29-61 °F
2	May 14-15	45-71 °F
3	June 12-13	52-76 °F
4	July 11-12	67-84 °F

Surveys were conducted by biologists skilled in the identification of all common anuran vocalizations with the potential to occur within the NR AOC (Table 2). Observers were also trained to estimate distance to, and calling indexes of, calling anurans, and were familiar with wetland plants of Western New York. Surveys were conducted during evenings with little wind and temperatures above the identified thresholds, preferably in moist conditions. Surveys were not conducted in sustained wind speeds above 12 miles per hour (mph) (i.e., level 3 on the Beaufort scale), or during periods of heavy rain. All surveys were conducted between 30 minutes after sunset and 1:00 a.m.

Table 2. List of Target Marsh Anurans in the NR AOC

Common Name	Scientific Name
American Toad	*Anaxyrus americanus*
Gray Treefrog	*Hyla versicolor*
Spring Peeper	*Pseudacris crucifer*
Boreal/Western Chorus Frog Complex	*Pseudacris maculata/triseriata complex*
American Bullfrog	*Lithobates catesbeianus*
Green Frog	*Lithobates clamitans*
Mink Frog	*Lithobates septentrionalis*
Wood Frog	*Lithobates sylvaticus*
Northern Leopard Frog	*Lithobates pipiens*
Pickerel Frog	*Lithobates palustris*

2.1.3 Call Surveys

A calling survey technique was used, whereby an observer listened for anuran vocalizations along the previously determined survey route. Each survey route was composed of 10 survey points randomly located within anuran breeding habitat (e.g., wetlands, ponds, shoreline) within the NR AOC. A survey route was completed by one observer (an assistant was used to fill out data forms but did not observe calling anurans) in a single night. At each survey point an observer recorded a two-minute settling period, at which time no observations were recorded and anurans were given time to adjust to any disturbances caused by the arrival of the survey team. Following the settling period, the observer listened for 5 minutes (recording data in two time brackets: the first 3 minutes and the remaining 2 minutes), and then recorded the amphibian calling index for each species heard. Use of recordings of frog calls or other artificial measures to elicit frog responses were not used. When possible, efforts were made to avoid surveying during short-term temporary periods of noise or disturbance near the site.

2.1.4 Anuran Survey Data

Field data for species targeted within the NR AOC (Table 2) during the 2015 survey period were recorded on data forms approved by the USFWS and NYSDEC prior to survey efforts. In addition to documenting occurrences of the target species, key elements of the data collection effort included an amphibian call index, and information on the weather conditions and background noise which are described in more detail below. A blank copy of the anuran data form and observer instructions for completing the form is included in Appendix C.

The amphibian calling index was developed to assist surveyors in identifying relative abundance of calls at any given survey point. The amphibian calling index is provided in the survey instructions portion of the data form (Appendix C). When recording the amphibian calling index, level 1 was assigned when calls did not overlap and calling individuals could be discretely counted; level 2 was assigned if calls of individuals overlapped, but the number of individuals could still be reasonably estimated; and, level 3 was assigned when an estimate of individuals could not be made because of significant overlap in calls making them seem continuous (i.e., a full chorus). Modifiers were used to describe if a calls were occurring within (modifier - a), outside (modifier - b), or both inside and outside (modifier - c) the targeted habitat (within 50-meter radius of survey point). For example, a full chorus of Spring Peepers heard both inside and outside of the targeted habitat was recorded as 3c.

Background Noise

Background noise was documented by recording the number of cars that passed during the listening period and noting any other sources of noise. Car counting was conducted by the observer assistant. The observer indicated whether background noise impaired his/her ability to hear by placing "yes" or "no" in the "*Was Noise a Factor?"* row. Noise levels were identified using the noise index (1-4 scale) provided in the instructions portions of the data form. If a significant noise disturbance lasted for longer than one minute, the observer could discontinue the listening period to avoid sampling during the excessive noise. If such a break was taken it was noted in the "*Did you take a break?"* row on the data form. After the major disturbance ends, the observer resumed

listening for the time remaining. A survey break was only used for significant noise disturbance lasting longer than one minute, and was not be used for background noise.

Weather Conditions

The observer recorded the time, sky code, air temperature and wind code at each point along the survey route to verify that the sampling conditions were met on the evening of the survey (Weir and Mossman 2005). If at least eight of the ten stops did not meet temperature guidelines, surveys would be conducted on another night. Additionally, observed moon or moonlight was noted by placing a "yes" or "no" in the *"Moon or Moonlight Visible?"* row on the data form.

2.1.5 Anuran Habitat Data

Initial data collection of site habitat characteristics was conducted during the 2014 survey effort. This data was then supplemented in 2015 to include the three new point locations (A-11, A-12, A-13), and at one point from 2014 (A2-9) whose location was shifted slightly for better survey coverage of the target marsh. Collected habitat data included percent cover of dominant plant species within a 50 m radius of each survey point, water level, and natural disturbances and management activities near the site. A blank copy of the habitat data form and observer instructions for completing the form are included in Appendix E.

2.1.6 Photographic Documentation of Survey Points

A photographic record of general habitat/site conditions at each survey point was collected in 2014 concurrent to habitat measurement data collection. The photographic record was updated with 2015 photographs as needed to better document conditions at an existing site (A1-2), and to document habitat at the newly established sites. The updated photographic record is presented in Appendix A.

2.2 MARSH BIRD SURVEYS

2.2.1 Survey Routes and Points

Survey routes and points were originally established using Google Earth™ software and ground-truthed to determine suitability during broad reconnaissance level surveys conducted on March 25-26 and April 17-18, 2014. Survey routes were determined by grouping survey points in a way that all points within a route could be visited during a single morning or evening survey event. Following 2014 efforts, bird points B1-8 and B1-9 were added to capture two additional marsh complexes identified while on site for 2014 efforts, and point B1-1 was eliminated because of unavoidable highway noise so excessive that surveys were not possible. Two survey routes were established as shown on Figures 3A and 3B; Route B1 comprised of eight points and Route B2 comprised of seven. Thirteen of the fifteen survey points are located near previously surveyed areas established by NYSDEC as part of the NR MMP and included all points on routes B1 and B2 except B2-1, B2-2, and B1-9 (Figures 3A and 3B).

Points were located based on recommendations from NYSDEC and availability of potentially suitable habitat. The majority of the emergent marshes located within the NR AOC are relatively

small in size [typically less than 16 hectares (ha)]. For this reason, all potential emergent marshes dominated by vegetation typically associated with wetland habitats and encompassing at least 0.5 ha were considered when establishing point placement. A single survey point was placed in marshes that were determined to have potential marsh bird habitat (emergent vegetation) totaling less than 16 ha in size (Figures 3A and 3B). For larger marshes, points were placed at 400 m spacing, or approximately 1 point per 16 ha when appropriate. Survey areas were photographed and the latitude and longitude were recorded for each survey point using a handheld GPS receiver. A unique identification number was assigned to each survey point and included the route number followed by the point number (e.g., the first survey point on the first survey route received the unique identifier B1-1).

2.2.2 Sampling Periods and Conditions

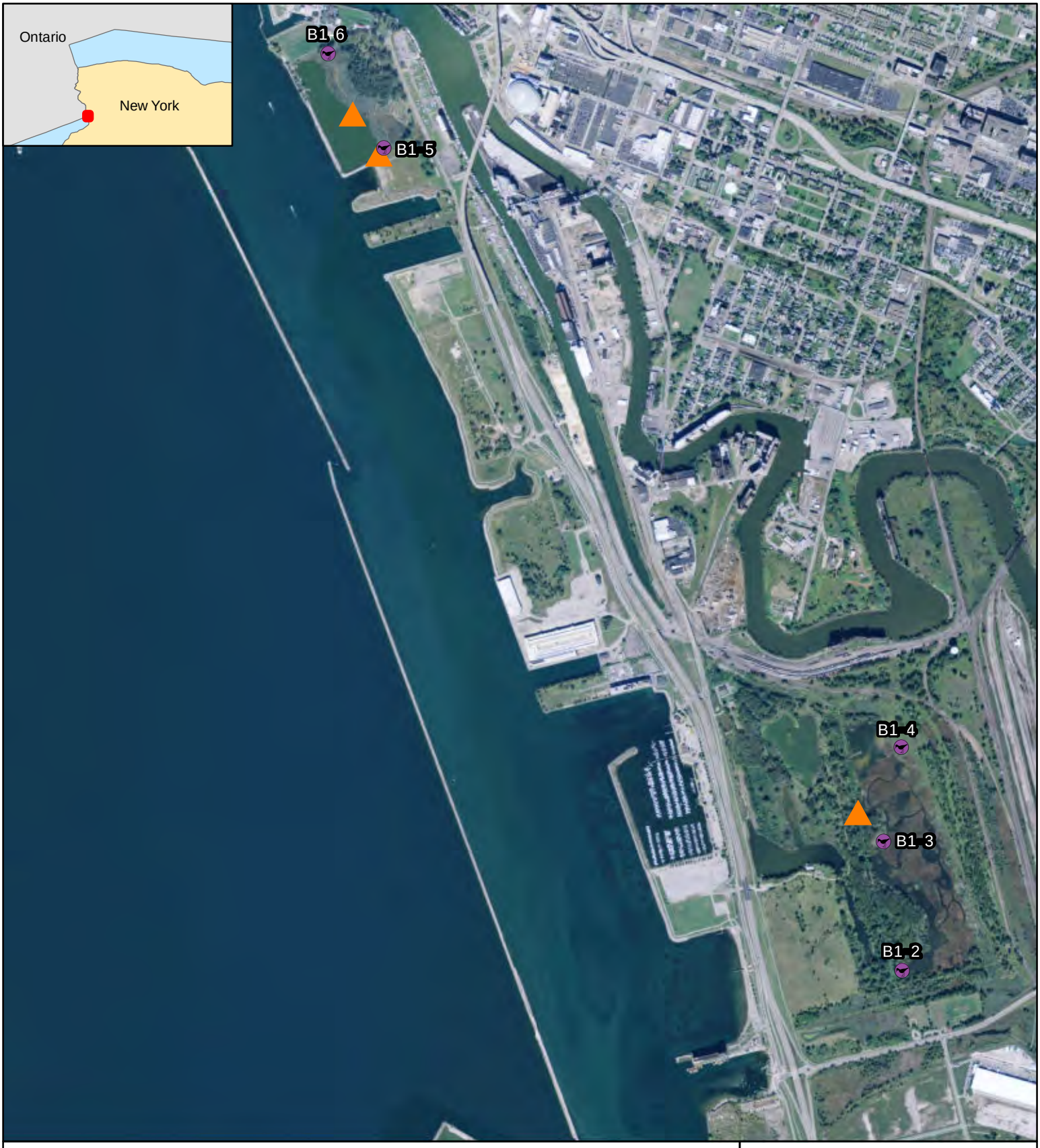
The primary goal of the marsh bird survey effort was to collect information on target primary and secondary marsh bird species to facilitate efforts to establish population estimates and to evaluate trends in the number of breeding adults for each species within the NR AOC. Per approved marsh bird survey guidelines (Conway 2011) and as identified in the approved NR AOC Marsh Anuran and Avian Work Plan, three surveys were completed within the recommended survey windows. Optimal seasonal timing varies from year to year, depending on weather conditions and breeding chronology of focal marsh birds. The timeline presented in Table 3 was followed for the 2015 survey effort and follows the same general schedule as 2014 survey efforts. Survey dates were selected to capture the variation in breeding phenology among coexisting species, with a goal of increasing the probability of conducting at least one of the surveys during the seasonal peak in vocalization among all focal marsh bird species in the area.

Table 3. 2015 Survey Dates for Target Marsh Bird Species

Survey Event	Survey Dates
1	May 15-16
2	June 13-14
3	June 27-28

Figure 3A. Marsh Bird Survey Route and Point Locations.

Figure 3B. Marsh Bird Survey Route and Point Locations.



Legend

- Route B1 Survey Point
- Marsh Monitoring Program Survey Point

N

0 0.075 0.15 0.3 Miles

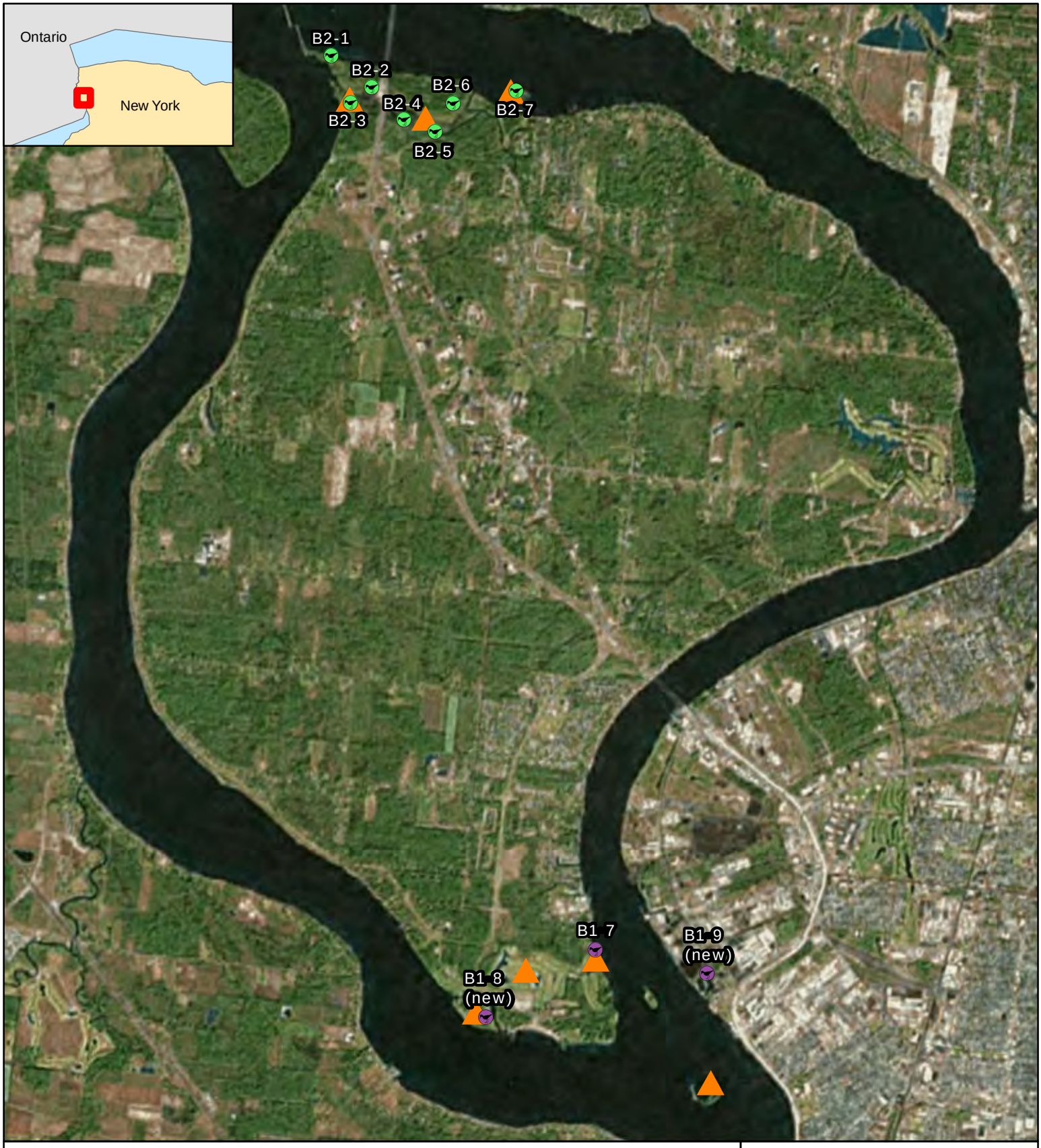
Figure 3A. Marshbird Survey Routes
Buffalo, Erie County, NY

Prepared For:
US Fish and Wildlife Service
NY Department of Environmental Conservation

Prepared By:
NewEarth
ECOLOGICAL CONSULTING, LLC

Source: NewEarth Ecological Consulting, 2015; Esri, DigitalGlobe, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Date: 12/21/2015



Legend

- Route B1 Survey Point
- Route B2 Survey Point
- Marsh Monitoring Program Survey Point

N

0 0.25 0.5 1 Miles

Figure 3B. Marshbird Survey Routes
Grand Island, Erie County, NY

Prepared For:
US Fish and Wildlife Service
NY Department of Environmental Conservation

Prepared By:
NewEarth
ECOLOGICAL CONSULTING, LLC

Source: NewEarth Ecological Consulting, 2015; Esri, DigitalGlobe, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Date: 12/21/2015

Marsh bird surveys were conducted by biologists skilled in the identification of the common calls of primary and secondary focal species (Table 4) with the potential to occur within the NR AOC. Observers were also experienced in the identification of calls of secondary marsh bird species likely to occur in the Project area, estimating the distance to calling marsh birds, and were familiar with wetland plants of Western New York.

Table 4. List of Primary and Secondary Marsh Birds Targeted in the NR AOC

Common Name	Scientific Name
Primary Focal Birds	
American Bittern	*Botarus lentiginosus*
American Coot	*Fulica americana*
Common Gallinule	*Gallinula galeata*
King Rail	*Rallus elegans*
Least Bittern	*Ixobrychus exilis*
Pied-billed Grebe	*Podilymbus podiceps*
Sora	*Porzana carolina*
Virginia Rail	*Rallus limicola*
Secondary Focal Birds	
Black Tern	*Chlidonias niger*
Common Tern	*Sterna hirundo*
Forster's Tern	*Sterna forsteri*
Green Heron	*Butorides virescens*
Marsh Wren	*Cistotoruus palustris*
Sedge Wren	*Cistothorus platensis*
Swamp Sparrow	*Melospiza georgiana*
Willow Flycatcher	*Empidonax traillii*
Wilson's Snipe	*Gallinago delicata*

Based on information provided by NYSDEC related to known peak marsh bird vocalization periods in the region, surveys were completed during the morning survey period (i.e., 30 minutes before sunrise to 3 hours after sunrise) for all survey events. In order to reduce time of day bias, points were visited in numerically ascending order during the first set of surveys, descending order during the second set of surveys, and ascending order during the final set of surveys.

Since weather conditions can affect detection probability of marsh birds (Conway 2011), surveys were only conducted during appropriate conditions, when wind speeds were less than 20 km/hr (12 mph), and not during periods of heavy fog or sustained rain. A pocket wind meter (Kestrel 3000) was used to obtain an accurate measure of wind speed in the field. Surveys were postponed if the observer believed winds were affecting calling probability (even if winds were <20 km/hr).

2.2.2 Call Surveys

Due to the secretive nature of marsh birds they are seldom observed and vocalizations are heard infrequently. For these reasons surveyors utilized broadcast calls to elicit vocalizations during surveys. Per recommended marsh bird survey guidelines (Conway 2011) survey efforts at each point included a 2-minute settling period after arrival on site; a 5-minute passive monitoring period

in which surveyors recorded all primary and secondary focal species (see Table 4) detected; then an 8-minute call-broadcast period, in which recorded primary focal marsh bird calls were broadcast into the marsh. The call-broadcast species sequence included only the primary focal species: Least Bittern, Sora, Virginia Rrail, King Rail, American Bittern, Common Gallinule, American Coot, and Pied-billed Grebe, and included 30 seconds of calls for each species, with 30 seconds of silence between calls. The 30 seconds of calls consisted of a mix of the most common calls for the species, separated by 5 to 6 seconds of silence between each call type.

Broadcast equipment included use of an mp3 player with an externally connected speaker with a sound pressure of 80-90 dB at 1m in front of the speaker. The broadcast speaker was placed upright on the ground or on the bow of the boat (when conducting surveys from boat) and was aimed in the direction of the marsh at each survey point (Figures 3A and 3B). Surveyors stood at a minimum 2 m to the side of the speaker while listening for vocal responses.

Because time spent seeking, observing, and recording non-focal species may detract from the quality of observations for primary and secondary focal species, surveyors did not record non-focal species during the survey period (see Johnson *et al.* 2009; Conway 2011 for discussion). When possible, efforts were made to avoid surveying during short-term temporary periods of noise or disturbance near the site.

2.2.3 Marsh Bird Survey Data

Field data for marsh bird species targeted within the NR AOC during the 2015 survey period were recorded on data forms which were approved by the USFWS and NYSDEC prior to survey efforts. In addition to information regarding the survey event and weather conditions, key elements of the data collection included responses from the primary focal broadcast species, and secondary focal species, which are described in more detail below. A blank copy of the marsh bird data form and detailed observer instructions for completing the form are included in Appendix D.

Primary Focal, Broadcast Species

Observers recorded the unique identification number (e.g. B2-1) and time when they first arrived at each survey point. When a focal species was detected, the four letter species code (located in the instructions portion of the marsh bird data form) was entered into the "Species" column on the data form. In addition to the four-letter code, a check box was recorded in each detection column corresponding to the time interval(s) during which that individual was detected. The observer recorded an individual once per minute, regardless of if the individual called once or several times during that minute. If an individual continued to call into a second minute of passive listening an "H" was placed in the second column. If that individual continued to call during the 30-second broadcast for American Bittern or the 30-second silent period following the American Bittern broadcast, an "H" was placed in the column for "AMBI", and so forth. If an individual was heard and seen, both a "H" and "S" were recorded in the appropriate column(s).

When determining if an individual was a new observation or an individual that was already detected, surveyors used their best professional judgment. In general, observers were conservative

and assumed that a call was from the same bird if heard from the same general location (i.e., similar direction and distance from the location of a previously recorded call) as a previously detected individual. If no species were observed during the survey period, the observer recorded "no birds" in the *Species* column of the data form. If the observer heard a marsh bird and was unable to identify the bird to the species level, the surveyor recorded "unknown" in the *Species* column and record all data for the individual as described above.

Secondary Focal, Non-Broadcast Species

Whenever possible, secondary focal species which specifically included Black Tern, Green Heron, Marsh Wren, Sedge Wren, Willow Flycatcher, Wilson's Snipe, Swamp Sparrow and Common Tern were recorded in the same manner as the primary focal species discussed above. Broadcast calls were not used to solicit responses from secondary focal species.

2.2.4 Marsh Bird Habitat Data

As with the anuran marsh habitat survey effort, initial marsh bird habitat data collection was performed during the 2014 survey effort, then supplemented during the 2015 effort with habitat information from the two new point locations (B-8 and B-9) and at three locations where points still target the original marsh area, but were moved slightly to better capture marsh conditions and bird observations (B1-5, B1-6, B2-3) As noted, the same data form template was used to document conditions at both marsh anuran and marsh bird sample points, and in some instances the same survey locations were used for both anurans and birds (Figures 3A and 3B). A copy of the data form and instructions are included in Appendix E.

2.2.5 Photographic Documentation of Survey Points

Photographs were collected at each station in 2014 and were only collected in 2015 at the two new point locations (B-8 and B-9). The photographic record of general habitat/site conditions at each marsh bird survey point is provided in Appendix A.

3.0 RESULTS

3.1 ANURANS

General site reconnaissance was conducted on April 16, 2015 to confirm the conditions and accessibility to locations, and anuran call monitoring surveys were performed on April 17-18; May 14-15; and June 12-13; and July 11-12 in 2015. Tables 5 through 9 summarize the survey results, and Figure 2 depicts the locations of each survey route and point. Appendix B provides coordinates for the geographic location of all survey points, Appendices C and E provide the raw survey data and completed data forms from 2015 anuran and habitat surveys.

3.1.1 Anuran Surveys

Survey Route A1 is located on Grand Island and is associated with various habitats along the Niagara River shoreline. Survey Route A2 is located on the east side of the Niagara River, from Tifft Nature Preserve at the southern extent to Gratwick Riverside Park at the northern extent of the survey route. A total of 10 points were surveyed for Route A1 and 13 were surveyed for Route A2 during the four survey periods; resulting in 92 survey events.

Six anuran species were recorded within targeted marsh survey areas across the 92 survey events (Table 5). A seventh species (Pickerel Frog) was documented during survey events, but only observed outside of the target marsh areas. Wood Frog, Mink Frog, and Gray Tree Frog were not detected in the study area.

Table 5. Anuran Species Detections per Survey Event

Species	# and % of Points with Detections Event 1 (April 17-18, 2015)[1]	# and % of Points with Detections Event 2 (May 14-15, 2015)[1]	# and % of Points with Detections Event 3 (June 13-14, 2015)[1]	# and % of Points with Detections Event 4 (July 11-12, 2015)[1]	Total Number of Survey Events With Detections[2]
Spring Peeper	13 (57%)	11 (48%)	3 (13%)	0	27 (29%)
Green Frog	0	0	9 (39%)	13 (57%)	22 (24%)
Bull Frog	0	0	5 (22%)	7 (30%)	12 (13%)
Pickerel Frog	0	0	0	0	0
Northern Leopard Frog	6 (26%)	0	0	0	6 (7%)
American Toad	3 (13%)	1 (4%)	1 (4%)	0	5 (5%)
Gray Tree Frog	0	0	0	0	0
Chorus Frog	9 (39%)	0	0	0	9 (10%)
Mink Frog	0	0	0	0	0
Wood Frog	0	0	0	0	0

[1] 23 events total

[2] 92 events total

The two modifications made to the survey protocol prior to the 2015 effort (a fourth survey event in April and extending the final survey into July), allowed surveyors to capture early season calls

of the chorus frog and high numbers of Green Frogs that were most active in July. Northern Leopard Frog and Chorus Frog were only recorded during the first survey event. Of the 92 total survey events, Spring Peepers were heard during the highest number of events (27), followed by Green Frog at 22 and Bull Frog at 12 (Table 5).

Of the 23 points surveyed, four had no anuran species detections: A1-5, A2-7, A2-8, and A2-10 (Table 6). Spring Peepers were heard at the highest number of survey stations on both routes (at nine points on A1 and six on A2), followed by Green Frogs (at six points on A1 and seven on A2).

Table 6. Anuran Species Detections per Survey Point

Route A1												
Species	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**# Unique Points Species was Detected at**
Spring Peeper	x	x	x	x		x	x	x	x	x	9
Green Frog		x	x	x			x	x	x		6
Bull Frog			x					x	x		3
Pickerel Frog											0
Northern Leopard Frog				x				x			2
American Toad		x									1
Gray Tree Frog											0
Chorus Frog	x	x		x			x				4
Mink Frog											0
Wood Frog											0

Route A2													
Spring Peeper	x	x	x		x					x		x	6
Green Frog	x	x	x	x						x	x	x	7
Bull Frog	x	x	x						x			x	5
Pickerel Frog													0
Northern Leopard Frog	x	x								x		x	4
American Toad		x				x			x				3
Gray Tree Frog													0
Chorus Frog	x	x				x				x		x	5
Mink Frog													0
Wood Frog													0

Calls noted inside, outside, and both inside and outside of the targeted habitat at each survey point were recorded using calling code modifiers to evaluate locations of calling amphibians (as described in the Amphibian Calling Index portion of section 2.1.4). Nearly all of the recorded frog calls were detected from within the targeted habitat (89% or 72 of 81 recorded calls in the 5-minute survey period for both Survey Route A1 and A2). Several calls at points A1-6 and A2-5 were only of species located outside of the target survey marsh area (11% or 10 of 81 recorded calls).

Table 7. Location of Anuran Species in Relation to Survey Points

Point	Total Species Detections	Cumulative Species Detections (within target habitat only)	Cumulative Species Detections (within and outside of target habitat)	Cumulative Species Detections (outside target habitat only)
Route A1				
A1-1	3	0	1	2
A1-2	5	1	4	0
A1-3	5	3	2	0
A1-4	5	0	5	0
A1-5	0	0	0	0
A1-6	1	0	0	1
A1-7	4	1	2	1
A1-8	6	2	4	0
A1-9	5	2	3	0
A1-10	2	1	0	1
TOTAL	**36**	**10**	**21**	**5**
Route A2				
A2-1	7	4	3	0
A2-2	9	3	3	3
A2-3	6	6	0	0
A2-4	2	2	0	0
A2-5	1	0	0	1
A2-6	2	0	2	0
A2-7	0	0	0	0
A2-8	0	0	0	0
A2-9	2	2	0	0
A2-10	0	0	0	0
A2-11	5	1	3	1
A2-12	2	1	1	0
A2-13	9	3	6	0
TOTAL	**45**	**22**	**18**	**5**

Data were collected in a manner that also allowed for an evaluation of two widely used anuran monitoring protocols (i.e. Environment Canada Marsh Monitoring Program [MMP] three minute intervals vs. the North American Amphibian Monitoring Program [NAAMP] five minute intervals) (Table 8). As expected, extending the survey period an additional two minutes resulted in some additional detections, but no new species were recorded.

On Route A1, a total of two additional species were documented that were not captured during the 3-minute survey window, whereas extending an additional two minutes on Route A2 resulted in five additional detections. Of the 81 call detections, 50 were of call index #1 (individual calls could be distinguished), 23 were of call index #2 (some individuals could be distinguished, but some overlapping calls), and eight were of call index # 3 (large choruses, calls continuous and/or overlapping). This suggests that although some species may be detected relatively frequently, survey wide 62% of the detections were of a small number of individuals at any given station.

Table 8. Anuran Species Detected Using 3 Minute and 5 Minute Call Intervals

Species	Survey Route A1		Survey Route A2	
	3-Minute Period # of Points Recorded	5-Minute Period # of Points Recorded	3-Minute Period # of Points Recorded	5-Minute Period # of Points Recorded
Survey Event 1 (April 17-18, 2015)				
Spring Peeper	9	9	3	4
Green Frog	0	0	0	0
Bull Frog	0	0	0	0
Pickerel Frog	0	0	0	0
Northern Leopard Frog	2	2	3	4
American Toad	0	0	3	3
Gray Tree Frog	0	0	0	0
Chorus Frog	4	4	5	5
Survey Event 2 (May 14-15, 2015)				
Spring Peeper	5	5	6	6
Green Frog	0	0	0	0
Bull Frog	0	0	0	0
Pickerel Frog	0	0	0	0
Northern Leopard Frog	0	0	0	0
American Toad	1	1	0	0
Gray Tree Frog	0	0	0	0
Chorus Frog	0	0	0	0
Survey Event 3 (June 12-13, 2015)				
Spring Peeper	2	2	1	1
Green Frog	3	3	5	6
Bull Frog	1	1	3	4
Pickerel Frog	0	0	0	0
Northern Leopard Frog	0	0	0	0
American Toad	0	0	0	1
Gray Tree Frog	0	0	0	0
Chorus Frog	0	0	0	0

Table 8. Anuran Species Detected Using 3 Minute and 5 Minute Call Intervals (continued)

Species	Survey Route A1		Survey Route A2	
	3-Minute Period # of Points Recorded	5-Minute Period # of Points Recorded	3-Minute Period # of Points Recorded	5-Minute Period # of Points Recorded
Survey Event 4 (July 11-12, 2015)				
Spring Peeper	0	0	0	0
Green Frog	5	6	7	7
Bull Frog	2	3	4	4
Pickerel Frog	0	0	0	0
Northern Leopard Frog	0	0	0	0
American Toad	0	0	0	0
Gray Tree Frog	0	0	0	0
Chorus Frog	0	0	0	0

3.1.2 Incidental Observations

Six Northern Leopard Frogs and four American Toads were observed incidentally while traversing the Project Area; breeding calls of both were also documented during survey events. Only the Pickerel Frog, heard calling on 4/18 while walking within Tifft Nature Preserve, was not documented during any survey events. Numerous feral/outdoor cats as well as an occasional Red Fox, Whitetail deer, Muskrat, and Beaver were also noted.

3.1.3 Disturbances Noted During Survey Efforts

In highly developed areas, such as the Niagara River AOC, noise can be a significant factor in surveyor ability to detect calling amphibians. Despite surveyor efforts to avoid periods of high noise levels and activity at points, noise had a moderate (score = 2) to serious (score $\geq$ 3) effect on two or more survey events at 16 (70%) of the point locations (Table 9). The primary source of noise on anuran surveys was associated with vehicle traffic and boats. Other factors included sirens, airplanes, construction equipment, and noise from people recreating in the area. Additionally, ongoing restoration and monitoring efforts in Tifft and Times Beach nature preserves have affected vegetation and in some cases has resulted in fluctuating water levels within the marsh system. Disturbance from these activities may have a short-term direct negative affect on amphibian breeding activities in the marsh, but efforts are likely to improve marsh conditions and suitability for breeding amphibians over time. Survey points within that are most likely to be affected by these activities include A2-1, A2-2, and A2-3.

Table 9. Noise Levels During Anuran Survey Events

Point	Noise Event 1[1]	Noise Event 2[1]	Noise Event 3[1]	Noise Event 4[1]
Route A1				
A1-1	1	0	0	0
A1-2	1	0	1	0
A1-3	1	0	1	0
A1-4	4	3	0	1
A1-5	0	2	3	0
A1-6	2	0	0	0
A1-7	4	2	0	0
A1-8	4	3	3	0
A1-9	2	2	3	0
A1-10	3	1	2	0
Route A2				
A2-1	0	1	1	0
A2-2	0	1	1	1
A2-3	0	1	3	3
A2-4	2	3	1	2
A2-5	1	3	2	2
A2-6	0	2	3	1
A2-7	3	2	2	1
A2-8	1	1	2	2
A2-9	1	1	0	1
A2-10	2	1	2	1
A2-11	3	1	0	2
A2-12	0	2	2	2
A2-13	0	0	1	2

[1] Effect on Sampling: 0 = none; 1 = slight; 2 = moderate; 3 = serious; 4 = profound

3.1.4 Habitat

Of the 23 marshes surveyed, five are considered open water habitat (i.e., site dominated by open water and wetland/aquatic vegetation cover is less than 25%), twelve are open water/marsh habitats (i.e., site with at least 25% cover of wetland vegetation, and open water present within 50 m of the marsh sample point), and the remaining six sites are considered marsh habitats (i.e., site with at least 25% cover of wetland vegetation, surface water may/may not have be present in the marsh, but any open water is 50 m or more away) (Table 10, and see photographs in Appendix A).

Table 10. Anuran Marsh Habitat Conditions

Point	General Type	Detections[1]	% Veg Cover[2]	Water Depth (m)	% Typha (N)[3]	% Lythrum (I)[3]	% Phragmites (I)[3]	% Lonicera (I)[3]	Open Water/Veg Interspersion	Distance to Open Water (m)[4]
Route A1										
A1-1	Open Water/Marsh	3	110	0	10	10	0	0	20/80	3
A1-2	Open Water	5	30	0.75	10	10	0	0	80/20	1
A1-3	Open Water/Marsh	5	130	0	60	40	0	0	30/70	5
A1-4	Marsh	5	100	0.15	35	14	0	0	0/100	None
A1-5	Open Water/Marsh	0	45	0.12	30	5	0	0	70/30	3
A1-6	Open Water	1	0	0.1	0	0	0	0	100/0	0
A1-7	Marsh	4	110	0	30	0	0	0	0/100	80
A1-8	Open Water/Marsh	6	60	0.25	40	0	0	0	50/50	1
A1-9	Marsh	5	100	0	70	0	0	0	0/100	None
A1-10	Open Water	2	0	0.6	0	0	0	0	100/0	2
Route A2										
A2-1	Open Water/Marsh	7	67	0	60	0	0	5	30/70	1
A2-2	Open Water/Marsh	9	100	0	100	0	0	0	25/75	1
A2-3	Marsh	6	80	0	70	0	10	0	0/100	70
A2-4	Open Water/Marsh	2	37	0.8	20	0	0	0	75/25	2
A2-5	Marsh	1	100	0		0	100	0	0/100	None
A2-6	Marsh	2	110	0	30	0	70	0	0/100	None
A2-7	Open Water	0	0	0.17		0	0	0	100/0	0
A2-8	Open Water	0	0	1.0		0	0	0	100/0	0
A2-9	Open Water/Marsh	2	45	0	20	5	20	0	40/60	10
A2-10	Open Water/Marsh	0	28	0.5	10	0	0	0	80/20	5
A2-11	Open Water/Marsh	5	90	1.5	0	10	75	5	75/25	3
A2-12	Open Water/Marsh	2	95	0.8	60	15	0	0	65/35	3
A2-13	Open Water/Marsh	9	85	1.2	30	15	0	0	75/25	2

[1] Cumulative number of species detections for all survey events

[2] Cover may exceed 100% due to overlap of vegetation at varying heights within a strata

[3] (I) = New York State recognized non-native invasive species; (N) native species, but potentially noxious

[4] 0 = open water present at point location; none = no open water within 100 m

Four marshes had no marsh vegetation (primarily because they were open water habitats). Of the 19 remaining areas, one or more invasive species (*Phragmites australis, Lythrum salicaria,* and *Lonicera tatarica*), or potentially noxious species (*Typha angustifolia,* and *Typha latifolia*), were present in each. The invasive species *Phragmites australis* was the dominant vegetation (i.e., had higher coverage than any other species) at three of the sites; A2-5, A2-6 and A2-11 (Table 10), and cattails (i.e., genus *Typha*) were the dominant species at twelve (A1-2, A1-3, A1-4, A1-5, A1-8, A1-9, A2-1, A2-2, A2-3, A2-4, A2-12, and A2-13). *Phragmites* and *Typha* were equally dominant at site A2-9. Native species were more common than these invasive/noxious species at remaining vegetated sites. Other common wetland plants included species in the following genus: *Carex, Cornus, Sparganium, Eupatorium, Bolboschoenus, Schoenoplectus, Dispaucus, Nuphar, Decodan, and Persicaria* (Appendix E). Of these, only C*arex, Cornus, Sparganium,* and *Eupatorium* were found as common species in more than one marsh area surveyed.

Ten sites had no measurable surface water present on the marsh surface at the time of survey (Table 10). Of the remaining 14 areas, water levels were greater than 0.30 m (> ~12 inches) at nine sites, between greater than 0.15 and less than 0.30 m (> ~6 and ~12 inches) at two sites, and between 0.1 and 0.15 m (~ 4 to < ~6 inches) at three sites (Table 10). Although surface water was not present within the marsh habitat at 10 survey locations, open water was present within 50 meters of five of the sites (A1-1, A1-3, A2-1, A2-2, and A2-9), and within 100 m of two sites (A1-7 and A2-3). No open water was reported within 100 m of sites A1-9, A2-5, and A2-6. However, surface water levels are presented herein to give the reader a sense of overall habitat condition near the survey point. It should be noted that water levels can fluctuate dramatically, and the conditions at the location of the measurements are not necessarily representative of the overall marsh system and specific locations that an individual may be breeding in.

3.2 MARSH BIRDS

General site reconnaissance was conducted to evaluate site conditions and accessibility on May 14, 2015, and marsh bird monitoring surveys were conducted on May 15th and 16th, June 13th and 14th, and June 27th and 28th, 20152015. Tables 111 through 414 summarize the survey results, and Figures 3A and 3B show the locations of each survey route and point. Appendix B provides coordinates for the geographic location of all survey points, Appendices D and E provide the raw survey data and completed data forms from 2015 marsh bird and habitat surveys.

3.2.1 Marsh Bird Surveys

Eight survey points for Route B1 were established within Tifft Nature Preserve, Times Beach Nature Preserve, and Beaver Island State Park and generally are associated with various open water habitats along the Niagara River shoreline and adjacent near shore areas. Points for survey Route B2 were established on Grand Island and Sunken Island (also referred to as Grass Island by various sources), with six of the seven survey points located within Buckhorn Island State Park. A total of fifteen points were surveyed for each survey route during the three survey periods, resulting in 45 survey events.

Primary Focal Species

Six of the eight target primary focal marsh bird species were recorded across 45 survey events (Table 11). Surveys along Route B1 resulted in the recording of four species (i.e. least bittern, common gallinule, Virginia rail, and pied-billed grebe), whereas surveys along Route B2 recorded five species (i.e. Virginia Rail, American Coot, Pied-billed Grebe, Common Gallinule, and Sora). Virginia Rail was the most commonly observed species, and was detected during 20% of the survey events (9 of 45). Virginia Rail and Pied-billed Grebe had the highest numbers of individuals recorded at a given point (three individual rails at B1-4 and three grebes at B2-7). King Rail, a target species, was never heard in the project area.

Virginia Rail and Common Gallinule were the species most commonly detected on Environment Canada's MMP routes (on at least 10% of station-years) for this region. All additional target species for this survey were detected on MMP routes, but in much lower numbers (between 4 and 9% of station-years) (Archer and Jones 2009). King Rail were not detected on any MMP routes in any region surveyed.

Table 11. Marsh Bird Species Detections per Survey Event

Species	# and % of Points with Detections Event 1 (May 15-16, 2015)[1]	# and % of Points with Detections Event 2 (June 13-14, 2015)[1]	# and % of Points with Detections Event 3 (June 27-28, 2015)[1]	Total Number of Survey Events with Detections[2]
Least Bittern	1 (7%)	0	0	1 (2%)
Sora	1 (7%)	1 (7%)	0	2 (4%)
Virginia Rail	3 (20%)	3 (20%)	3 (20%)	9 (20%)
American Bittern	0	0	0	0
Common Gallinule	1 (7%)	1 (7%)	1 (7%)	3 (7%)
American Coot	1 (7%)	0	0	1 (2%)
Pied-Billed Grebe	1 (7%)	1 (7%)	1 (7%)	3 (7%)

1 15 events total

2 45 events total

Of the 15 points surveyed, nine had no marsh bird species detections: B1-5; B1-6; B1-7; B1-8; B2-1; B2-2; B2-4; B2-5; and B2-6 (Table 12). Point B2-7 had the highest number of different species detected (Common Gallinule, Sora, American Coot, and Pied-billed Grebe). Least Bittern was only observed at point B1-2 and American Coot was only documented within the target marsh at B2-7 (Table 12).

Table 12. Marsh Bird Species Detections per Survey Point

Point	Number of Individuals Detected[1]							
	Least Bittern	Sora	Virginia Rail	American Bittern	Common Gallinule	American Coot	Pied-Billed Grebe	Total Detections
Survey Event 1 (May 15-16, 2015)								
B1-2	1 (1)	-	1 (0)	-	-	-	-	2 (1)
B1-3	0 (1)	-	1 (1)	-	0 (1)	-	-	1 (3)
B1-4	-	-	1 (1)	-	0 (1)	-	-	1 (2)
B1-5	-	-	-	-	-	-	-	0
B1-6	-	-	-	-	-	-	-	0
B1-7	-	-	-	-	-	-	-	0
B1-8	-	-	-	-	-	-	-	0
B1-9	-	-	-	-	-	-	-	0
B2-1	-	-	0 (1)	-	-	-	-	0 (1)
B2-2	-	-	-	0 (1)	-	-	-	0 (1)
B2-3	-	-	0 (1)	-	-	-	-	0 (1)
B2-4	-	-	-	-	-	-	-	0
B2-5	-	-	-	-	-	-	-	0
B2-6	-	-	0 (1)	-	-	-	-	0 (1)
B2-7	-	1 (0)	-	-	1 (2)	1 (0)	2 (6)	5 (8)
Survey Event 2 (June 13-14, 2015)								
B1-2	0 (1)	-	-	-	-	-	0 (1)	0 (2)
B1-3	0 (1)	1 (0)	1 (1)	-	1 (1)	-	-	3 (3)
B1-4	-	-	3 (1)	-	0 (1)	-	-	3 (2))
B1-5	-	-	-	-	0 (1)	-	-	0 (1)
B1-6	-	-	-	-	-	-	-	0
B1-7	-	-	0 (1)	-	-	-	-	0 (1)
B1-8	-	-	-	-	-	-	-	0
B1-9	-	-	1 (NA)	-	-	-	-	1 (0)
B2-1	-	-	-	-	-	-	-	0
B2-2	-	-	-	-	-	-	-	0
B2-3	-	-	0 (1)	-	-	-	-	0 (1)
B2-4	-	-	-	-	-	-	-	0
B2-5	-	-	-	-	-	-	-	0
B2-6	-	-	-	-	-	-	-	0
B2-7	-	0 (1)	-	-	-	-	2 (1)	2 (2)

[1] Results from 2014 are indicated in parenthesis

Table 12. Marsh Bird Species Detected per Survey Point (continued)

Survey Event 3 (June 27-28, 2015)[1]								
Point	Least Bittern	Sora	Virginia Rail	American Bittern	Common Gallinule	American Coot	Pied-Billed Grebe	Total Detections
B1-2	0 (1)	-	2 (0)	-	-	-	-	2 (1)
B1-3	0 (1)	-	0 (1)	-	0 (1)	-	0 (1)	0 (4)
B1-4	0 (1)	-	1 (0)	-	1 (1)	-	-	2 (2)
B1-5	-	-	-	-	-	-	-	0
B1-6	-	-	-	-	-	-	-	0
B1-7	-	-	-	-	-	-	-	0
B1-8	-	-	-	-	-	-	-	0
B1-9	-	-	-	-	-	-	-	0
B2-1	-	-	-	-	-	-	-	0
B2-2	-	0 (1)	-	-	-	-	-	0 (1)
B2-3	-	-	2 (0)	-	-	-	-	2 (0)
B2-4	-	-	-	-	-	-	-	0
B2-5	-	-	-	-	-	-	-	0
B2-6	-	-	-	-	-	-	-	0
B2-7	-	-	-	-	-	-	3 (1)	3 (1)

[1] Results from 2014 are indicated in parenthesis

Secondary Focal Species

Secondary focal species were also documented during each of the three survey events and five of the nine targeted secondary focal species were detected. Species detected on Survey Route B1 included Swamp Sparrow, Willow Flycatcher, Marsh Wren, Common Tern, and Green Heron; while Survey Route B2 secondary focal species included Swamp Sparrow, Marsh Wren, Willow Flycatcher, and Common Tern. The most commonly observed secondary focal species were the Swamp Sparrow, recorded during 21 of 45 (47%) survey events, followed by Willow Flycatcher, detected during 13 of 45 (29%) survey events. Black Tern, Forster's Tern, Sedge Wren and Wilson's Snipe were not detected in the survey area.

3.2.2 Incidental Observations

On May 15th, two Northern Harriers were observed flying over the marsh surface near point B1-3.

3.2.3 Disturbances Noted During Survey Efforts

Similar to anuran survey efforts, noise (primarily from vehicle and boat traffic), had some effect on surveyor ability to detect calls. Noise was at moderate (score = 2) to serious (score = 3) levels during two or more survey events at seven (47%) of the 15 point locations (Table 13). Although not necessarily documented during actual survey event windows, boats including excessively loud high-speed jet boats, were repeatedly observed in close proximity to known nesting areas for marsh birds and herons such as point B2-7 as well as the Motor Island heron rookery and adjacent restoration site. Additionally, ongoing restoration efforts in Tifft and Times Beach nature preserves

has affected vegetation and in some cases resulted in fluctuating water levels within the marsh system. Disturbance from these activities may have a short-term direct negative affect on marsh bird breeding activities in the marsh, but efforts are likely to improve conditions for marsh species over time. Survey points that are most likely to be affected by these activities include B1-2, B1-3, B1-5 and B1-6.

In addition, ongoing restoration and research activities at Times Beach have resulted in some impacts to the marsh vegetation and ongoing disturbance (i.e., noise, human activity) which may have affected breeding activities of marsh dependent species. Marsh species are expected to colonize the site once disturbance activities on the marsh cease.

Table 13. Noise Levels During Marsh Bird Survey Events.

Point	Noise Level Event 1[1]	Noise Level Event 2[1]	Noise Level Event 3[1]
Route B1			
B1-2	2	3	0
B1-3	2	2	1
B1-4	1	0	1
B1-5	0	0	0
B1-6	0	0	0
B1-7	1	0	1
B1-8	0	0	1
B1-9	1	0	0
Route B2			
B2-1	1	3	2
B2-2	3	1	3
B2-3	2	2	1
B2-4	3	0	2
B2-5	1	0	1
B2-6	1	0	1
B2-7	1	3	2

[1] Effect on Sampling: 0 = none; 1 = slight; 2 = moderate; 3 = serious; 4 = profound

3.2.4 Habitat

Twelve of the 15 marsh bird survey points are positioned to assess the same marsh complexes as anuran survey points. Of the marshes surveyed, eight are considered open water/marsh habitats (i.e., site with at least 25% cover of wetland vegetation, and open water present within 50 m of the marsh sample point), and six were considered marsh habitats (i.e., site with at least 25% cover of wetland vegetation, surface water may/may not have been present in the marsh, but any open water is 50 m or more away) (Table 14).

Table 14. Marsh Bird Habitat Conditions

Point	General Type	Detections[1]	% Veg Cover[2]	Water Depth (m)	% Typha (N)[3]	% Lythrum (I)[3]	% Phragmites (I)[3]	% Lonicera (I)[3]	Open Water/Veg Interspersion	Distance to Open Water (m)[4]
B1-2	Open Water/Marsh	4	67	0	60	0	0	5	30/70	1
B1-3	Open Water/Marsh	4	100	0.67	30	0	0	0	70/30	0
B1-4	Open Water/Marsh	6	100	0.9	100	0	0	0	25/75	1
B1-5	Marsh	0	80	0	70	0	10	0	0/100	70
B1-6	Marsh	0	100	0	80	0	0	0	25/75	50
B1-7	Open Water/Marsh	0	125	0.1	50	30	0	0	30/70	3
B1-8	Open Water	0	30	0.75	10	10	0	0	80/20	1
B1-9	Open Water/Marsh	1	90	1.5	0	10	75	5	75/25	3
B2-1	Marsh	0	80	0	30	0	0	0	0/100	none
B2-2	Marsh	0	105	0	55	0	0	0	0/100	none
B2-3	Marsh	2	100	0	70	0	0	0	0/100	none
B2-4	Open Water/Marsh	0	60	0.25	40	0	0	0	50/50	1
B2-5	Marsh	0	130	0	80	0	0	0	0/100	none
B2-6	Open Water/Marsh	0	90	0.23	0	0	0	0	25/75	1
B2-7	Open Water/Marsh	10	70	0.58	70	0	0	0	40/60	0

[1] Cumulative number of species detections for all survey events

[2] Cover may exceed 100% due to overlap of vegetation at varying heights within a strata

[3] (I) = New York State recognized non-native invasive species; (N) = native species, but potentially noxious

[4] 0 = open water present at point location; none = no open water within 100 m

Fourteen of the 15 marshes were comprised of one or more invasive species (*Phragmites australis, Lythrum salicaria,* and *Lonicera tatarica*), or potentially noxious species (*Typha angustifolia,* and *Typha latifolia*). The invasive species *Phragmites australis* was the most common species at one site; B1-9 (Table 14), and cattails (i.e., genus *Typha*) were the most common at 9 sites. Native species were more common than these invasive/noxious species at remaining vegetated sites. Other relatively common native wetland plants included species in the following genus: *Carex, Hibiscus, Lemna, Persicaria, Impatiens, Eupatorium, Urtica, Solidago Coronilla, Saggitaria, Nymphea, Nuphar, Decadon,* and an unknown species of grass (Appendix E). Of these, only C*arex, Hibiscus, Persicaria and Saggitaria* were found as common species in more than one marsh area surveyed.

Eight (53%) of the sites had measurable surface water present at the time of survey (Table 14). Water levels were greater than 0.30 m (> ~12 inches) at five sites, between greater than 0.15 and less than 0.30 m (> ~6 and ~12 inches) at two sites, and between 0.1 and 0.15 m (~ 4 to < ~6 inches) at one location. Although no surface water was present within the marsh habitat at seven of the survey locations, open water was within 50 m of sites B1-2 and B1-6 and within 100 m of site B1-5. No open water was reported within 100 m of sites B2-1, B2-2, B2-3, and B2-5. As with the anuran habitat, it should be noted that water levels can fluctuate dramatically, and the water levels at the location of the measurements are not necessarily representative of the overall marsh system and specific locations that an individual bird may be breeding in.

4.0 DISCUSSION

Summaries and data presented herein were collected during the second annual survey effort for the Project. Three additional years of data collection are planned and will help to improve efforts to evaluate and assess marsh anuran and marsh bird populations and habitats within the NR AOC, and will provide a basis for future year-year comparisons.

Routes and Points

Two survey routes with 23 points total were sampled for anurans and two routes with 15 points were sampled for marsh birds during the 2015 effort. Numerous potential locations were visited at the onset of the 2015 survey in an effort to identify any additional suitable areas to include in the survey effort. However, only three new survey locations were identified for anurans (Figure 2) and two were added for marsh birds (Figures 3A, 3B). One marsh bird point (B1-1) was eliminated due to repeated unsuccessful attempts to conduct surveys at the location because of extreme noise levels from highway traffic.

This study represents nearly a full census of every location of potentially suitable habitat within the NR AOC that met the sample selection criteria (i.e., minimum size, location adjacent to the Niagara River, and direct hydrologic connection to the river) for the target guilds. As discussed throughout NR AOC planning documents, nearly all of the former marshes in the region no longer exist, or are degraded to the extent that the vegetation, hydrologic regimes, food sources, and lack of adjacent undeveloped/undisturbed upland areas may make them unsuitable as habitat for breeding anurans and marsh birds. Wetland creation and restoration efforts such as those proposed in the NR AOC action plan (Filipski 2012) are the only foreseeable measures that would provide opportunities for significant expansion of anuran and marsh bird survey routes and points.

Anurans

Six of the 10 target anuran species were documented during the 2015 anuran survey effort and each of the species was also documented during 2014 surveys and during MMP data collection efforts in the NR AOC study area between 1995 and 2011 (Archer and Jones 2009). A seventh species (a lone Pickerel Frog) was documented while on site for survey events, but outside of the target marsh areas. The Pickerel Frog was not documented in 2014, nor was it reported on any previous MMP surveys in the general study area. Three species were not detected during this survey or during 2014 surveys; Mink Frog, Wood Frog, and Gray Tree Frog. The Gray Tree Frog comprised 14% of the species detections on MMP surveys in the region, Wood Frog comprised 1% of the detections. Gray Tree Frogs typically call later in the breeding season and would likely be detected in a later-times survey event. The vernal pool habitat that Wood Frogs depend on for successful breeding may occur in the general MMP survey area (which includes locations greater than 800 ft from the Niagara River), but are not found in the NR AOC study area. Mink Frogs typically occur in areas to the north of the NR AOC and extending into Canada and have never been documented in the general study area on MMP routes.

In an effort to better target species that may have been missed or underrepresented in 2014, the Work Plan for this study was revised post-2014 efforts to include an additional survey event, and to schedule the first and last events earlier (mid-April) and later (mid-July) in the breeding season. These adjustments to the survey approach resulted in documentation of relatively high numbers of chorus frogs in the Project Area; which had previously only been documented incidentally and in low numbers in 2014, as well as higher numbers of Green Frogs, bumping this species from one of the least documented calls heard in 2014 to the second most common species. Consistent with these results, MMP also reported the highest number of detections for Spring Peepers followed by Green Frog (Archer and Jones 2009).

A total of 81 detections of frogs were made during the 92 survey events and included all of the common anuran species known to occur in the region. In 2014, five point locations had no species detections. In 2015 four (17%) of the 23 points had no species detections and of these two are the same points with no detections in 2014 (A1-5 and A2-8). However, although available marsh habitat is being utilized by anurans, consistent with 2014 results over 90% of the detections were of only a small number of chorusing individuals at any given station (call index #2 or less). This reinforces the hypothesis that overall anuran population numbers throughout the NR AOC are quite low.

Collectively 81 documented call events (i.e., call of a single species at a single point) were recorded over the 92 survey events that took place within the four survey periods of 2015; of these, Northern Leopard Frog comprised 7% of the calls detected, American Toad comprised 6%, and Bullfrog comprised 15%. Results from 2014 found that Northern Leopard Frog comprised 4% of all documented calls, American Toad comprised 19%, and Bullfrog comprised 26%. Similarly, MMP data from 1995 through 2011 found that Northern Leopard Frog comprised 2% of the 487 calls detected, American Toad comprised 7%, and Bullfrog comprised 14%.

Wildlife populations are by nature extremely variable year-to-year, long-term large multi-replicate data sets are typically needed to capture true trends. Cause and effect determinations in population trends are further complicated due to effects on species from a host of site variables that may/may not be measurable, variations in weather conditions, previous or on-going activities in the area, logistical problems, overall small population numbers of the target species throughout the region, and the often secretive and allusive nature of the species. The relatively small sample size of this study may not be adequate to detect population trends with meaningful significance. However, future survey efforts, and combining data from this study with other ongoing anuran data collection efforts in the region, will facilitate efforts to assess trends in anuran populations in the NR AOC. Additionally, proposed NR AOC marsh creation and restoration measures (Filipski 2012), if implemented, will eventually yield additional marsh locations and opportunities to increase the survey effort and sample sizes.

Marsh Birds

The 2015 survey effort included two new survey locations. Site B-9 yielded an additional location of Virginia rail, whereas surveys at site B-8 resulted in no marsh bird detections. As with the 2014 survey, this effort detected six of the eight target marsh bird species. American Bittern and King Rail were not observed in 2015, American Coot and King Rail were not detected in 2014. King Rail are also notably absent from other survey efforts in the region (Archer and Jones 2009, Yard et. al. 2012). Although nearly all of the marsh bird species known to occur in the region were

detected during this study, over 95% of the detections were of only a single individual. Despite the fact that marsh birds are secretive and often non-responsive to broadcast calls, this suggests that population numbers throughout the NR AOC are quite low. Additional survey efforts and longer time spent meandering through available habitat may yield higher numbers.

Sunken Island (also referred to as Grass Island by various sources) (point B2-7) and portions of Tifft Preserve (points B1-2 through B1-4) offer the largest relatively high quality marshes in the NR AOC study area, and both the 2015 and 2014 study results found the highest diversity of species in these areas. The Sunken Island area was previously the only known breeding location on the Niagara River for Pied-billed Grebes and American Coots and each of these species were observed in the vicinity of Sunken Island during 2015 and 2014 survey efforts. However, a grebe documented in Tifft Preserve on 2 out of 3 survey events in 2014, was not observed in 2015.

Collectively a total of 27 documented marsh bird call events (i.e., call of a single species at a single point) were recorded over the 45 survey events that took place within the three survey periods; compared to 32 call events detected in 2014. Similar to the marsh anuran effort, marsh bird breeding activities and detectability are highly variable and best captured through extensive survey efforts. The small sample size in the NR AOC may not be sufficient to evaluate marsh bird population trends with any meaningful significance, and there are currently no obvious opportunities to expand the survey effort into additional marshes; this survey was essentially a full census of all accessible available habitat. By comparison, marsh bird population trend analysis conducted by NYSDEC in 2012 included data from nearly 1,500 call-broadcast surveys at 417 survey points (Yard et. al. 2012). However, future annual survey efforts and combining data from this study with other ongoing anuran data collection efforts in the region, will facilitate efforts to assess trends in anuran populations in the NR AOC. Additionally, proposed NR AOC marsh creation and restoration measures (Filipski 2012), if implemented, will eventually yield additional marsh locations and opportunity to increase the survey effort and sample sizes.

5.0 CONCLUSIONS

This study is the second of five annual survey events that will be conducted at an intensive level within the NR AOC and represents nearly a full census of every location of habitat within the AOC that met the sample selection criteria (i.e., minimum size, location adjacent to the Niagara River, and direct hydrologic connection to the river) for the target anuran and marsh bird species. The study provides the baseline on which future survey events will be evaluated and offers a foundation for future comparisons with other studies locally and in the region.

It is well-known that nearly all of the former marshes in the region no longer exist, have been significantly reduced in size, and/or have had at least some of their primary wetland functions degraded. Despite this, seven of the ten targeted anuran species and six of the eight targeted marsh bird species were confirmed in the NR AOC during this study area. Future survey efforts will help to assess population sizes and species use of the marshes found in the NR AOC.

6.0 LITERATURE CITED

Archer, R.W. and K. E. Jones. 2009. The Marsh Monitoring Program Annual Report, 1995-2007: Annual indices and trends in bird abundance and amphibian occurrence in the Great Lakes basin. Published by Bird Studies Canada in cooperation with Environment Canada, 39 pp.

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. Ecological systems of the United States: A working classification of U.S. terrestrial systems. NatureServe, Arlington, VA.

Conway, C.J. 2011. Standardized North American Marsh Bird Monitoring Protocol. Waterbirds 34(3): 319-346.

Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center. Available at: http://www.npwrc.usgs.gov/resource/wetlands/classwet/index.htm

Crewe, T.L, Timmermans, S.T.A., and K. E. Jones. 2005. The Marsh Monitoring Program Annual Report, 1995-2003: Annual indices and trends in bird abundance and amphibian occurrence in the Great Lakes basin. Published by Bird Studies Canada in cooperation with Environment Canada, 39 pp.

Filipski, Mark. 2012. Remedial Action Plan Stage 2 Addendum, Niagara River Area of Concern. New York State Department of Environmental Conservation. January 2012.

NewEarth Ecological Consulting (NewEarth). 2015. Beneficial Use Impairment Removal Project, Niagara River Area of Concern Anuran and Avian Population Monitoring Work Plan, 2014-2018. Prepared for the U.S. Fish and Wildlife Service, Region 6, and the New York State Department of Environmental Conservation. January 13, 2015, 25 pp.

Osborne, C.E., I.M. Mazzochi, H. Kennedy, S. Muller, D.J. Adams, and J.W. Ozard. 2011. Occupancy, detection and habitat associations of secretive marsh bird species in New York State. Technical Report. New York State Department of Environmental Conservation, Albany, NY, USA.

Weir, L.A. and M.J. Mossman. 2005. North American Amphibian Monitoring Program (NAAMP). In M. J. Lannoo (ed.), Amphibian Declines: Conservation Status of United States Species, pp. 307-313. Univ. of California Press, Berkeley.

Yard, K.A., C.E. Osborne, J.W. Ozard, and P.G. Novak. 2012. New York Marsh Bird Monitoring Program Pilot Study, 2009-2011. Technical Report. New York State Department of Environmental Conservation, Albany, NY, USA.

APPENDIX A

PHOTOGRAPHIC DOCUMENTATION

Anuran Survey Point A1-1 Facing Northeast

Anuran Survey Point A1-2 Facing Southwest

Anuran Survey Point A1-3 Facing North

Anuran Survey Point A1-4 Facing North

Anuran Survey Point A1-5 Facing North

Anuran Survey Point A1-6 Facing Northeast

Anuran Survey Point A1-7 Facing East

Anuran Survey Point A1-8 Facing North

Anuran Survey Point A1-9 Facing West

Anuran Survey Point A1-10 Facing Southeast

Anuran Survey Point A2-1 Facing Southeast

Anuran Survey Point A2-2 Facing Southeast

Anuran Survey Point A2-3 Facing Northwest

Anuran Survey Point A2-4 Facing Northeast

Anuran Survey Point A2-5 Facing West

Anuran Survey Point A2-6 Facing North

Anuran Survey Point A2-7 Facing Northeast

Anuran Survey Point A2-8 Facing Southwest

Anuran Survey Point A2-9 Facing Southwest

Anuran Survey Point A2-10 Facing Northwest

Anuran Survey Point A2-11 Facing West

Anuran Survey Point A2-12 Facing Southeast

Avian Survey Point B1-1 – Deleted due to excessive noise

Avian Survey Point B1-2 Facing East

Avian Survey Point B1-3 Facing Northeast

Avian Survey Point B1-4 Facing Southwest

Avian Survey Point B1-5 Facing Northwest

Avian Survey Point B1-6 Facing South

Avian Survey Point B1-7 Facing Southeast

Avian Survey Point B1-8 Facing West

Avian Survey Point B1-9 Facing West

Avian Survey Point B2-1 Facing South

Avian Survey Point B2-2 Facing West

Avian Survey Point B2-3 Facing West

Avian Survey Point B2-4 Facing North

Avian Survey Point B2-5 Facing North

Avian Survey Point B2-6 Facing South

Avian Survey Point B2-7 Facing Northeast

APPENDIX B

COORDINATES FOR ANURAN AND MARSH BIRD SURVEY LOCATIONS

2015 Anuran and Marsh Bird Survey Point Locations

Route	Point ID	Latitude	Longitude
Anuran Surveys			
A1	A1-1	42.960503	-78.939217
A1	A1-2	42.959568	-78.957962
A1	A1-3	42.967510	-78.942993
A1	A1-4	43.007469	-78.931328
A1	A1-5	43.025017	-78.894989
A1	A1-6	43.060871	-78.972527
A1	A1-7	43.061314	-78.978668
A1	A1-8	43.057976	-78.986420
A1	A1-9	43.059189	-78.994759
A1	A1-10	43.026093	-79.011536
A2	A2-1	42.844940	-78.850868
A2	A2-2	42.852051	-78.853264
A2	A2-3	42.874725	-78.885559
A2	A2-4	42.934406	-78.907394
A2	A2-8	43.023518	-78.880058
A2	A2-5	43.000961	-78.926895
A2	A2-6	43.006184	-78.906746
A2	A2-9	43.034512	-78.885399
A2	A2-7	43.016853	-78.891350
A2	A2-10	43.054249	-78.899612
A2	A2-11 (new)	42.967445	-78.925240
A2	A2-12 (new)	42.931976	-78.904709
A2	A2-13 (new)	42.852886	-78.858452
Marsh Bird Surveys			
B1	B1-1 (deleted)	42.843636	-78.851906
B1	B1-2	42.845013	-78.850868
B1	B1-3	42.848431	-78.853615
B1	B1-4	42.852074	-78.853279
B1	B1-5	42.872456	-78.883560
B1	B1-6	42.875782	-78.887016
B1	B1-7	42.968556	-78.942459
B1	B1-8 (new)	42.959610	-78.957802
B1	B1-9 (New)	42.967400	-78.925217
B2	B2-1	43.064117	-78.998535
B2	B2-3	43.059143	-78.994789
B2	B2-2	43.061146	-78.991837
B2	B2-4	43.057987	-78.986374
B2	B2-5	43.057045	-78.981514
B2	B2-6	43.060448	-78.979279
B2	B2-7	43.062645	-78.969978

APPENDIX C

2015 ANURAN SURVEY DATA AND FORMS

Niagara River Area Of Concern Marsh Anuran Survey Protocol

Anuran Calling Survey Data Form

Please complete information below		Data collected at start of each survey point	
Observer Name(s):	S. GROVE / M. GROVE	Additional notes:	CHORUS FROG IN FOREST POOLS LEOPARD IN PEM PEEPERS IN BOTH MOST ACTIVITY ON ISLAND WITH IN FOREST POOLS
Route Number:	A-1 GRAND ISLAND		
Survey Date (mm/dd/yyyy):	04/17/2015		
Window Number:	1	Days since last rainfall:	4 DRIZZLE 4/13, .3" ON 4/10

Data collected at each point	Survey Point Number									
	1	2	3	4	5	6	7	8	9	10
Start Time (military):	2127	2158	2228	0149	0205	2425	2405	2334	0114	2316
Air Temperature: Select Scale: °C (°F)	47	46	46	41	41	43	46	43	41	44
Was noise a factor? (use index)	1	1	1	4	0	2	4	4	2	3
Did you take a break? (check if yes)	N	N	N	N	N	N	N	N	N	N
Wind (Use Wind Scale)	2	2	2	2	2	2	3	2	2	0
Sky (Use Sky Codes)	1	1	1	1	1	1	1	1	1	1
Moon or Moonlight Visible (Y or N)	N	N	N	N	N	N	N	N	N	N
Number of cars that passed (within 50 m)	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
Snow cover (Y or N)	N	N	N	N	N	N	N	N	N	N

Species List	1	2	3	4	5	6	7	8	9	10
American toad										
Gray tree frog										B B
Spring peeper	1 1	3 3	2 2	3 3	—	2B 2B	3 3	2 2	3 3	2 2
Western/Boreal chorus frog	2B 2B	1 1	— —	3 3	— —	— —	2 2	— —	— —	— —
Mink frog										
Wood frog										
American bull frog										
Green frog										
Northern leopard frog				1 1	+ —			1 1		
Pickerel frog										

Comments: (1) CHORUS FROGS FAR OFF (2) FROGS NOT ON POND EDGE - IN FOREST AT EPHEMERAL POOL (4) CONSTANT HWY NOISE (6) SPPE / BOCF TO S OF ROAD IN FOREST NONE ALONG RIVER

ALL CODE "C" X-CEPT IF NOTED

(9) CHORUS IN FOREST ALONG WALK

(5) PEEPER - CHORUS - IN

PEEPERS & CHORUS FROGS IN FOREST AREAS THROUGHOUT

LEOPARD FAR AWAY

N. LEOPARD FROG S. GRAND ISLAND

Niagara River Area Of Concern Marsh Anuran Survey Protocol

Anuran Calling Survey Data Form

Please complete information below		Data collected at start of each survey point	
Observer Name(s):	S. GROVE M. GROVE	Additional notes:	CHORUS FROGS WITHIN FOREST AREAS THROUGHOUT SITE several lone Leopard frogs
Route Number:	A-2		
Survey Date (mm/dd/yyyy):	04/18/2015		
Window Number:	1	Days since last rainfall:	5 DRIZZLE ON 4/13, .3" ON 4/10

Data collected at each point	Survey Point Number									
	1	2	3	4	5	6	7	8	9	10
Start Time (military):	0105	2410	2345	2315	2240	2229	2219	2205	2155	2148
Air Temperature: Select Scale: °C °F	44	45	47	49	50	50	51	50	50	50
Was noise a factor? (use index)	0	0	0	2	1	0	3	1	1	2
Did you take a break? (check if yes)	N	N	N	N	N	N	N	N	N	N
Wind (Use Wind Scale)	1	2	3	2	2	2	2	2	2	2
Sky (Use Sky Codes)	1	1	1	1	1	1	1	1	1	1
Moon or Moonlight Visible (Y or N)	N	N	N	N	N	N	N	N	N	N
Number of cars that passed (within 50 m)	0 0	0 0	0 0	0 0	2 0	1 0	3 0	0 0	0 0	0 0
Snow cover (Y or N)	N	N	N	N	N	N	N	N	N	N

Species List	1	2	3	4	5	6	7	8	9	10
American toad		2B 2B				1 1				
Gray tree frog										
Spring peeper	1 2	2B 2B								
Western/Boreal chorus frog	1 1	1B 1B				1 1				
Mink frog										
Wood frog										
American bull frog										
Green frog										
Northern leopard frog	1 1	2 2								
Pickerel frog										

Comments: 2120-2140
A2-11 102ND ST LANDFILL - NO HABITAT NO FROGS - PEEPERS/CHORUS TO SOUTH
8|9|7 - NO HABITAT RIP-RAP/DEVELOPED
5 SMALL PATCH OF PHRAG
NO MOON
PICKEREL @ TIFFT ON WAY TO POINTS
ICE CHUNKS ON NIAGARA RIVER
10 - CHORUS FROGS ACROSS ROAD TO EAST
4 - ↓ BUT DRY, NO POOLS STANDING H2O
NONE ON POINTS
2 - MANY LEOPARD IN ↓, PEEPER, TOAD, CHORUS IN ↓ DUE EAST 150 YDS

Niagara River Area Of Concern Marsh Anuran Survey Protocol

Anuran Calling Survey Data Form

Please complete information below		Data collected at start of each survey point	
Observer Name(s):	S. GROVE M. GROVE	Additional notes:	
Route Number:	A-2		
Survey Date (mm/dd/yyyy):	04/18/2015		
Window Number:		Days since last rainfall:	

Data collected at each point	Survey Point Number									
	~~1~~ 11	~~2~~ 12	~~3~~ 13	~~4~~ 14	5	6	7	8	9	10
Start Time (military):	2120	2250	2435	0120						
Air Temperature: Select Scale: °C (°F)	51	51	45	44						
Was noise a factor? (use index)	0	3	0	0						
Did you take a break? (check if yes)	N	N	N	N						
Wind (Use Wind Scale)	2	2	2	1						
Sky (Use Sky Codes)	1	1	1	1						
Moon or Moonlight Visible (Y or N)	N	N	N	N						
Number of cars that passed (within 50 m)	0 0	4 4	0 0	0 0						
Snow cover (Y or N)	N	N	N	N						

Species List	1	2	3	4	5	6	7	8	9	10
American toad				1 1						
Gray tree frog										
Spring peeper		- 1		1 1						
Western/Boreal chorus frog		1 1		1 1						
Mink frog										
Wood frog										
American bull frog										
Green frog										
Northern leopard frog		- 1		2 2						
Pickerel frog										

Comments: CHORUS FROGS TO EAST OF RIVER ROAD - VERY LITTLE HABITAT TO WEST OF IT ALONG RIVER

13 - MOVED - NO HABITAT @ ORIGINAL LOCATION

ADD 13 - NO FROGS BUT POND/MARSH ADJ TO #2 POND TO WEST NO MOON

14 - TIFFT ~~PARKING AREA~~ BOARDWALK TO N END
PEEPERS, CHORUS, TOAD ON MARSH EDGE TO NW
LEOPARDS SURROUND BOARDWALK

11 - LANDFILL - DELETE POINT

Niagara River Area Of Concern Marsh Anuran Survey Protocol

Anuran Calling Survey Data Form

Please complete information below		Data collected at start of each survey point
Observer Name(s):	S. GROVE M. GROVE	Additional notes:
Route Number:	A1	
Survey Date (mm/dd/yyyy):	5/15/2015	
Window Number:		Days since last rainfall: 0 .6" ON 5/15, .5" ON 5/11

Data collected at each point	Survey Point Number									
	1	2	3	4	5	6	7	8	9	10
Start Time (military):	2245	2209	2310	2323	2339	2108	2055	2127	2155	2211
Air Temperature: Select Scale: °C (°F)	63	63	63	62	62	65	65	65	64	64
Was noise a factor? (use index)	0	0	0	3	2	0	2	3	2	1
Did you take a break? (check if yes)	N	N	N	N	N	N	N	N	N	N
Wind (Use Wind Scale)	0	0	1	0	0	0	0	0	0	1
Sky (Use Sky Codes)	2	2	2	2	2	5	5	2	5	2
Moon or Moonlight Visible (Y or N)	N	N	N	N	N	N	N	N	N	N
Number of cars that passed (within 50 m)	0 | 0	0 | 0	0 | 0	4 | 3	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	2 | 1
Snow cover (Y or N)	N	N	N	N	N	N	N	N	N	N

Species List	1	2	3	4	5	6	7	8	9	10
American toad		1 –								
Gray tree frog	B B A	A B						A B	A B	
Spring peeper	2 1	1 1				– –	2 B B 2	2 2	2 2	– –
Western/Boreal chorus frog										
Mink frog										
Wood frog										
American bull frog										
Green frog										
Northern leopard frog										
Pickerel frog										

Comments: AMCO / PBGR / VIRA @ A6

PEEPERS @ 7, 9 IN SAME MARSH SYSTEM BUT > 50 m AWAY

SCATTERED SHOWERS 2000 - 2200

2 TOADS ON TRAIL NEAR A1-6, 1 LEOPARD FROG ON BERM @ A1-9, 1 LEFR @ A3 IN LAWN NEAR POINT

TOADS HEARD CALLING @ SEV. LOCATIONS AROUND S. END OF GRAND ISL.

Niagara River Area Of Concern Marsh Anuran Survey Protocol

Anuran Calling Survey Data Form

Please complete information below		Data collected at start of each survey point	
Observer Name(s):	S GROVE M GROVE	Additional notes:	
Route Number:	A2		
Survey Date (mm/dd/yyyy):	05/14/2015		
Window Number:		Days since last rainfall:	3 .5" ON 5/11

Data collected at each point	Survey Point Number									
	1	2	3	4	5	6	7	8	9	10
Start Time (military):	2130	2145	2240	2313	2355	2406	2418	2426	2437	2449
Air Temperature: Select Scale: °C / °F	53	53	53	53	53	52	52	52	51	51
Was noise a factor? (use index)	1	1	1	3	3	2	2	1	1	2
Did you take a break? (check if yes)	—	—	—	—	—	—	—	—	—	—
Wind (Use Wind Scale)	1	1	1	2	1	1	2	1	2	2
Sky (Use Sky Codes)	2	2	1	0	2	2	2	2	2	2
Moon or Moonlight Visible (Y or N)	N	N	N	N	N	N	N	N	N	N
Number of cars that passed (within 50 m)	0 0	0 0	0 0	0 0	7 2	2 1	0 0	0 0	0 0	0 0
Snow cover (Y or N)	N	N	N	N	N	N	N	N	N	N

Species List	1	2	3	4	5	6	7	8	9	10
American toad										
Gray tree frog										
Spring peeper	1	1	1	0	1	0		(1)	0	
Western/Boreal chorus frog										
Mink frog										
Wood frog										
American bull frog										
Green frog										
Northern leopard frog										
Pickerel frog										

Comments: 5900 Mi. LIGHT POLLUTION — NO MOON
1/2 - NOISE - TRAFFIC | RR | GEESE - LONE PEEPERS

LONE PEEPERS PTS 1, 2, 3, 5, 11, 13
POOR HABITAT 4, 5, 8
NO " 7, 10

Niagara River Area Of Concern Marsh Anuran Survey Protocol

Anuran Calling Survey Data Form

Please complete information below		Data collected at start of each survey point	
Observer Name(s):	S. GROVE M. GROVE	Additional notes:	
Route Number:	A2		
Survey Date (mm/dd/yyyy):	05/14/2015		
Window Number:		Days since last rainfall:	.5 ON 5/11

Data collected at each point	Survey Point Number									
	1	2	3	4	5	6	7	8	9	10
Start Time (military):	2345	2325	2210							
Air Temperature: Select Scale: °C °F	52	52	52							
Was noise a factor? (use index)	1	2	0							
Did you take a break? (check if yes)	—	—	—		—	—	—			
Wind (Use Wind Scale)	1	2	2							
Sky (Use Sky Codes)	2	1	1							
Moon or Moonlight Visible (Y or N)	N	N	N							
Number of cars that passed (within 50 m)	2 0	0 0	0 0							
Snow cover (Y or N)	N	N	N							

Species List	1	2	3	4	5	6	7	8	9	10
American toad										
Gray tree frog										
Spring peeper	1 (3) 0		1 1							
Western/Boreal chorus frog										
Mink frog										
Wood frog										
American bull frog										
Green frog										
Northern leopard frog										
Pickerel frog										

Comments:

13- 1 LONE PEEPER

Niagara River Area Of Concern Marsh Anuran Survey Protocol
Anuran Calling Survey Data Form

Please complete information below		Data collected at start of each survey point	
Observer Name(s):	S. GROVE M. GROVE	Additional notes:	100% CLOUDS, RAIN WITHIN PAST 2 HRS OF SURVEY START
Route Number:	A-1		
Survey Date (mm/dd/yyyy):	6/12/2015		
Window Number:	3	Days since last rainfall:	Ø RAIN WITHIN PAST 2 HRS

Data collected at each point	Survey Point Number									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Start Time (military):	2256	2309	2324	2339	2353	2143	2125	2159	2200	2239
Air Temperature: Select Scale: °C (°F)	59	59	59	59	59	58	58	58	58	58
Was noise a factor? (use index)	0	1	1	0	3	0	0	3	3	2
Did you take a break? (check if yes)	N									N
Wind (Use Wind Scale)	2	2	2	1	1	2	1	1	1	1
Sky (Use Sky Codes)	5	5	5	2	2	2	2	2	2	2
Moon or Moonlight Visible (Y or N)	N	N	N	N	N	N	N	N	N	N
Number of cars that passed (within 50 m)	0 0	0 0	0 0	1 2	0 0	0 0	0 0	0 0	0 0	1 1
Snow cover (Y or N)	N									N

Species List	1	2	3	4	5	6	7	8	9	10
American toad										
Gray tree frog										
Spring peeper			1 1							1 1
Western/Boreal chorus frog										
Mink frog										≠ ≠
Wood frog										
American bull frog			1 1							
Green frog				2 0				1 1	1 1	
Northern leopard frog										
Pickerel frog										

Comments: NO CHORUSING HEARD ANYWHERE WHILE NAVIGATING SITE

2100~
PT. 7 - COOT CALLING
MISTY 2250 - 2335

AM. TOAD - W. RIVER RD.
#5 = PARTIERS ON BOATS

4 = 98% FROGS TO DATE IN # ON N. SIDE OF RD. FEW IN # TO SOUTH

Niagara River Area Of Concern Marsh Anuran Survey Protocol
Anuran Calling Survey Data Form

Please complete information below		Data collected at start of each survey point	
Observer Name(s):	S. GROVE M. GROVE	Additional notes:	
Route Number:	A2		
Survey Date (mm/dd/yyyy):	6/13/2015		
Window Number:	3	Days since last rainfall:	<1 .2" ON 6/12

Data collected at each point	Survey Point Number									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Start Time (military):	2345	2359	2333	2256	2218	2207	2156	2147	2137	2126
Air Temperature: Select Scale: °C (°F)	65	65	65	67	67	67	67	67	67	67
Was noise a factor? (use index)	1	1	3	1	2	3	2	2	0	1
Did you take a break? (check if yes)	N	Y								N
Wind (Use Wind Scale)	0	0	1	2	1	1	1	1	1	2
Sky (Use Sky Codes)	1	1	1	1	1	1	1	1	1	1
Moon or Moonlight Visible (Y or N)	N	N	N	N	N	N	N	N	N	N
Number of cars that passed (within 50 m)	0 0	0 0	0 0	0 0	8 5	9 2	0 0	0 0	0 0	0 0
Snow cover (Y or N)	N									N

Species List	1	2	3	4	5	6	7	8	9	10
American toad									/1	
Gray tree frog										
Spring peeper			1 1							
Western/Boreal chorus frog										
Mink frog										
Wood frog										
American bull frog	1 1	2 2	/1							
Green frog	2 2	2 2	/1	1 1						
Northern leopard frog										
Pickerel frog										

Comments: 7,10 NO HABITAT
PT 3 CONSIDER A SPLIT INTO 2 PTS?, TRAFFIC !!
CITY NOISE MAKE SURVEYS CHALLENGING
FROGS HEARD @ BOTH ENDS OF MARSH
LEOPARD FROG @ PT 2 - TRAIL, STOPPED FOR TRAIN 5 MIN

VIRA @ 2

Niagara River Area Of Concern Marsh Anuran Survey Protocol

Anuran Calling Survey Data Form

Please complete information below		Data collected at start of each survey point	
Observer Name(s):	S. GROVE M. GROVE	Additional notes:	
Route Number:	A2		
Survey Date (mm/dd/yyyy):	6/13/2015		
Window Number:		Days since last rainfall:	< 1

Data collected at each point	Survey Point Number									
	1	2	3	4	5	6	7	8	9	10
Start Time (military):	2227	2306	2421							
Air Temperature: Select Scale: °C (°F)	67	66	65							
Was noise a factor? (use index)	0	2	1							
Did you take a break? (check if yes)	N	—	—							
Wind (Use Wind Scale)	0	1	0							
Sky (Use Sky Codes)	1	1	1							
Moon or Moonlight Visible (Y or N)	N	—	—							
Number of cars that passed (within 50 m)	0 0	0 0	0 0							
Snow cover (Y or N)	N	—	—							

Species List	1	2	3	4	5	6	7	8	9	10
American toad										
Gray tree frog										
Spring peeper										
Western/Boreal chorus frog										
Mink frog										
Wood frog										
American bull frog			1 1							
Green frog		1 1	1 1							
Northern leopard frog										
Pickerel frog										

Comments: VIRA CALLING @ #11

Niagara River Area Of Concern Marsh Anuran Survey Protocol
Anuran Calling Survey Data Form

Please complete information below		Data collected at start of each survey point
Observer Name(s):	S. GROVE M. GROVE	Additional notes:
Route Number:	A-1	
Survey Date (mm/dd/yyyy):	7/12/2015	
Window Number:	4	Days since last rainfall: 2.5 , .26" ON 7/9

Data collected at each point	Survey Point Number									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Start Time (military):	0235	0219	0207	0151	0136	0312	0321	0337	0410	0300
Air Temperature: Select Scale: °C °F	65	66	66	66	67	65	65	65	64	65
Was noise a factor? (use index)	0	0	0	1	0	0	0	0	0	0
Did you take a break? (check if yes)	N	N	N	N	N	N	N	N	N	N
Wind (Use Wind Scale)	1	1	1	1	1	1	2	2	2	1
Sky (Use Sky Codes)	0	0	0	0	0	0	0	0	0	0
Moon or Moonlight Visible (Y or N)	N	N	N	N	N	N	N	N	N	N
Number of cars that passed (within 50 m)	0 | 0	0 | 0	0 | 0	1 | 1	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0
Snow cover (Y or N)	N									

Species List	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
American toad										
Gray tree frog										
Spring peeper										
Western/Boreal chorus frog										
Mink frog										
Wood frog										
American bull frog			2 C, 2 C					0	1 A	1 A, 1 A
Green frog		0	1	1 B, 1 A	3	3 C		1 A, 1 A	3 C	3 C, 3 C
Northern leopard frog										
Pickerel frog										

Comments: 4- MARSH TO S. OF ROAD A NO FROGS CALLING

Niagara River Area Of Concern Marsh Anuran Survey Protocol

Anuran Calling Survey Data Form

Please complete information below		Data collected at start of each survey point
Observer Name(s):	S. GROVE M. GROVE	Additional notes:
Route Number:	A-2	
Survey Date (mm/dd/yyyy):	7/11/2015	
Window Number:	4	Days since last rainfall: 1.5 .26" ON 7/9

Data collected at each point	Survey Point Number 1	2	3	4	5	6	7	8	9	10
Start Time (military):	1041	1024	1005	1111	1212	1224	1238	1251	107	123
Air Temperature: Select Scale: °C (°F)	67	68	69	67	67	67	67	66	66	66
Was noise a factor? (use index)	0	1	3	2	2	1	1	2	1	1
Did you take a break? (check if yes)	N	N	N	N	N	N	N	N	Y	N
Wind (Use Wind Scale)	0	0	0	0	0	0	0	0	0	0
Sky (Use Sky Codes)	1	1	1	1	1	1	1	1	1	1
Moon or Moonlight Visible (Y or N)	N	N	N	N	N	N	N	N	N	N
Number of cars that passed (within 50 m)	0 0	0 0	0 0	0 0	2 3	0 2	0 0	0 0	0 0	0 0
Snow cover (Y or N)	N	N	N	N	N	N	N	N	N	N

Species List	1	2	3	4	5	6	7	8	9	10
American toad										
Gray tree frog										
Spring peeper										
Western/Boreal chorus frog										
Mink frog										
Wood frog										
American bull frog		1 1	2 2						1 1	
Green frog	2 2	2 2	1 1	2 2						
Northern leopard frog										
Pickerel frog										

Comments: 3- CONCERT NOISE A A AA A A AA AA

1 BULLFROG @ TIFFT NATURE CTR POND 1ST FROG HEARD HERE THIS SEASON

10, 7 - NO HABITAT 9 = BREAK FOR EXCESSIVELY LOUD BOAT

6 - POLICE

MUSKRAT @ 8

SPP: DEER, OPPOSUM, MUSKRAT, FOX, RABBIT

HOUSE / FERAL CATS

Niagara River Area Of Concern Marsh Anuran Survey Protocol

Anuran Calling Survey Data Form

Please complete information below		Data collected at start of each survey point
Observer Name(s):	S.GROVE M.GROVE	Additional notes:
Route Number:	A-2	
Survey Date (mm/dd/yyyy):	7/11/2015	
Window Number:	4	Days since last rainfall:

Data collected at each point	Survey Point Number									
	1	2	3	4	5	6	7	8	9	10
Start Time (military):	1158	1101	1015							
Air Temperature: Select Scale: °C °F	66	67	68							
Was noise a factor? (use index)	2	2	2							
Did you take a break? (check if yes)	N	N	N							
Wind (Use Wind Scale)	0	0	0							
Sky (Use Sky Codes)	1	1	1							
Moon or Moonlight Visible (Y or N)	N	N	N							
Number of cars that passed (within 50 m)	0 0	0 0	0 0							
Snow cover (Y or N)	N	N	N							

Species List	1	2	3	4	5	6	7	8	9	10
American toad										
Gray tree frog										
Spring peeper										
Western/Boreal chorus frog										
Mink frog										
Wood frog										
American bull frog			1 1							
Green frog	1 1	1 1	1 1							
Northern leopard frog										
Pickerel frog										

Comments: A A A A

GRN FROGS INDEX 2 IN DITCH TO N OF PT A2-12

APPENDIX D

2015 MARSH BIRD SURVEY DATA AND FORMS

NIAGARA RIVER AREA OF CONCERN MARSH BIRD SURVEY DATA FORM

DATE (e.g. 15 May 2015): 5/15/2015 **MULTIPLE OBSERVER SURVEY:** YES / NO **BOAT TYPE:** NA

MARSH NAME: TIFFT / TIMES BEACH **OBSERVER NAMES (LIST ALL):** S.GROVE

WATER DEPTH (by station #): B1: 1 - 10", 2 - 14", 3 - 11", 4 - 6", 5 - 2", 6, DRY except along open water

ADDITIONAL NOTES:

STATION NUMBER	START TIME (MILITARY)	TEMP. (F)	SKY	WIND (Beaufort)	BACKGROUND NOISE	SPECIES	OBSERVED DURING: PASS 0-1	PASS 1-2	PASS 2-3	PASS 3-4	PASS 4-5	LEBI	SORA	VIRA	KIRA	AMBI	COGA	AMCO	PBGR	OUTSIDE	CALL TYPE(S)	DIRECTION	IN TARGET AREA (Y/N)	DISTANCE (METERS)	DISTANCE AIDE	PREVIOUSLY DETECTED (Y/N)	COMMENTS
B1-2	0535	51	2	1	2	LEBI		H					H				H				COO	O	Y	10	—	Y	SWSP, WIFL MAWR RWBL
	0539					VIRA					H		H								WIPE	O	Y	20	—	Y	↓
B1-3	0605	52	1	1	2	VIRA							H								WIPE	O	Y	20	—	—	NOHA PAIR
~~B1-1~~	~~0647~~	~~53~~	~~1~~	~~1~~	~~2~~	~~—~~																O	—	—	—	—	DELETE
B1-4	0718	54	1	1	1	VIRA							H								WIPE	O	Y	15	—	—	SWSP, WIFL, COTE MAWR RWBL
B1-6	0803	56	1	0	0	—																O					LETE, COTE RWBL, BCNH, GBHE
B1-5	0831	56	1	0	0	—																O					
B1-9	0846	57	1	0	1	—																O					NewData PT
																						O					
																						O					
																						O					
																						O					
																						O					
																						O					
																						O					

GEESE LOUD @ MOST PTS - ENOUGH TO REDUCE SURVEY AREA @ TIFFT

B1-1 DELETED - EXCESSIVE HIGHWAY NOISE

NIAGARA RIVER AREA OF CONCERN MARSH BIRD SURVEY DATA FORM

DATE (e.g. 15 May 2015): 5/16/2015 **MULTIPLE OBSERVER SURVEY:** YES / (NO) **BOAT TYPE:** CANOE

MARSH NAME: BEAVER ISLAND, BUCKTHORN **OBSERVER NAMES (LIST ALL):** S. GROVE / M. GROVE

WATER DEPTH (by station #): B1: 8-6", 7-5", B2: 1-8", 2-10", 3-2", 4, 6", 5-0", 6-9", 7: 14"

ADDITIONAL NOTES: _____

STATION NUMBER	START TIME (MILITARY)	TEMP. (F)	SKY	WIND (Beaufort)	BACKGROUND NOISE	SPECIES	OBSERVED DURING: PASS 0-1	PASS 1-2	PASS 2-3	PASS 3-4	PASS 4-5	LEBI	SORA	VIRA	KIRA	AMBI	COGA	AMCO	PBGR	OUTSIDE	CALL TYPE(S)	DIRECTION	IN TARGET AREA (Y/N)	DISTANCE (METERS)	DISTANCE AIDE	PREVIOUSLY DETECTED (Y/N)	COMMENTS
B1-8	0530	57	2	1	0	—																Q					
B1-7	0617	59	4	2	1	—																O					OSPR FLYOVER SWSP, A
B2-3	0708	60	4	1	2	VIRA								1							GRUNT	Q	Y	10	N	N	SWSP, MARW
						VIRA								1							GRUNT	Q	Y	15	N	N	
B2-4	0736	61	4	1	3	—																O					MARW, SWSP
B2-6	0750	62	4	1	1	—																O					" "
B2-5	0830	63	2	0	1	—																O					MARW
B2-7	0843	63	2	1	1	AMCO					V										VISUAL	Q	Y	15	N	N	
						PBGR				H			H						V		BOTH	Q	Y	10	N	N	
						COGA								H								Q	Y	5	N	N	
						SORA							H									Q	Y	10	N	N	
						PBGR							H						H			Q					
B22	1904	70	1	1	3	—																O					WIFL, SWSP
B2-1	0901	64	2	1	1	—																O					WIFL

B1-8 ADDED PER DEC REQUEST BUT MARGINAL FRINGE HABITAT

B2-5 - SATURATED, H_2O ONLY ALONG OPEN WATER AREAS

Version 12/18/2014

NIAGARA RIVER AREA OF CONCERN MARSH BIRD SURVEY DATA FORM

DATE (e.g. 15 May 2015): 6/13/2015 **MULTIPLE OBSERVER SURVEY:** YES / NO **BOAT TYPE:** CANOE

MARSH NAME: _____ **OBSERVER NAMES (LIST ALL):** S. GROVE / M. GROVE

WATER DEPTH (by station #): 4, 5, 6, 7, 2, 1, MARSH SATURATED, 2" H_2O IN CHANNEL AND MARSH EDGES & ALONG BEN H_2O

ADDITIONAL NOTES: ~~B2-3~~ 1-2" POCKETS OF H_2O THROUGHOUT
B1-8 SMALL POCKET OF PHRAG REST of area high/dry STEEP POND EDGES 0cm
B1-7 SHALLOW H_2O ON MARSH IN CAT AREAS 20cm

STATION NUMBER	START TIME (MILITARY)	TEMP. (F)	SKY	WIND (Beaufort)	BACKGROUND NOISE	SPECIES	OBSERVED DURING: PASS 0-1	PASS 1-2	PASS 2-3	PASS 3-4	PASS 4-5	LEBI	SORA	VIRA	KIRA	AMBI	COGA	AMCO	PBGR	OUTSIDE	CALL TYPE(S)	DIRECTION	IN TARGET AREA (Y/N)	DISTANCE (METERS)	DISTANCE AIDE	PREVIOUSLY DETECTED (Y/N)	COMMENTS
B2-6	0514	59	2	3	0																	O					WIFL, SWSP
B2-7	0539	59	2	3	2	PBGR	H												H		PRIMARY	~~O~~	Y	10	N	N	COTE, CATE
						PBGR													H		"	~~O~~	Y	20	N	Y	
B2-4	0602	59	2	2	0																	O					SWSP
B2-5	0626	60	2	1	0																	O					SWSP
B2-3	0646	60	2	1	2																	O					MARW, SWSP
B2-2	0740	60	2	1	1																	O					SWSP, COTE
B2-1	0814	60	2	1	3																	O					COTE, WIFL, SWSP
B1-8	0825	61	2	0	0																	O					NONE
B1-7	0851	61	2	0	0																	O					SWSP
B2-7	2010	71	1	1	3	PBGR			X								X	X	Y		PRIMARY	~~O~~	Y	2	N	Y	FROM ROADSIDE COTE @ LEAST 5 (REVISITED DUE TO BOAT NOISE)
																						O					
																						O					
																						O					

SORA - WHINNY UP THEN DOWN
VIRA ROCK KIDICK - GRUNT DESCEND
BLRA - KICK CALLS
GALIN → RISE THEN FALL SLOWLY
COOT - KICKS, ICACKS, SQUEALS
GREBE

☆ EXCESSIVELY LOUD BOATS NEAR MARSH | PRESENCE AREA B2-7

NIAGARA RIVER AREA OF CONCERN MARSH BIRD SURVEY DATA FORM

DATE (e.g. 15 May 2015): 6/14/2015 **MULTIPLE OBSERVER SURVEY:** YES / (NO) **BOAT TYPE:** NONE

MARSH NAME: _____ **OBSERVER NAMES (LIST ALL):** S GROVE / M. GROVE

WATER DEPTH (by station #): BI-2

ADDITIONAL NOTES: 1-21 2-32 3-24 4-10 5-5 6-0 9-15 cm

STATION NUMBER	START TIME (MILITARY)	TEMP. (F)	SKY	WIND (Beaufort)	BACKGROUND NOISE	SPECIES	OBSERVED DURING: PASS 0-1	PASS 1-2	PASS 2-3	PASS 3-4	PASS 4-5	LEBI	SORA	VIRA	KIRA	AMBI	COGA	AMCO	PBGR	OUTSIDE	CALL TYPE(S)	DIRECTION	IN TARGET AREA (Y/N)	DISTANCE (METERS)	DISTANCE AIDE	PREVIOUSLY DETECTED (Y/N)	COMMENTS
BI-1	—																					O					NOISE POINT DELETED
BI-2	0508	64	2	0	3	—																O					MAWR!!
BI-3	0540	64	2	1	2	SORA					V			C							CALL KEER	O	Y	50	N	N	MAWR! GRHE
						VIRA								C							GRUNT	O	Y	10	N	N	
						COGA								S							WIPS OUT	O	Y	35	N	N	
BI-4	0645	65	2	0	0	VIRA			V												GRUNT	O	Y	2	N	N	MAWR, GRHE
						VIRA							C	G								O	X	20	N	N	WIFL
						VIRA								G								O	X	3	N	N	BCNH? FLY THRU ONLY
																						O					
BI-5	0720	66	2	0	0	—																O					WIFL
BI-6	0747	67	2	0	0	—																O					WIFL, BCNH
																						O					MAWR
BI-9	0821	68	2	0	0	VIRA								S/G							BOTH	O					NEW POINT
																						O					WIFL,

BI-2 – BI- SIGNIFICANT NOISE FROM TRAINS, TRAFFIC AND BIRD SONGS (GRACKLES, OTHER)

BI-5 – Sections of marsh impacted to install browse study plots / cages

Version 12/18/2014

NIAGARA RIVER AREA OF CONCERN MARSH BIRD SURVEY DATA FORM

DATE (e.g. 15 May 2015): 6/27/2015 **MULTIPLE OBSERVER SURVEY:** YES / (NO) **BOAT TYPE:** CANOE

MARSH NAME: _____ **OBSERVER NAMES (LIST ALL):** S.GROVE, M.GROVE

WATER DEPTH (by station #): 3- 2.0" 4-2.0", 5-2 1-5cm

ADDITIONAL NOTES: 2-8cm 6-10cm 9-22cm 2- 8-

STATION NUMBER	START TIME (MILITARY)	TEMP. (F)	SKY	WIND (Beaufort))	BACKGROUND NOISE	SPECIES	OBSERVED DURING: PASS 0-1	PASS 1-2	PASS 2-3	PASS 3-4	PASS 4-5	LEBI	SORA	VIRA	KIRA	AMBI	COGA	AMCO	PBGR	OUTSIDE	CALL TYPE(S)	DIRECTION	IN TARGET AREA (Y/N)	DISTANCE (METERS)	DISTANCE AIDE	PREVIOUSLY DETECTED (Y/N)	COMMENTS
B23	0458	59	2	2	1	—																O					MARW, RWBL GRHE, SWSP
4	0529	59	2	2	2	—																O					RWBL, SWSP
5	0545	59	2	2	1	—																O					RWBL, SWSP
7	0607	60	2	3	1	PBGR	—	—	—	—	—		V						VH		TYPICAL	O	Y	10	N	N	RWBL
						PBGR													H		"	O	Y	5	N	N	
						PBGR													H		"	O	Y	20	N	N	
B21	0653	62	2	3	2	—																O					
B2-2	0713	62	2	3	3	—																O					SWSP
B1-7	0731	64	2	2	1																	O					WIFL
B1-8	0805	64	2	2	1																	O					WIFL, SWSP
B26	0630	60	2	3	1	—																O					
																						O					
																						O					
																						O					

RWBL @ ALL POINTS

NIAGARA RIVER AREA OF CONCERN MARSH BIRD SURVEY DATA FORM

DATE (e.g. 15 May 2015): 6/08/2015 **MULTIPLE OBSERVER SURVEY:** YES / NO **BOAT TYPE:** NA

MARSH NAME: _____ **OBSERVER NAMES (LIST ALL):** S. GROVE

WATER DEPTH (by station #): _____

ADDITIONAL NOTES: _____

STATION NUMBER	START TIME (MILITARY)	TEMP. (F)	SKY	WIND (Beaufort)	BACKGROUND NOISE	SPECIES	OBSERVED DURING														CALL TYPE(S)	DIRECTION	IN TARGET AREA (Y/N)	DISTANCE (METERS)	DISTANCE AIDE	PREVIOUSLY DETECTED (Y/N)	COMMENTS
							PASS 0-1	PASS 1-2	PASS 2-3	PASS 3-4	PASS 4-5	LEBI	SORA	VIRA	KIRA	AMBI	COGA	AMCO	PBGR	OUTSIDE							
B1-4	0503	57	2	3	1	VIRA							✓				H				GRUNTS	Ø	Y	7	N	N	MAWR, SWSP WIFL,
						COGA											✓				WIPEOUT	Ø	Y	10	N	N	DELAYED START DUE TO TRAINS
B1-3	0521	57	2	3	1	—															—	O					WIFL
B1-2	0553	57	2	3	0	VIRA							✓	H	V						GRUNTS	Ø	Y	10	N	N	SWSP, MARS
						VIRA													✓	H1	CLAP/GRUNTS	Ø→	Y	30	N	N	
B1-5	0617	57	2	2	0	—																O					MARW SWSP
B1-6	0750	57	5	2	0	—																O					STARTED DRIZZLING @ END
B1-9	0820	57	2	2	0	—																O					GRHE
																						O					
																						O					
																						O					
																						O					
																						O					
																						O					
																						O					

CATCHED RWBL ALL PTS CRN FROGS @ 3
BULL FROGS @ 3
Beaver @B3
TURTLE EGGS

APPENDIX E

2105 HABITAT MONITORING DATA AND FORMS

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 25/06/2014

Observer(s) Name(s): J. SWEITZER, B. GRIFFITH

Survey Point (complete for each point): A1-1

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIFd

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.K 33

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Bolboschoenus fluviatilis	60
Lythrum salicaria	10
Typha latifolia	10
Eupatorium maculatum	10
Carex lacustris	20

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4483-4484

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs			X		
Trees			X		
Bare soil					
Water			X		
Upland					
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 3

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 20-80

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 7.5 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 3 **Upland area (m):** 15

Ditch (m): — **Large open-water area (m):** 3

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): 50

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 7/11/2015

Observer(s) Name(s): S. GROVE

Survey Point (complete for each point): A1-2 | B1-8

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, parking lot/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, open water/upland, PSS or PFO wetland/Marsh, other (describe)__

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PUBH/PEM

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]:_____

Most dominant plant species (Record % Cover for 3-5 dominant species):

Plant Scientific Name (e.g., *Typha latifolia*)	% Cover (Absolute cover)
TYPHA	10
LYTHRUM SALICARIA	5
CAREX SPP	5

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, other:_____

_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs					
Trees					
Bare soil					
Water				X	
Upland				X	
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): –

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 80/20

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6,>6.

Litter depth (cm): 5 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

* Perimeter around POND

MARGINAL VALUE

Distance to Physical Characteristics

Water edge (m): 1

Upland area (m): 5

Ditch (m): –

Large open-water area (m): 1

Mudflat (m): –

Small open-water area (m): –

Road or dike (m): 30

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 25/06/2014

Observer(s) Name(s): J. SWEITZER, B. GRIFFITH

Survey Point (complete for each point): A1-3

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIF

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.m.19

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Lythrum salicaria	40
Typha angustifolia	60
Carex lacustris	30

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

42°58'2" N
79°56'33" W

Photo 4451

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs			X		
Trees	X				
Bare soil					
Water		X			
Upland			X		
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 2

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 30-70

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 1 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 5 **Upland area (m):** 10

Ditch (m): — **Large open-water area (m):** 80

Mudflat (m): — **Small open-water area (m):** 5

Road or dike (m): 15m

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 25/06/2014

Observer(s) Name(s): J. SUFITZER, B. GRIFFITH

Survey Point (complete for each point): A1-4

How was the point accessed? (Circle one): canoe, motor boat, (walk), wade?

Edge Type (Circle one): (roadside/marsh), ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PFO1C

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.k33

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha angustifolia	20
Typha latifolia	15
Sparganium	30
Lythrum salicaria	15
Cornus racemosa	20

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, (other:) ditch

Month/year (if known) of last management action: 2014

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4476

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs			✓		
Trees			✓		
Bare soil					
Water					
Upland					
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 0

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 0-100

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 0 **Water depth** (m): 0.15

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 0 **Upland area (m):** 3

Ditch (m): 15 **Large open-water area (m):** —

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): 5

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 25/06/2014

Observer(s) Name(s): J. SWEITZER, B. GRIFFITH

Survey Point (complete for each point): A1-5

How was the point accessed? (Circle one): canoe, motor boat, (walk), wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, (upland/marsh), open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): R2UBH

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.K.33

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha angustifolia	10
Typha latifolia	20
Lythrum salicaria	5
Persicaria maculosa	10

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4477

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs			X		
Trees			X		
Bare soil					
Water			X		
Upland		X			
Mudflat					
Floating veg.	X				

Distance to vegetation patch edge (m): N/A

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 70-30

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 0 **Water depth** (m): 0.12

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 1 **Upland area (m):** 5

Ditch (m): — **Large open-water area (m):** 3

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): 20

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 26/06/2014

Observer(s) Name(s): J. SWEITZER, B. GRIFFITH

Survey Point (complete for each point): A1-6

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): R2US2C / R2UBH

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: —

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
NONE	

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4505

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs		X			
Trees			X		
Bare soil					
Water			X		
Upland				X	
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): —

Type of patch (Circle one): (none), tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 100-0

Density of marsh vegetation[2] (Circle one): (None), sparse, moderate, dense

Estimated average marsh vegetation height (m): (0-1), 1-3, 3-6,>6.

Litter depth (cm): — **Water depth** (m): 0.10

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 0 **Upland area (m):** 1

Ditch (m): — **Large open-water area (m):** 0

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): 1

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 26/06/2014

Observer(s) Name(s): J. SUKITZER, B. GRIFFITH

Survey Point (complete for each point): A1-7

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIEd

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.k.6

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Carex lacustris	70
Typha latifolia	30
Cornus amomum	10

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4506

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs				X	
Trees			X		
Bare soil	X				
Water					
Upland			X		
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 2

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 0-100

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6,>6.

Litter depth (cm): 0 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 80 **Upland area (m):** 10

Ditch (m): 110 **Large open-water area (m):** 80

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): 150

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 26/06/2014

Observer(s) Name(s): J. SWEITZER, B. GRIFFITH

Survey Point (complete for each point): A1-10

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): R2UBH

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: N/A

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
NONE	

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4512

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs	X	X			
Trees					
Bare soil					
Water			X		
Upland			X		
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): —

Type of patch (Circle one): (none) tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 100 – 0

Density of marsh vegetation[2] (Circle one): (None), sparse, moderate, dense

Estimated average marsh vegetation height (m): (0-1), 1-3, 3-6,>6.

Litter depth (cm): — **Water depth** (m): 0.60

Method used for measuring water depth (Circle one): staff gauge, (meter stick), other: _____

Distance to Physical Characteristics

Water edge (m): 2 **Upland area (m):** 0

Ditch (m): 2 **Large open-water area (m):** 2

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): 5

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 24/06/2014

Observer(s) Name(s): J. SWEITZER B. GRIFFITH

Survey Point (complete for each point): A2-4

How was the point accessed? (Circle one): canoe, motor boat, (walk), wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, (open water/marsh,) interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PUBHx

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.m.19

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha angustifolia	20
Schoenoplectus sp.	10
Carex vulpinoidea	5
Butomus umbellatus	2

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other: N/A

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other: N/A

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photos 4437 -4438

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs		X			
Trees		X			
Bare soil			X		
Water			X	X	
Upland				X	
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 2

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 80/20

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 0 **Water depth** (m): 0.8

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 2 **Upland area (m):** 0

Ditch (m): — **Large open-water area (m):** 3

Mudflat (m): — **Small open-water area (m):** 2

Road or dike (m): 30

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 24/06/2014

Observer(s) Name(s): J. SWEITZER, B. GRIFFITH

Survey Point (complete for each point): A2-5

How was the point accessed? (Circle one): canoe, motor boat, (walk), wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe) trail / parking lot / trail

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIFx

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.9.6

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Phragmites australis	100

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other: _____

Month/year (if known) of natural disturbance event: N/A

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other: _____

Month/year (if known) of last management action: _____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4436

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs					
Trees					
Bare soil					
Water					
Upland					X
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 2

Type of patch (Circle one): none, tree, shrub, (herbaceous)

Wetland Interspersion (%open water and %vegetation cover): 0/100

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, (dense)

Estimated average marsh vegetation height (m): 0-1, (1-3), 3-6, >6.

Litter depth (cm): 5 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, (meter stick), other: _____

Distance to Physical Characteristics

Water edge (m): ~ **Upland area (m):** 2

Ditch (m): ~ **Large open-water area (m):** ~

Mudflat (m): ~ **Small open-water area (m):** ~

Road or dike (m): 3

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 24/06/2014

Observer(s) Name(s): Justin Sweitzer, B. Griffith

Survey Point (complete for each point): A2-6

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIA

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.a.6

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Phragmites australis	70
Typha angustifolia	30
Dipsacus sylvestris	10

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other: N/A

Month/year (if known) of natural disturbance event: N/A

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other: _____

Month/year (if known) of last management action: N/A

N/A

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs	X				
Trees					
Bare soil					
Water					
Upland					X
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 3

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 100% Vegetation

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6,>6.

Litter depth (cm): 0 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): – **Upland area (m):** 5

Ditch (m): – **Large open-water area (m):** –

Mudflat (m): – **Small open-water area (m):** –

Road or dike (m): 50

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 24/06/2014

Observer(s) Name(s): Justin Sweitzer, Ben Griffith

Survey Point (complete for each point): A2-7

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe) upland / open water - no marsh present

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): R2UBH

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]:

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
NONE	

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other: N/A

Month/year (if known) of natural disturbance event: N/A

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other: N/A

Month/year (if known) of last management action: N/A

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4434

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs		X			
Trees	X				
Bare soil		X			
Water			X		
Upland			X		
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): N/A

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): No wetland

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6,>6.

Litter depth (cm): N/A **Water depth** (m): 17cm

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 0 **Upland area (m):** 0

Ditch (m): — **Large open-water area (m):** 0

Mudflat (m): — **Small open-water area (m):** 0

Road or dike (m): 20

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 24/06/2014

Observer(s) Name(s): Justin Sweitzer, Ben Griffith

Survey Point (complete for each point): A2-8

How was the point accessed? (Circle one): canoe, motor boat, (walk), wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, (other) (describe) gravel driveway / marsh

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): R2UBH

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]:

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
NONE	

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other: N/A

Month/year (if known) of natural disturbance event: N/A

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other: N/A

Month/year (if known) of last management action: N/A

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

photo 4433

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs	X				
Trees					
Bare soil					
Water			X		
Upland				X	
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): N/A

Type of patch (Circle one): (none), tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): No wetland

Density of marsh vegetation[2] (Circle one): (None), sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6,>6.

Litter depth (cm): N/A **Water depth** (m): 1.0

Method used for measuring water depth (Circle one): staff gauge, (meter stick), other: _____

Distance to Physical Characteristics

Water edge (m): 0 **Upland area (m):** 0

Ditch (m): — **Large open-water area (m):** 0

Mudflat (m): — **Small open-water area (m):** 0

Road or dike (m): 3

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 24/06/2014

Observer(s) Name(s): Justin Sweitzer, Ben Griffith

Survey Point (complete for each point): AZ-9

How was the point accessed? (Circle one): canoe, motor boat, (walk), wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, (open water/marsh), interior/marsh, other (describe) parking lot / marsh

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIF

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.1.4/9

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Phragmites australis	20
Typha latifolia	20
Lythrum salicaria	5

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other: N/A

Month/year (if known) of natural disturbance event: N/A

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, (other: mowing)

Month/year (if known) of last management action: 06/2014

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4432

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs					
Trees					
Bare soil					
Water			X		
Upland				X	
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 1

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 40/60

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 3-5 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 10 **Upland area (m):** 5

Ditch (m): — **Large open-water area (m):** 10 CANAL

Mudflat (m): — **Small open-water area (m):** 10

Road or dike (m): 10

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 24/06/2014

Observer(s) Name(s): JUSTIN SWEITZER, BEN GRIFFITH

Survey Point (complete for each point): AZ-10

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, E W

interior/marsh, other (describe)

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): R2UBH

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.C.2.N.a / V.A.5.N.1.9

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Sparganium androcladum	10
Typha angustifolia	10
Nuphar variegatum	7
Carex scoparia	1

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other: N/A

Month/year (if known) of natural disturbance event: N/A

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other: N/A

Month/year (if known) of last management action: Unknown date for installation of boat dock, boat ramp, walking trail.

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4431

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs	X				
Trees					
Bare soil					
Water			X		
Upland			X		
Mudflat					
Floating veg.		X			

Distance to vegetation patch edge (m): 2

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 80/20

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 0 **Water depth** (m): 0.5

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 1 **Upland area (m):** 1

Ditch (m): N/A **Large open-water area (m):** 5

Mudflat (m): N/A **Small open-water area (m):** N/A

Road or dike (m): 30

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 7/12/2015

Observer(s) Name(s): S. GROVE

Survey Point (complete for each point): A2-11 / B1-9

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, parking lot/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, open water/upland, PSS or PFO wetland/Marsh, other (describe)__

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PUBHx / PEM

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]:_____

Most dominant plant species (Record % Cover for 3-5 dominant species):

Plant Scientific Name (e.g., *Typha latifolia*)	% Cover (Absolute cover)
PHRAGMITES AUSTRALIS	80
LYTHRUM SALICARIA	10
☆ UNABLE TO ACCESS BEYOND BERMS / FENCE / CHANNEL	MARSH EDGE

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, other: INDUSTRIAL SITE PONDS / POOLS

Month/year (if known) of natural disturbance event: ONGOING

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action: POSS A RESTORATION SITE IN SOME AREAS

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

PERIMETER MARSH AROUND POND – BERM / UPLAND ON PERIMETER OF SYSTEM

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs		X			
Trees		X			
Bare soil					
Water					
Upland				X	
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 3

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 75 - 25 MARSH ON EDGES OF POND

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 32.0 **Water depth** (m): EST 1.5

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: ESTIMATED

Distance to Physical Characteristics

Water edge (m): 3

Upland area (m): 5

Ditch (m): 1

Large open-water area (m): 3

Mudflat (m): 0

Small open-water area (m): NA

Road or dike (m): 60

UNABLE TO ENTER ⅓ DUE TO FENCE, CHANNEL, BERMS - SURVEYED FROM MARSH EDGE

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 7/12/2015

Observer(s) Name(s): S. GROVE

Survey Point (complete for each point): A2-12 SHAW ISLAND PARK

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, parking lot/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, open water/upland, PSS or PFO wetland/Marsh, other (describe)__

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PUB/PEM

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]:_____

Most dominant plant species (Record % Cover for 3-5 dominant species):

Plant Scientific Name (e.g., *Typha latifolia*)	% Cover (Absolute cover)
TYPHA LATIFOLIA / ANGUST	60
LYTHRUM SALICARIA	15
CAREX VULPENOIDEA	10
CORNUS RACEMOSA	10

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, other:_____

_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action: IN PARK - MOWING ALONG POND EDGE BUT SOME 10' BUFFER

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

PERIMETER MARSH AROUND POND - UPLAND SURROUNDS SYSTEM ALSO ASSOC. W/ SMALL DITCH

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs		X			
Trees		X			
Bare soil					
Water					
Upland				X	
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m):_____

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover):65/35

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, (dense)

Estimated average marsh vegetation height (m): 0-1, (1-3), 3-6,>6.

Litter depth (cm):6.0 **Water depth** (m):.8

Method used for measuring water depth (Circle one): staff gauge, (meter stick), other: _____

Distance to Physical Characteristics

Water edge (m):3

Upland area (m):5

Ditch (m): —

Large open-water area (m): —

Mudflat (m): —

Small open-water area (m):3

Road or dike (m):15

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 7/12/2015

Observer(s) Name(s): S. GROVE

Survey Point (complete for each point): A2-13 POND IN TIFFT

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, parking lot/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, open water/upland, PSS or PFO wetland/Marsh, other (describe)__

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PUBHx / PEM

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]:_____

Most dominant plant species (Record % Cover for 3-5 dominant species):

Plant Scientific Name (e.g., *Typha latifolia*)	% Cover (Absolute cover)
TYPHA LATIFOLIA	30
LYTHRUM SALICARIA	15
CAREX	20
EUPATORIUM	10
PERSICARIA	10
	85

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, other:_____

_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs					
Trees					
Bare soil					
Water					
Upland					
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m):_____

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover):75/25 perimeter marsh

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6,>6.

Litter depth (cm):# 3 **Water depth** (m): 1, 2

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 2 **Upland area (m):** 5

Ditch (m): — **Large open-water area (m):** 2

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): 75 (DIRT RD. RAILROAD & ROAD

FRINGE MARSH ALONG POND EDGE

---

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 24/06/2014

Observer(s) Name(s): J. SWEITZER, B. GRIFFITH

Survey Point (complete for each point): B1-1

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIFx

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.a

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Phragmites australis	100
Coronilla varia	10
Solidago sp	5

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4449

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs	X				
Trees		X			
Bare soil					
Water					
Upland			X		
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 0

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 0-100

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): >1 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): — **Upland area (m):** 5

Ditch (m): — **Large open-water area (m):** —

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): 10

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 24/06/2014

Observer(s) Name(s): Justin Switzer, Ben Griffith

Survey Point (complete for each point): B1-2 / A2-1

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIF / PUBH

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.1.9

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha angustifolia	60
Lonicera tatarica	5
Sambucus canadensis	2

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other: N/A

Month/year (if known) of natural disturbance event: N/A

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other: N/A

Month/year (if known) of last management action: N/A

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs			X		
Trees		X			
Bare soil					
Water			X		
Upland			X		
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 1

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 30/70

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 0 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 1 **Upland area (m):** 1

Ditch (m): — **Large open-water area (m):** 1

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): —

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 24/06/2014

Observer(s) Name(s): Justin Sweitzer, Ben Griffith

Survey Point (complete for each point): B1-3

How was the point accessed? (Circle one): canoe, motor boat, (walk), wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, (open water/marsh), interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIF/PUBH

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.1.9

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha angustifolia	30
Lemna sp.	70

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other: N/A

Month/year (if known) of natural disturbance event: N/A

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other: N/A

Month/year (if known) of last management action: N/A

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs					
Trees		X			
Bare soil					
Water					
Upland					
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 10

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 70 / 30

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 0 **Water depth** (m): .67

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 50

Upland area (m): 100

Ditch (m): —

Large open-water area (m): 0

Mudflat (m): —

Small open-water area (m): —

Road or dike (m): 100

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 24/06/2014

Observer(s) Name(s): J. SWEITZER, B. GRIFFITH

Survey Point (complete for each point): A2-2 / B1-4

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIF / PUBHx

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.1.9

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha angustifolia	100

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4448

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs	X				
Trees					
Bare soil					
Water					
Upland			X		
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 1

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 5-95

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6,>6.

Litter depth (cm): 0 **Water depth** (m): 9

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 1 **Upland area (m):** 0

Ditch (m): — **Large open-water area (m):** —

Mudflat (m): — **Small open-water area (m):** /

Road or dike (m): 20

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 24/06/2014

Observer(s) Name(s): J. SWEITZER

Survey Point (complete for each point): A2-3 / B1-5

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIES

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.I.9

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha angustifolia	70
Phragmites australis	10

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action: 2014

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Phots 4446

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs	X				
Trees		X			
Bare soil					
Water					
Upland				X	
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 1

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 0-100

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 10 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 70 **Upland area (m):** 2

Ditch (m): – **Large open-water area (m):** 70

Mudflat (m): – **Small open-water area (m):** 0

Road or dike (m): 100

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 24/06/2014

Observer(s) Name(s): J. SWEITZER D GRIFFITH

Survey Point (complete for each point): B1-6

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe) boardwalk / marsh

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIES

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.1.9

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha angustifolia	80
Impatiens capensis	20

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other: _____

Month/year (if known) of natural disturbance event: _____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other: _____

Month/year (if known) of last management action: 2014

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4443-4444

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs					
Trees		X			
Bare soil					
Water		X			
Upland			X		
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 0

Type of patch (Circle one): none, tree, shrub, (herbaceous)

Wetland Interspersion (%open water and %vegetation cover): 10 - 90

Density of marsh vegetation[2] (Circle one): None, sparse, (moderate), dense

Estimated average marsh vegetation height (m): 0-1, (1-3), 3-6, >6.

Litter depth (cm): 16 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, (meter stick), other: _____

Distance to Physical Characteristics

Water edge (m): 50 **Upland area (m):** 15

Ditch (m): — **Large open-water area (m):** 50

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): —

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 25/06/2014

Observer(s) Name(s): J. SWEITZER, B. GRIFFITH

Survey Point (complete for each point): B1-7

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIF

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5, N.m

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha latifolia	50
Lythrum salicaria	30
Sagittaria latifolia	10
Persicaria	5
Carex stricta	30

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4454

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs		X			
Trees		X			
Bare soil	X				
Water		X			
Upland			X		
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 3

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 30-70

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 1 **Water depth** (m): 0.02

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 3 **Upland area (m):** 20

Ditch (m): — **Large open-water area (m):** 30

Mudflat (m): — **Small open-water area (m):** 3

Road or dike (m): 25

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 7/11/2015

Observer(s) Name(s): S. GROVE

Survey Point (complete for each point): A1-2 | B1-8

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, parking lot/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, open water/upland, PSS or PFO wetland/Marsh, other (describe)__

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PUBH/PEM

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]:_____

Most dominant plant species (Record % Cover for 3-5 dominant species):

Plant Scientific Name (e.g., *Typha latifolia*)	% Cover (Absolute cover)
TYPHA	10
LYTHRUM SALICARIA	5
CAREX SPP	5

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, other:_____

_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs					
Trees					
Bare soil					
Water				X	
Upland				X	
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): –

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 80/20

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6,>6.

Litter depth (cm): 5 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

* Perimeter around POND

MARGINAL VALUE

Distance to Physical Characteristics

Water edge (m): 1

Upland area (m): 5

Ditch (m): –

Large open-water area (m): 1

Mudflat (m): –

Small open-water area (m): –

Road or dike (m): 30

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 7/12/2015

Observer(s) Name(s): S. GROVE

Survey Point (complete for each point): A2-11 / B1-9

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, parking lot/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, open water/upland, PSS or PFO wetland/Marsh, other (describe)__

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PUBHx / PEM

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]:_____

Most dominant plant species (Record % Cover for 3-5 dominant species):

Plant Scientific Name (e.g., *Typha latifolia*)	% Cover (Absolute cover)
PHRAGMITES AUSTRALIS	80
LYTHRUM SALICARIA	10
☆ UNABLE TO ACCESS BEYOND BERMS / FENCE / CHANNEL	MARSH EDGE

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, other: INDUSTRIAL SITE PONDS / POOLS

Month/year (if known) of natural disturbance event: ONGOING

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action: POSS A RESTORATION SITE IN SOME AREAS

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

PERIMETER MARSH AROUND POND – BERM / UPLAND ON PERIMETER OF SYSTEM

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs		X			
Trees		X			
Bare soil					
Water					
Upland				X	
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 3

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 75 - 25 MARSH ON EDGES OF POND

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 32.0 **Water depth** (m): EST 1.5

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: ESTIMATED

Distance to Physical Characteristics

Water edge (m): 3

Upland area (m): 5

Ditch (m): 1

Large open-water area (m): 3

Mudflat (m): 0

Small open-water area (m): NA

Road or dike (m): 60

UNABLE TO ENTER ⅓ DUE TO FENCE, CHANNEL, BERMS - SURVEYED FROM MARSH EDGE

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 26/06/2014

Observer(s) Name(s): J. SWEITZER, B. GRIFFITH

Survey Point (complete for each point): B2-1

How was the point accessed? (Circle one): canoe, motor boat, (walk), wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, (other (describe) PSS/marsh

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEM1Ed

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.m

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha latifolia	30
Carex lacustris	20
Hibiscus moscheutos	30

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other: _____

Month/year (if known) of natural disturbance event: _____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other: _____

Month/year (if known) of last management action: _____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4509

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs		X			
Trees		X			
Bare soil					
Water					
Upland					
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 2

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 0-100

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 3 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): —

Upland area (m): —

Ditch (m): —

Large open-water area (m): —

Mudflat (m): —

Small open-water area (m): —

Road or dike (m): 15

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 26/06/2014

Observer(s) Name(s): J. SWEITZER, B. GRIFFITH

Survey Point (complete for each point): B2-2

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIEd

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.m

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Hibiscus moscheutos	30
Typha latifolia	15
Typha angustifolia	40
Carex lacustris	20

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4510

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs	X				
Trees	X				
Bare soil					
Water					
Upland					
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 2

Type of patch (Circle one): none, tree, shrub, (herbaceous)

Wetland Interspersion (%open water and %vegetation cover): 0-100

Density of marsh vegetation[2] (Circle one): None, sparse, (moderate), dense

Estimated average marsh vegetation height (m): 0-1, (1-3), 3-6,>6.

Litter depth (cm): 5 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): — **Upland area (m):** 3

Ditch (m): — **Large open-water area (m):** —

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): 20

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 26/06/2014

Observer(s) Name(s): S. SWEITZER, B. GRIFFITH

Survey Point (complete for each point): B2-3, A1-9

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIEd

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.m.19

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha angustifolia	70
Euphorbia esula	20
Carex lacustris	10

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4511

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs		X			
Trees		X			
Bare soil					
Water					
Upland		X			
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 1

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 0-100

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 5 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 50 **Upland area (m):** 15

Ditch (m): — **Large open-water area (m):** —

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): 0

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 25/06/2014

Observer(s) Name(s): J. SWEETER

Survey Point (complete for each point): B2-4 / A1-8

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIEd

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.I.9

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha angustifolia	40
Decodon verticillatus	10
Nuphar variegatum	10

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Phab 4430

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs	X				
Trees	X				
Bare soil					
Water	X				
Upland			X		
Mudflat					
Floating veg.	X				

Distance to vegetation patch edge (m): 1

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 50-50

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6,>6.

Litter depth (cm): 3 **Water depth** (m): 25

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 1 **Upland area (m):** 2

Ditch (m): — **Large open-water area (m):** 1

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): 30

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 25/06/2014

Observer(s) Name(s): J. SWEITZER

Survey Point (complete for each point): B2-5

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIEd

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.1.9

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha angustifolia	80
Sagittaria latifolia	10
Persicaria	20
nettle	20

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other: N/A

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other: N/A

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4478

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs			X		
Trees		X			
Bare soil					
Water					
Upland			X		
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 2

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 0-100

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 3 **Water depth** (m): 0

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 100 **Upland area (m):** 15

Ditch (m): 50 **Large open-water area (m):** —

Mudflat (m): — **Small open-water area (m):** —

Road or dike (m): 40

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

Habitat Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

General Information

Survey Date (DD/MM/YYYY): 26/06/2014

Observer(s) Name(s): J. SWEITZER B. GRIFFITH

Survey Point (complete for each point): B2-6

How was the point accessed? (Circle one): canoe, motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, open water/marsh, interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIEd

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.k.6

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Grass	40
Carex lacustris	30
Sol. lugo SP.	10
Nymphaea odorata	10

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other: N/A

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Photo 4507

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs			X		
Trees			X		
Bare soil					
Water		X			
Upland		X			
Mudflat					
Floating veg.		X			

Distance to vegetation patch edge (m): 20

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 25-75

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6,>6.

Litter depth (cm): 0 **Water depth** (m): 0.23

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 1

Upland area (m): 25

Ditch (m): 1

Large open-water area (m): —

Mudflat (m): —

Small open-water area (m): 0

Road or dike (m): —

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems

General Information

Survey Date (DD/MM/YYYY): 25/06/2014

Observer(s) Name(s): B. GRIFFITH, J. SWEITZER

Survey Point (complete for each point): B2-7

How was the point accessed? (Circle one): (canoe), motor boat, walk, wade?

Edge Type (Circle one): roadside/marsh, ditch or berm/marsh, upland/marsh, (open water/marsh,

interior/marsh, other (describe)_____

Classification & Disturbance

NWI code (Record an NWI Code for the target wetland): PEMIC

NVCS Alliance (Record an NVCS Alliance code or codes for the target wetland)[1]: V.A.5.N.19

Most dominant plant species (Record % Cover for 3 dominant species):

Plant Scientific Name (e.g., *Typha domingensis*)	% Cover (Absolute cover)
Typha angustifolia	70

Natural Disturbance (circle all that apply): Fire, ice damage, animal/insect damage, trail/road construction, invasive species control, wetlands restoration, dredging, other:_____

Month/year (if known) of natural disturbance event:_____

Management Actions (circle all that apply): Trail/road construction, dredging, invasive species control (mechanical and chemical), wetland restoration, wildlife management, other:_____

Month/year (if known) of last management action:_____

[1] For NVCS Alliance codes, see http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol

Habitat characteristics (for 50-m radius area)

Select (by placing an "X" under each % category) the % of wetland perimeter covered by the following characteristics:

Perimeter Characteristic:	<5%	6-25%	26-50%	51-75%	>75%
Shrubs					
Trees					
Bare soil					
Water				X	
Upland					
Mudflat					
Floating veg.					

Distance to vegetation patch edge (m): 3

Type of patch (Circle one): none, tree, shrub, herbaceous

Wetland Interspersion (%open water and %vegetation cover): 40/60

Density of marsh vegetation[2] (Circle one): None, sparse, moderate, dense

Estimated average marsh vegetation height (m): 0-1, 1-3, 3-6, >6.

Litter depth (cm): 0 **Water depth** (m): 0.58

Method used for measuring water depth (Circle one): staff gauge, meter stick, other: _____

Distance to Physical Characteristics

Water edge (m): 2 **Upland area (m):** 200

Ditch (m): — **Large open-water area (m):** 5

Mudflat (m): — **Small open-water area (m):** 0

Road or dike (m): 200

[2] Estimate density of vegetation within 50 m around survey point using the following categories: 1-Dense = water not visible through base of stems at water level and you cannot easily push hand through the stems; 2-Moderate = anything that falls between dense and sparse; 3-Sparse = water easily visible through base of widely scattered stems