Beneficial Use Impairment Removal Project

Niagara River Area of Concern
Marsh Anuran and Avian Population Monitoring
Year 1 (2014) Survey Report

Final: January 19, 2015

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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.

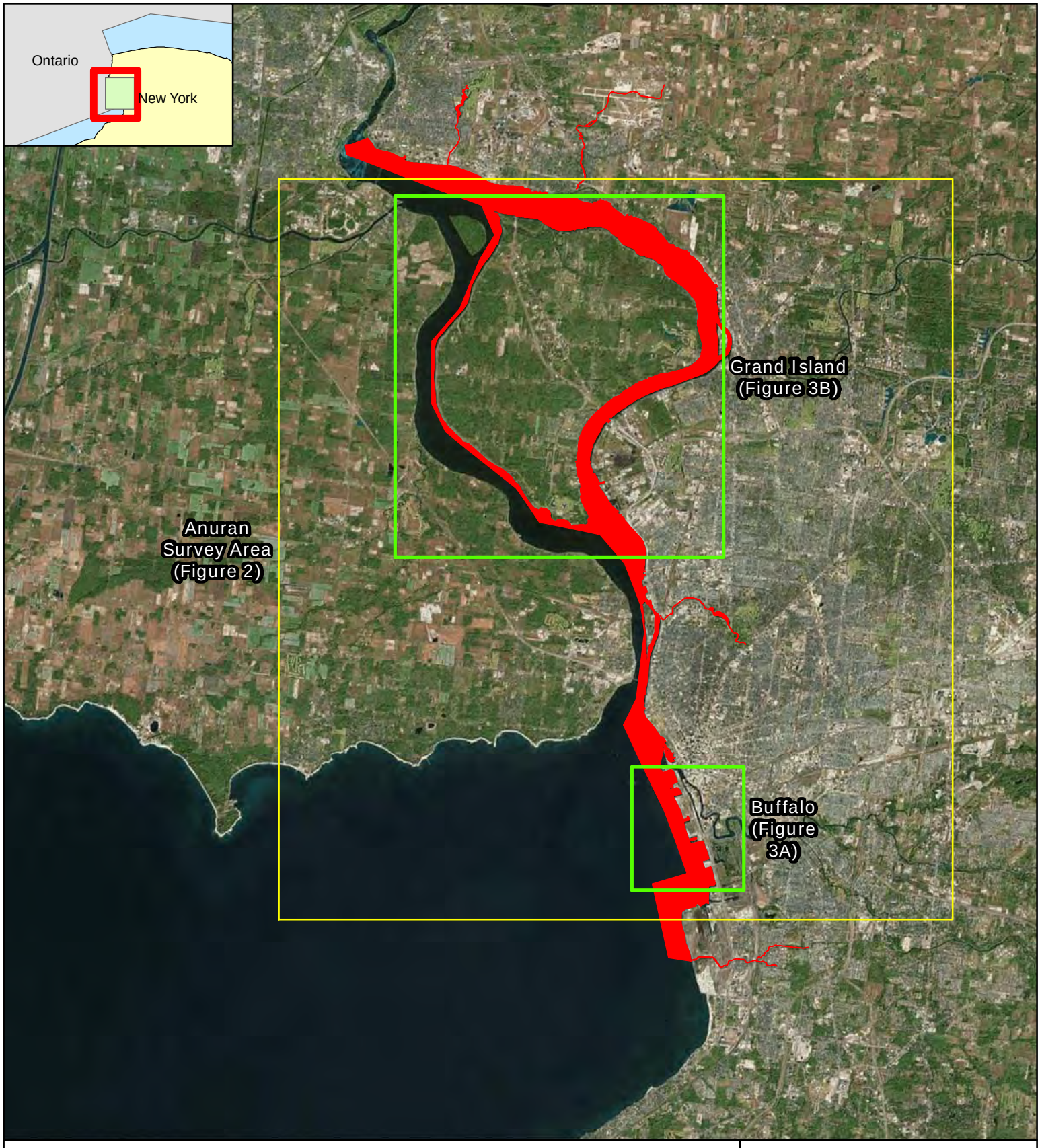
In February 2014, the NYFO and NYSDEC issued a Scope of Work for performance of NR AOC marsh anuran and avian population monitoring surveys (USFWS 2014). Following the criteria outlined in the Scope of Work, in April 2014 a Work Plan was developed, which identified the survey protocols to be used over 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 the 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 initial (Year 1) marsh anuran and avian monitoring effort are provided in Section 2.0 of this report. Results from the Year 1 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 2014 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 Smokes Creek in 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

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).

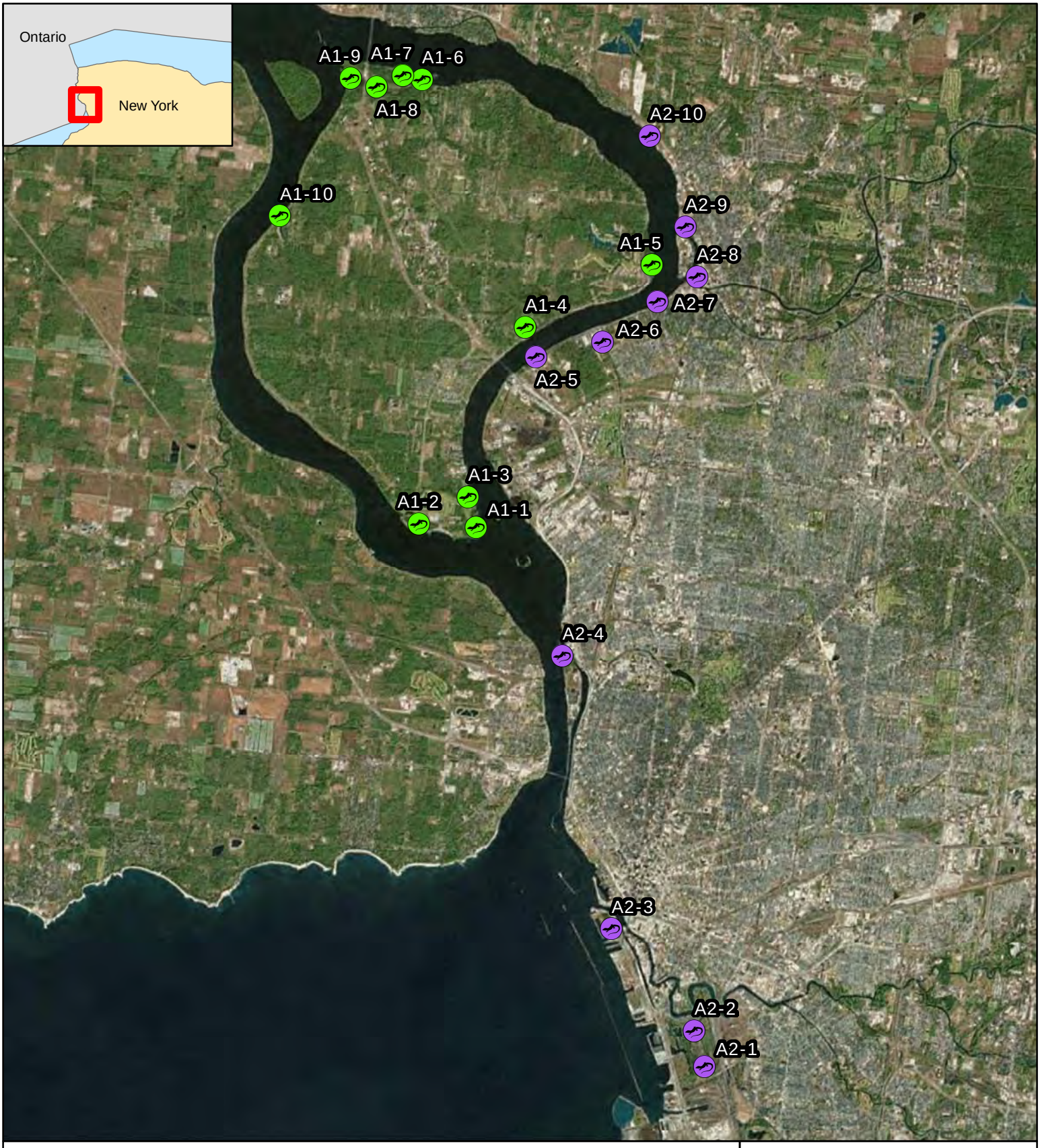
Survey routes, point locations, field methodologies and field efforts were closely coordinated with, and based upon recommendations from, USFWS representative Amy Roe, and NYSDEC representatives Connie Adams, Jennifer Tait, and Mark Filipski. The Work Plan should be referenced for additional details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

2.1 MARSH ANURAN SURVEYS

2.1.1 Survey Routes and Points

Survey routes were 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 were established with ten survey points per route as shown in Figure 2. Five of the ten survey points on survey route A1, and five of the ten 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; A1-5; A1-8; A1-9; A2-6; A2-7; A2-8; A2-9; and, A2-10.

Survey points were located based recommendations from NYSDEC, availability of potentially suitable habitat, and in most cases spaced at least 800 meters (m) apart. 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).



Legend

- Route A1 Survey Point
- Route A2 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: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Date: 9/26/2014

2.1.2 Sampling Periods and Conditions

Because peak amphibian calling periods are more strongly associated with temperature and precipitation than with date (Archer and Jones 2009), visits were scheduled to occur during three separate events according to minimum night air temperatures above 41 °F, 50 °F, and 63 °F in the general NR AOC survey area for the first, second and third visits, respectively. Sampling periods were established to target peak vocalization periods for early-, mid- and late-season breeding amphibians. In an attempt to capture the vocalization periods of all target breeding amphibians, 2014 surveys were at least 15 days apart and completed between mid May and late June as shown in Table 1.

Table 1. 2014 Anuran Survey Dates and Temperature Ranges

Survey Event	Survey Dates	Temperature Range During Surveys
Pre-breeding General Site Recon	March 25-26, 2014	14-37 °F
Pre-breeding General Site Recon	April 17-18, 2104	29-61 °F
1	May 19-21	45-71 °F
2	June 3-4	52-76 °F
3	June 24-25	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.

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*

Surveys were only 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) or 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.

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 2014 survey period were recorded on data forms which were 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

Habitat monitoring was an important part of this study and data gathered regarding marsh habitat can facilitate management decisions. Natural changes in water levels and/or management activities (e.g. wetland restoration efforts, dredging, bank stabilization, etc.) can have significant impacts on marsh conditions (e.g. vegetation composition and structure, substrate composition and structure, water levels), thereby potentially causing significant changes to marsh anuran populations. In addition to recording the percent cover of dominant plant species within a 50 m radius of each survey point and water level, key components of the habitat data collection effort included information on natural disturbances and management activities near the site. A blank copy of the habitat data form and observer instructions for completing the form is included in Appendix E. The same form was used to document conditions at both marsh anuran and marsh bird sample points and in some instances the same locations were used for both anurans and birds.

Date of Last Natural Disturbance

Natural disturbance was recorded on the habitat monitoring data form following the first survey. The observer recorded the month and year of the most recent natural disturbance (e.g., flood, hurricane, tornado, wild fire, etc.) that occurred within a 50 m radius of each survey point. If a natural disturbance occurs during the survey year (i.e., 15 May through 30 June) it may be necessary to record these data more than once per year.

Date of Last Management Action

A description of the most recent wetland management actions should be recorded on the habitat monitoring data form following the first survey of each year. The observer recorded the month and year of the most recent management action (e.g., flooding, wetland restoration efforts, mowing, herbicide or insecticide use, wildlife management activities, etc.) that occurred within a 50 m radius of each survey point.

2.1.6 Photographic Documentation of Survey Points

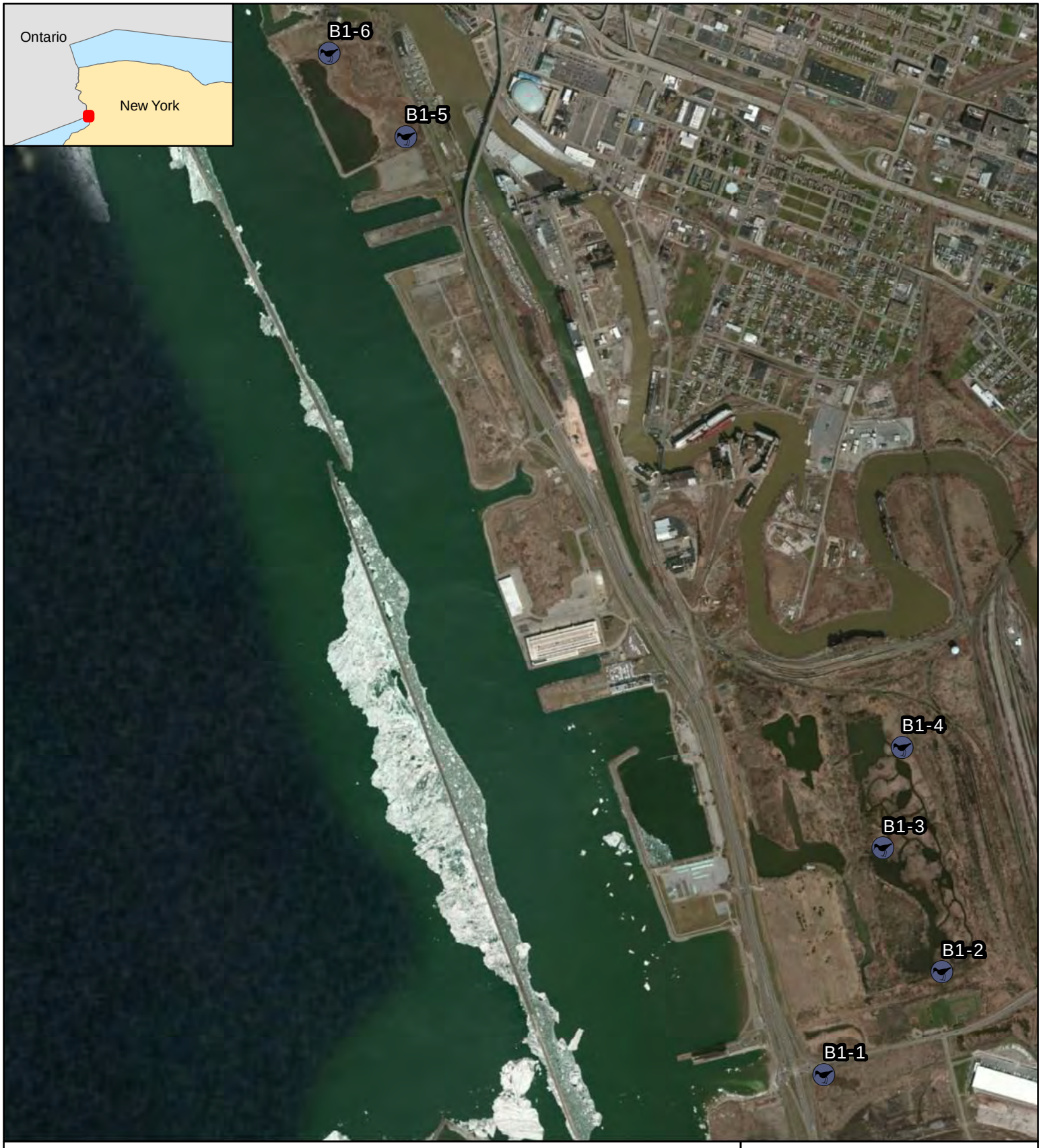
A photographic record of general habitat/site conditions at each survey point was collected concurrent to habitat measurement data collection and is presented in Appendix A.

2.2 MARSH BIRD SURVEYS

2.2.1 Survey Routes and Points

Survey route locations were initially 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. Two survey routes were established as shown on Figures 3A and 3B; each with seven points. Seven of the fourteen survey points (four on route B1 and three on route B2) are located near previously surveyed points established by NYSDEC as part of the NR MMP and included survey points: B1-3; B1-5; B1-6; B1-7, B2-3; B2-4 and, B2-7.

Survey 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. Points 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).



Legend

Route B1 Survey Point

N

0 0.075 0.15 0.3 Miles

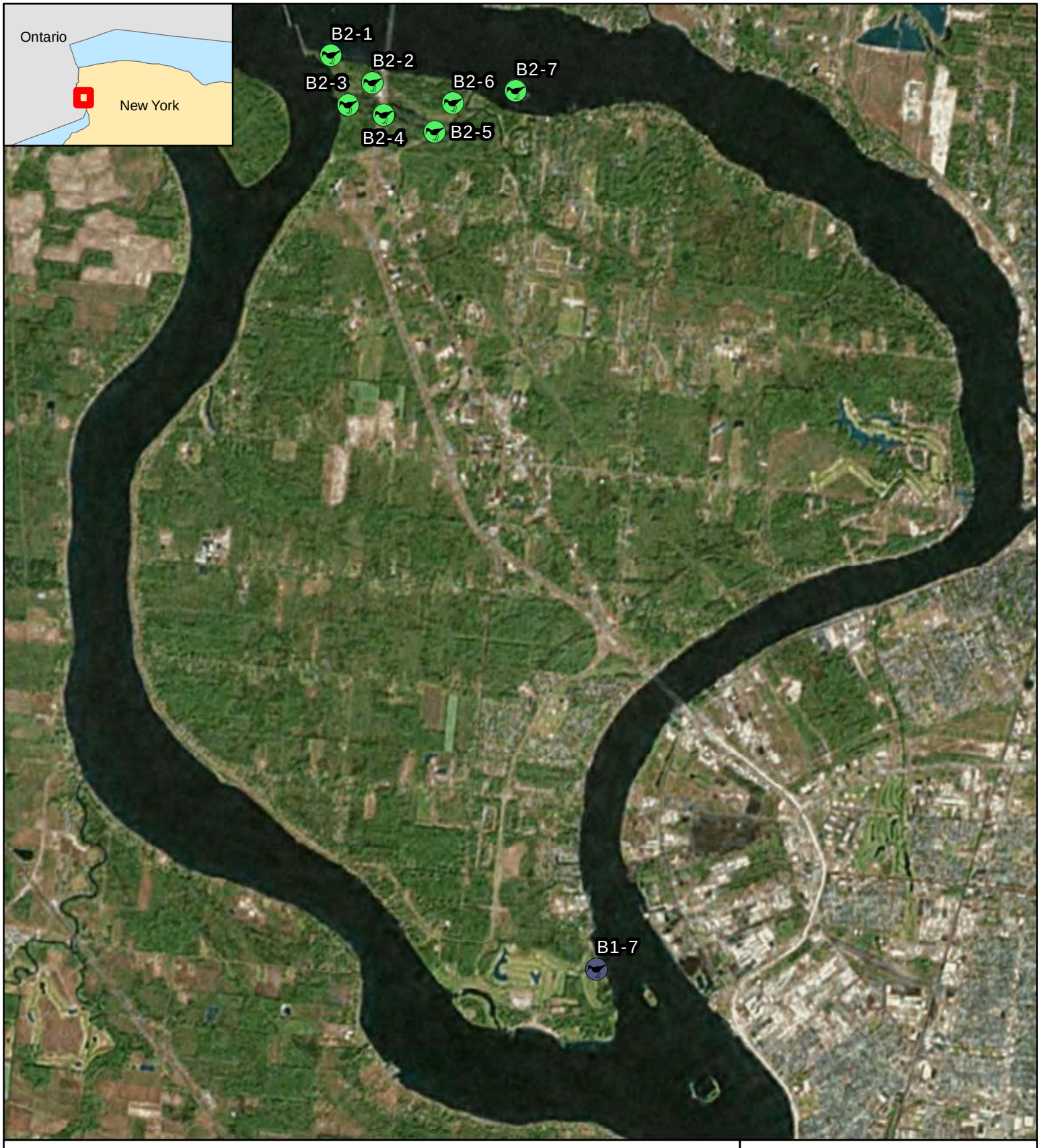
Figure 3A. Marshbird Survey Routes
Buffalo, Erie County, NY

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

Prepared By:
NewEarth
ECOLOGICAL CONSULTING, LLC

Source: Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Date: 9/25/2014



Legend

- Route B1 Survey Point
- Route B2 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: Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Date: 9/25/2014

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 2014 survey effort. 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. 2014 Survey Dates for Target Marsh Bird Species

Survey Event	Survey Dates
Pre-breeding General Site Recon	March 25-26, 2014
Pre-breeding General Site Recon	April 17-18, 2104
1	May 20-21,2014
2	June 4-5, 2014
3	June 25-26, 2014

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*

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

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 are <20 km/hr).

2.2.3 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 rail, 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.

2.2.4 Marsh Bird Survey Data

Field data for marsh bird species targeted within the NR AOC during the 2014 survey period (Table 4) 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 is 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 for 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.

2.2.5 Marsh Bird Habitat Data

As with the anuran population monitoring, habitat monitoring was an important part of the marsh bird monitoring effort because habitat data can drive population responses and can be used to inform management decisions. 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. Habitat sampling efforts included recording the percent cover of dominant plant species within a 50 m radius of each survey point, and information on natural disturbances and management activities near the site as described in Section 2.1.5. A blank copy of the habitat data form and observer instructions for completing the form is included in Appendix E.

2.2.6 Photographic Documentation of Survey Points

A photographic record of general habitat/site conditions at each marsh bird survey point was collected at the time habitat measurement data was collected and is presented in Appendix A.

3.0 RESULTS

3.1 ANURANS

General site reconnaissance was conducted to establish survey locations on March 25-26 and April 17-18, 2014, and anuran call monitoring surveys were conducted on May 19th through 21st, June 3rd and 4th, and June 24th and 25th, 2104. 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 2014 anuran and habitat surveys.

3.1.1 Anuran Surveys

Survey Route A1 was established on Grand Island and is associated with various habitats along the Niagara River shoreline. Survey Route A2 was established on the east side of the Niagara River, from near Smokes Creek at the southern extent of the NR AOC, to Gratwick Riverside Park at the northern extent of the survey route. A total of 10 points were surveyed for each survey route during the three survey periods.

Six anuran species were recorded within targeted marsh survey areas across the 60 survey events (Table 5). A seventh species (gray tree frog) was documented during a survey event, but only observed outside of the target marsh area, and an eighth species (chorus frog) was detected

during site reconnaissance efforts in the area, but prior to the 2014 survey event. Spring peepers were only recorded during the first survey event, but, were widespread across the survey area. Northern leopard frog and gray tree frog were only recorded during the second survey event. Spring peepers were heard at the highest number of locations (10 unique points), followed by bull frog and American toad which were heard at eight locations each (Table 5).

Table 5. Anuran Species Detected per Survey Event

Species	Number and % of Points with Detections Event 1 (May 19-21, 2014)	Number and % of Points with Detections Event 2 (June 3-4, 2014)	Number and % of Points with Detections Event 3 (June 25-26, 2014)	Number of Unique Points Species was Heard at
Spring Peeper	10 (50 %)[1]	0	0	10 (50 %)[1]
Green Frog	0	5 (25%)	4 (20%)	5 (25%)
Bull Frog	0	4 (20%)	8 (40%)	8 (40%)
Pickerel Frog	3 (15%)	1 (5%)	0	3 (15%)
Northern Leopard Frog	0	2 (10%)	0	2 (10%)
American Toad	4 (20%)[1]	5 (25%)[1]	0	8 (40%)
Gray Tree Frog	0	1 (5%)[1]	0	1 (5%)[1]

[1] Some calls heard at a given point were from locations outside of the target marsh survey area

Spring peeper, green frog, bull frog, northern leopard frog, American toad, and gray tree frog are commonly detected on Environment Canada's MMP survey routes (on at least 10% of station-years) in this region, and similar to this study, MMP also reports the highest detections for spring peepers (Archer and Jones 2009). One species commonly heard on MMS survey routes (15% of station-years), wood frog, was not detected on this survey. A second species, pickerel frog, was uncommon (~ 2% of station-years) on MMP routes.

Of the 20 points surveyed, five had no anuran species detections: A1-1; A1-6; A1-10; A2-5; and A2-8 (Table 6). Point A2-10 had detections; but only of species located outside of the target survey marsh area.

Table 6. Anuran Species Detected per Survey Point

Point	Cumulative Species Detections (within target habitat only)	Cumulative Species Detections (within and/or outside of target habitat)
Route 1		
A1-1	0	0
A1-2	5	5
A1-3	1	1
A1-4	3	3
A1-5	3	3
A1-6	0	0
A1-7	4	5
A1-8	3	3
A1-9	1	1
A1-10	0	0
Route 2		
A2-1	7	7
A2-2	6	6
A2-3	2	2
A2-4	3	3
A2-5	0	0
A2-6	2	2
A2-7	1	2
A2-8	0	0
A2-9	3	3
A2-10	0	2

Calls noted inside, outside, and both inside and outside the targeted habitat at each survey point were recorded using calling code modifiers (as described in the Amphibian Calling Index portion of section 2.1.4). While the majority of the recorded calls were found to occur within the targeted habitat at survey points (82.6% or 38 of 46 recorded calls in the 5-minute survey period for both Survey Route A1 and A2), several calls were also noted outside of the targeted habitat (8.7% or 4 of 46 recorded calls in the 5-minute survey period for both Survey Route A1 and A2), or in both the targeted habitat and outside of the targeted habitat (8.7% or 4 of 46 recorded calls in the 5-minute survey period for both Survey Route A1 and A2). Summaries presented in Tables 5 and 7 include all observations heard from a point whether inside or outside of the targeted marsh area.

Data were collected in a manner that allowed for an evaluation of two widely used anuran monitoring protocols (i.e. Environment Canada Marsh Monitoring Program [MMP] 3 minute intervals vs. the North American Amphibian Monitoring Program [NAAMP] 5 minute intervals) (Table 7). As expected, the 5-minute intervals resulted in additional recordings, though the variation was slight. All species detected in the 5-minute intervals were also detected using the 3-minute interval method; however, 5-minute intervals resulted in more overall recordings per survey period (e.g. during the second survey event of Survey Route A2 four recordings of spring peepers were documented using 3-minute intervals, while six recordings of spring peepers were documented using 5-minute intervals).

Collectively a total of 47 documented call events (i.e., call of a single species at a single point) were recorded over the three survey events in the 5-minute listening period (Table 7). Sixteen call events for three different species were recorded during event 1, 18 call events for 6 species were recorded during event 2, and 12 call events were recorded for 2 species during the final event. Of the 47 call events, 42 were of call index #1 (individual calls could be distinguished), 5 were of call index #2 (some individuals could be distinguished, but some overlapping calls), and none 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 89% of the detections were of only a small number of individuals at any given station.

Table 7. Anuran Species Detected Using 3 Minute and 5 Minute Call Intervals

Species	Survey Route A1		Survey Route A2	
	3-Minute Period	5-Minute Period	3-Minute Period	5-Minute Period
	# of Points Recorded	# of Points Recorded	# of Points Recorded	# of Points Recorded
Survey Event 1 (May 19-21, 2014)				
Spring Peeper	3	4	4	6
Green Frog	0	0	0	0
Bull Frog	0	0	0	0
Pickerel Frog	3	3	0	0
Northern Leopard Frog	0	0	0	0
American Toad	0	0	4	4
Gray Tree Frog	0	0	0	0
Total Call Events		**7**		**10**
Survey Event 2 (June 3-4, 2014)				
Spring Peeper	0	0	0	0
Green Frog	2	2	2	3
Bull Frog	2	2	2	2
Pickerel Frog	1	1	0	0
Northern Leopard Frog	0	0	1	2
American Toad	1	1	3	4
Gray Tree Frog	1	1	0	0
Total Call Events		**7**		**11**
Survey Event 3 (June 25-26, 2014)				
Spring Peeper	0	0	0	0
Green Frog	2	2	2	2
Bull Frog	4	5	2	3
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
Total Call Events		**7**		**5**

3.1.2 Incidental Observations

During the three 2014 survey periods observers noted incidental observations of anurans and other wildlife. Notable observations included a large migration (> 75 individuals) of northern leopard frogs during a rainy evening on May 20th at the Tifft Nature Preserve. Surveys were not conducted on this evening due to the rain conditions; however, surveyors traveled along some of the survey route, and observed heavy frog movements throughout Tifft Nature Preserve.

Additional observations included an eastern garter snake (*Thamnophis sirtalis*) sighting, as well as pickerel frog and western/boreal chorus frog (*Pseudacris triseriata/maculatum*) calling, at Buckhorn Island State Park during pre-survey field reconnaissance efforts on April 17th.

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 = 3) effect on two or more survey events at 12 (60%) of the point locations (Table 8). The primary source of noise on anuran surveys was associated with vehicle traffic on roadways. Noise from boats, sirens, airplanes and those associated with construction equipment use and humans involved in recreational activities were also reported.

Table 8. Noise Levels During Anuran Survey Events

Point	Noise Level Event 1[1]	Noise Level Event 2[1]	Noise Level Event 3[1]
A1-1	2	3	1
A1-2	1	2	1
A1-3	3	2	2
A1-4	3	1	2
A1-5	2	1	3
A1-6	2	2	2
A1-7	2	2	1
A1-8	2	2	1
A1-9	2	1	2
A1-10	1	1	0
A2-1	2	1	1
A2-2	2	1	1
A2-3	3	1	2
A2-4	2	1	1
A2-5	3	2	3
A2-6	2	2	2
A2-7	2	1	2
A2-8	2	1	2
A2-9	1	1	1
A2-10	1	2	1

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

3.1.4 Habitat

Of the 20 marshes surveyed, five are considered open water habitat (i.e., site dominated by open water and wetland/aquatic vegetation cover is less than 25%), six 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 nine 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 9). Based on an evaluation of general habitat conditions for the target species, sites A1-2, A1-6, A1-10, A2-5, A2-6, A2-7, A2-8, A2-9,

and A2-10 are of overall low quality due to poor water/vegetation interspersion, lack of water in the marsh system, lack of wetland vegetation, high energy environment (i.e., unprotected river shoreline), and/or dominance of invasive species (see photographs in Appendix A).

Table 9. Anuran Marsh Habitat Conditions

Point	General Type	Detections[1]	Overall habitat Quality	% 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]
A1-1	Marsh	0	adequate	110	0	10	10	0	0	20/80	3
A1-2	Open Water	5	poor	0	0.75	0	0	0	0	100/0	0
A1-3	Marsh	1	adequate	130	0	60	40	0	0	30/70	5
A1-4	Marsh	3	adequate	100	0.15	35	14	0	0	0/100	none
A1-5	Open Water/Marsh	3	adequate	45	0.12	30	5	0	0	70/30	3
A1-6	Open Water	0	poor	0	0.1	0	0	0	0	100/0	0
A1-7	Marsh	4	adequate	110	0	30	0	0	0	0/100	80
A1-8	Marsh	3	adequate	60	0.25	40	0	0	0	50/50	1
A1-9	Marsh	1	adequate	100	0	70	0	0	0	0/100	none
A1-10	Open Water	0	poor	0	0.6		0	0	0	100/0	2
A2-1	Open Water/Marsh	7	adequate	67	0	60	0	0	5	30/70	1
A2-2	Marsh	6	adequate	100	0	100	0	0	0	5/95	1
A2-3	Marsh	2	adequate	80	0	70	0	10	0	0/100	70
A2-4	Open Water/Marsh	3	adequate	37	0.8	20	0	0	0	80/20	2
A2-5	Marsh	0	poor	100	0		0	100	0	0/100	none
A2-6	Open Water/Marsh	2	poor	110	0	30	0	70	0	0/100	none
A2-7	Open Water	1	poor	0	0.17		0	0	0	40/0	0
A2-8	Open Water	0	poor	0	1.0		0	0	0	40/0	0
A2-9	Marsh	3	poor	45	0	20	5	20	0	40/60	10
A2-10	Open Water/Marsh	0	poor	28	0.5	10	0	0	0	80/20	5

[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

Five marshes had no marsh vegetation (primarily because they were open water habitats). Of the 15 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 at two of the 15 sites; A2-5 and A2-6 (Table 9), and cattails (i.e., genus *Typha*) were the dominant species at seven sites. *Phragmites* and *Typha* were equally dominant at site A2-9. Other common wetland plants included species in the following genus: *Carex, Cornus, Sparganium, Eupatorium, BolboschoenusSchoenoplectus, Dispaucus, Nuphar, Decodan, and Persicaria* (Appendix E). Of these, only C*arex, Cornus, Sparganium, Eupatorium,* were found as common species in more than one marsh area surveyed.

Half (10) of the sites had no measurable surface water present at the time of survey (Table 9). Of the remaining 10 areas, 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 four sites (Table 8). Although surface water was not present within the marsh habitat at 10 survey locations, open water was present within 50 meters of four 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.

3.2 MARSH BIRDS

General site reconnaissance was conducted to establish survey locations on March 25-26 and April 17-18, 2014, and marsh bird monitoring surveys were conducted on May 20th and 21st, June 4th and 5th, and June 25th and 26th, 2104. Tables 10 through 13 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 2014 anuran and habitat surveys.

3.2.1 Marsh Bird Surveys

Survey Route B1 was established on Tifft Nature Preserve, Times Beach Nature Preserve, and Beaver Island State Park and is associated with various habitats along the Niagara River shoreline and adjacent near shore habitats. Survey Route B2 was established on Grand Island and Sunken Island, with six of the seven survey points located at Buckhorn Island State Park. A total of seven points were surveyed for each survey route during the three survey periods, resulting in 42 survey events. An eighth survey point (B1-8) was surveyed on Strawberry Island during the first survey event, but was removed from subsequent events due to low habitat suitability and access constraints. No species were detected at the location during the single survey event and the data was not included in the analysis.

Primary Focal Species

Six of the eight target primary focal marsh bird species were recorded across 42 survey events (Table 10). Surveys along Route B1 resulted in the recording of four species (i.e. least bittern, common gallinule, Virginia rail, and pied-billed grebe), while surveys along Route B2 recorded

five species (i.e. Virginia rail, American bittern, pied-billed grebe, common gallinule, and sora). Virginia rail was the most commonly observed species, and was detected during 23% of the survey events (10 of 42). Pied-billed grebe had the highest number of individuals recorded at a given point (6 individuals at B2-7). Several American coot were observed while travelling to/from survey point B2-7, but were never heard during a survey. King rail, a target species, was never heard in the project area.

Virginia rail and common gallinule are also 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 10. Marsh Bird Species Detected per Survey Event

Species	Number and % of Points with Detections Event 1 (May 20-21, 2014)	Number and % of Points with Detections Event 2 (June 4-5, 2014)	Number and % of Points with Detections Event 3 (June 25-26, 2014)	Number of Unique Points Species was Heard at
Least Bittern	2 (14%)	2 (14%)	3 (21%)	3 (21%)
Sora	0	1 (7%)	1 (7%)	2 (14%)
Virginia Rail	5 (36%)	4 (29%)	1 (7%)	6
American Bittern	1 (7%)	0	0	1 (7%)
Common Gallinule	3 (21%)	3 (21%)	2 (14%)	4 (29%)
American Coot	0	0	0	0
Pied-Billed Grebe	1 (7%)	2 (14%)	1 (7%)	3 (21%)

Of the 14 points surveyed, five had no marsh bird species detections: B1-1; B1-5; B1-6; B2-4; and B2-5 (Table 11). Point B1-3 had the highest number of species detected (least bittern, Virginia rail, common gallinule, and pied-billed grebe). Location B-7 had the highest number of individuals during a single survey event, with six pied-billed grebes and two common gallinules recorded. Sora was only observed at point B2-7, and American bittern was only documented within the target marsh at B2-2 (Table 11). An American bittern was also observed as a flyover during surveys at B2-5, but was not included in the number of detections because it could not be tied to a marsh in the NR AOC survey area.

Table 11. Marsh Bird Species Detected per Survey Point

Point	Number of Individuals Detected						
	Least Bittern	Sora	Virginia Rail	American Bittern	Common Gallinule	American Coot	Pied-Billed Grebe
Survey Event 1 (May 20-21, 2014)							
B1-1	0	0	0	0	0	0	0
B1-2	1	0	0	0	0	0	0
B1-3	1	0	1	0	1	0	0
B1-4	0	0	1	0	1	0	0
B1-5	0	0	0	0	0	0	0
B1-6	0	0	0	0	0	0	0
B1-7	0	0	0	0	0	0	0
B2-1	0	0	1	0	0	0	0
B2-2	0	0	0	1	0	0	0
B2-3	0	0	1	0	0	0	0
B2-4	0	0	0	0	0	0	0
B2-5	0	0	0	0	0	0	0
B2-6	0	0	1	0	0	0	0
B2-7	0	0	0	0	2	0	6
Survey Event 2 (June 4-5, 2014)							
B1-1	0	0	0	0	0	0	0
B1-2	1	0	0	0	1	0	1
B1-3	1	0	1	0	1	0	0
B1-4	0	0	1	0	1	0	0
B1-5	0	0	0	0	0	0	0
B1-6	0	0	0	0	0	0	0
B1-7	0	0	1	0	0	0	0
B2-1	0	0	0	0	0	0	0
B2-2	0	0	0	0	0	0	0
B2-3	0	0	1	0	0	0	0
B2-4	0	0	0	0	0	0	0
B2-5	0	0	0	0	0	0	0
B2-6	0	0	0	0	0	0	0
B2-7	0	1	0	0	0	0	1

Table 11. Marsh Bird Species Detected per Survey Point (continued)

Survey Event 3 (June 25-26, 2014)							
Point	Least Bittern	Sora	Virginia Rail	American Bittern	Common Gallinule	American Coot	Pied-Billed Grebe
B1-1	0	0	0	0	0	0	0
B1-2	1	0	0	0	0	0	0
B1-3	1	0	1	0	1	0	1
B1-4	1	0	0	0	1	0	0
B1-5	0	0	0	0	0	0	0
B1-6	0	0	0	0	0	0	0
B1-7	0	0	0	0	0	0	0
B2-1	0	0	0	0	0	0	0
B2-2	0	1	0	0	0	0	0
B2-3	0	0	0	0	0	0	0
B2-4	0	0	0	0	0	0	0
B2-5	0	0	0	0	0	0	0
B2-6	0	0	0	0	0	0	0
B2-7	0	0	0	0	0	0	1

Secondary Focal Species

Secondary focal species were also documented during each of the three survey events and six 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 was the swamp sparrow, recorded at 59 % (13 of 22) of survey points along Survey Route B1 across all survey events, and 86 % (18 of 21) of survey points along Survey Route B2 across all survey events. Black tern, also a secondary focal species, was seen in the project area, but never observed during a survey event. Forster's tern was not detected in the survey area.

3.2.2 Incidental Observations

Three American coot were observed during the first survey event while travelling to/from survey point B2-7, and two were observed in the same vicinity during the second survey event. The birds did not vocalize and were never heard or seen during any surveys. This species is notoriously secretive and typically does not respond to broadcast calls. During the second event, four black terns were observed flying over the Niagara River approximately 300 m off the southeast shoreline of Grand Island.

3.2.3 Disturbances Noted During Survey Efforts

Similar to anuran survey efforts, noise (primarily from vehicle traffic), affected the surveyors ability to detect calls during some survey events. Noise was at moderate (score = 2) to serious (score = 3) levels or two or more survey events at eight (67%) of the point locations (Table 12). In two instances (both in event 1), survey efforts were profoundly affected by noise (score = 4).

In addition, ongoing efforts to control invasive *Phragmites* at Times Beach have resulted in the loss of marsh vegetation and ongoing disturbance (i.e., noise, human activity) which have likely affected breeding activities of marsh dependent species. Marsh species are expected to colonize the site once suitable vegetation and hydrology have become reestablished.

Table 12. Noise Levels During Marsh Bird Survey Events.

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

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

3.2.4 Habitat

Of the 14 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 be present in the marsh, but any open water is 50 m or more away) (Table 13). As with the anuran habitats, some marsh bird locations included in the survey (B1-1, B1-5, B1-6, B2-1, B2-2, B2-3, and B2-5) may be of questionable suitability for breeding marsh birds based on the lack of desirable wetland vegetation, poor hydrologic conditions, and /or poor open water/marsh interspersion (see photographs in Appendix A).

Table 13. Marsh Bird Habitat Conditions

Point	General Type	Detections[1]	Overall Habitat Quality	% 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]
B1-1	Marsh	0	poor	115	0	0	0	100	0	0/100	none
B1-2	Open Water/Marsh	5	adequate	67	0	60	0	0	5	30/70	1
B1-3	Open Water/Marsh	10	adequate	100	0.67	30	0	0	0	70/30	0
B1-4	Marsh	6	adequate	100	0.9	100	0	0	0	5/95	1
B1-5	Marsh	0	poor	80	0	70	0	10	0	0/100	70
B1-6	Marsh	0	poor	100	0	80	0	0	0	10/90	50
B1-7	Open Water/Marsh	1	adequate	125	0.02	50	30	0	0	30/70	3
B2-1	Marsh	1	poor	80	0	30	0	0	0	0/100	none
B2-2	Marsh	2	poor	105	0	55	0	0	0	0/100	none
B2-3	Marsh	2	poor	100	0	70	0	0	0	0/100	none
B2-4	Open Water/Marsh	0	adequate	60	0.25	40	0	0	0	50/50	1
B2-5	Marsh	0	poor	130	0	80	0	0	0	0/100	none
B2-6	Open Water/Marsh	1	adequate	90	0.23		0	0	0	25/75	1
B2-7	Open Water/Marsh	5	adequate	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

Thirteen of the 14 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 dominant vegetation at one site; B1-1 (Table 13), and cattails (i.e., genus *Typha*) were the dominant species at 11 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.

Six (43%) of the sites had measurable surface water present at the time of survey (Table 13). Water levels were greater than 0.30 m (> ~12 inches) at three 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 eight 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 B1-1, B2-1, B2-2, B2-3, and B2-5.

4.0 DISCUSSION

Summaries and data presented herein were collected during the initial survey effort for the Project; launched in 2014. Additional years of data collection will help to improve efforts to evaluate and assess marsh anuran and marsh bird populations and trends and habitat conditions within the NR AOC and will provide a basis for future year-year comparisons.

Routes and Points

Two survey routes with 20 points total were sampled for anurans and two routes with 14 points were sampled for marsh birds. Both survey efforts would undoubtedly benefit from the addition of more survey points to increase coverage and sample sizes. However, 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. Opportunities to expand survey coverage are limited, but several locations will be evaluated in 2015 for possible inclusion in future survey efforts, these include up to six additional anuran survey points (most will likely be placed within marshes already being surveyed, where noise may have affected the surveyor's ability to detect calling anurans across the full marsh extent), and one additional marsh bird survey point in the Beaver Island State Park marsh system.

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

This study detected six of the eight anuran species commonly documented in the region on MMP surveys (Archer and Jones 2009). A seventh species (chorus frog) was reported in April prior to the start of 2014 survey efforts, and the eighth species (wood frog) was not detected. Pickerel frog, an uncommon species on MMP events, was documented during the 2014 effort. In an effort to better target some of the species that may have been missed or underrepresented in 2014, the Work Plan for this study was revised post-2014 efforts to call for survey events in mid-

late April; mid-late May; mid-June; and mid-July for a total of four survey events instead of three as was done in 2014. The second June event was eliminated from future survey efforts because the 2014 event yielded only 2 species, and these had been reported in higher numbers on the prior June event. Although most of the common anuran species known to occur in the region were detected in this study, over 89% of the detections were of only a small number of chorusing individuals at any given station (call index #2 or less). This suggests that population numbers throughout the NR AOC are quite low. The potential addition of up to six survey points and the expanded survey window covering April and July on future surveys may help to yield higher numbers of individuals and species in areas where they were previously not documented.

Based on an evaluation of general habitat conditions at anuran survey point locations, nine of the 20 marsh sites (A1-2, A1-6, A1-10, A2-5, A2-6, A2-7, A2-8, A2-9, and A2-10) are of overall low quality primarily due to poor open water/wetland vegetation interspersion, lack of hydrology within the wetland, lack of desirable wetland vegetation, and/or poor location along the river shoreline (see photographs in Appendix A). These site conditions may help to explain the lack of anuran species observed at several sites (A1-6, A1-10, A2-5, A2-8, and A2-10), but site A1-1 (a site with overall good quality habitat) also had no detections, and sites A1-2, A2-6, A2-7, and A2-9 (poor quality sites) all had species detections. The link between marsh habitat availability and anuran populations is well documented, and some of the locations with poor habitat lack several of the basic characteristics to qualify as marsh habitat. However, the factors that determine how the various parameters within a habitat affect species use and productivity (e.g., vegetation type, percent cover, water levels in/near marsh areas, habitat size, surrounding habitats, and level of disturbance) are not well understood. In highly disturbed areas such as the NR AOC, where marsh habitat is extremely limited and threats to survival are high, even the poorest quality marshes may be of importance in sustaining breeding populations. Although few opportunities were identified to add additional marsh habitats to the survey effort to expand the pool of habitats evaluated for anurans, future replicates will help in the evaluation of how these marshes are being used by the target anuran species (for example, are poor quality marshes used consistently, were species missed in the high quality marsh), and to identify other factors that may be driving marsh site selection.

An important component of the 2014-2018 monitoring effort is to evaluate trends in populations of northern leopard frog, American toad, and bullfrog in the study area. Collectively 47 documented call events (i.e., call of a single species at a single point) were recorded over the 60 survey events that took place within the three survey periods of 2014; of these there were 22 detections for northern leopard frog, American toad, and bullfrog. 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 to 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

This study detected six of the eight target marsh bird species identified for this survey. A seventh species (American coot) was detected incidentally while on site. The eighth target species (king rail) was not detected on this study or others 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 effort and longer time spent meandering through available habitat may yield higher numbers. For example, American coot were observed while canoeing to survey locations within the marshes of Buckhorn Island State Park, but were never documented on a survey. In addition, during the 2014 survey effort a recently restored marsh system within Beaver Island State Park was identified as potential marsh bird habitat. The 2015 survey effort will include an evaluation of the area for possible inclusion in future survey efforts.

Half of the 14 marsh bird survey sites (B1-1, B1-5, B1-6, B2-1, B2-2, B2-3, and B2-5) are believed to be of overall low quality for breeding marsh birds based on the lack of water at or near the point, absence of desirable wetland vegetation, and/or poor open water/wetland vegetation interspersion (see photographs in Appendix A). These site conditions may help to explain the lack of target species observed at sites B1-1, B1-5, B1-6, and B2-5. But, site B2-4 (a site with overall good quality habitat) also had no detections, and sites B2-1, B2-2, and B2-3 (poor quality sites) all had species detections (Table 13). As with the marsh anuran habitats, the factors that determine how breeding marsh birds may be affected by the various parameters of a habitat (e.g., vegetation type, percent cover, water levels in and near marsh areas, habitat size, surrounding habitats, and level of disturbance) are not well understood. In highly disturbed areas such as the NR AOC, where marsh habitat is extremely limited and threats to survival are high, even the poorest quality marshes may be of importance in sustaining a breeding population. Although few opportunities were identified to add additional marshes to the survey effort to expand the pool of marsh bird habitats evaluated, future replicates will help in the evaluation of how these marshes are being used by the target species (for example, are poor quality marshes used consistently, were species missed in the high quality marsh), and to identify other factors that may be driving marsh site selection by the target marsh bird species.

Sunken Island (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 the 2014 study results found the highest diversity of species in these areas (collectively five or more detections). 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 2014 survey efforts. However, a grebe was also documented in Tifft Preserve on 2 out of 3 survey events, suggesting this species may also be breeding within the preserve.

Collectively a total of 32 documented marsh bird call events (i.e., call of a single species at a single point) were recorded over the 42 survey events that took place within the three survey periods. Similar to the marsh anuran effort, this small sample size 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 NY DEC in 2102 included data from nearly 1,500 call-broadcast surveys at 417 survey points (Yard et. al. 2012). 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 opportunity to increase the survey effort and sample sizes.

5.0 CONCLUSIONS

This study is the first 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 eight targeted anuran species and seven of the eight targeted heron 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.

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APPENDIX A

PHOTOGRAPHIC DOCUMENTATION

Anuran Survey Point A1-1 Facing Northeast

Anuran Survey Point A1-2 Facing Northwest

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 Northeast

Anuran Survey Point A2-2 Facing Southwest

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

Avian Survey Point B1-1 Facing Southeast

Avian Survey Point B1-2 Facing Northwest

Avian Survey Point B1-3 Facing North

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 Northeast

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 Northeast

Avian Survey Point B2-6 Facing South

Pending - Avian Survey Point B2-7 Facing Northeast

APPENDIX B

COORDINATES FOR ANURAN AND MARSH BIRD SURVEY LOCATIONS

2014 Anuran and Marsh Bird Survey Locations

ANURANS			
Point ID	**Route**	**Latitude**	**Longitude**
A1-1	A1	42° 57' 38.110" N	78° 56' 21.060" W
A1-2	A1	42° 57' 35.240" N	78° 57' 25.250" W
A1-3	A1	42° 58' 2.172" N	78° 56' 34.155" W
A1-4	A1	43° 0' 26.892" N	78° 55' 52.793" W
A1-5	A1	43° 1' 29.949" N	78° 53' 40.131" W
A1-6	A1	43° 3' 39.138" N	78° 58' 21.097" W
A1-7	A1	43° 3' 40.725" N	78° 58' 43.212" W
A1-8	A1	43° 3' 28.714" N	78° 59' 11.113" W
A1-9	A1	43° 3' 33.745" N	78° 59' 40.817" W
A1-10	A1	43° 1' 33.738" N	79° 0' 41.622" W
A2-1	A2	42° 50' 38.956" N	78° 50' 55.559" W
A2-2	A2	42° 51' 7.384" N	78° 51' 11.736" W
A2-3	A2	42° 52' 22.610" N	78° 52' 57.250" W
A2-4	A2	42° 56' 1.557" N	78° 54' 28.139" W
A2-5	A2	43° 0' 3.462" N	78° 55' 36.811" W
A2-6	A2	43° 0' 22.255" N	78° 54' 24.295" W
A2-7	A2	43° 1' 0.672" N	78° 53' 28.866" W
A2-8	A2	43° 1' 24.464" N	78° 52' 48.048" W
A2-9	A2	43° 2' 4.240" N	78° 53' 7.439" W
A2-10	A2	43° 3' 15.203" N	78° 53' 59.275" W

MARSH BIRDS			
Point ID	**Route**	**Latitude**	**Longitude**
B1-1	B1	42° 50' 21.576" N	78° 51' 19.126" W
B1-2	B1	42° 50' 37.483" N	78° 50' 59.472" W
B1-3	B1	42° 50' 53.400" N	78° 51' 13.157" W
B1-4	B1	42° 51' 7.467" N	78° 51' 11.799" W
B1-5	B1	42° 52' 22.661" N	78° 52' 57.177" W
B1-6	B1	42° 52' 32.820" N	78° 53' 13.264" W
B1-7	B1	42° 57' 58.505" N	78° 56' 30.523" W
B2-1	B2	43° 3' 50.819" N	78° 59' 54.740" W
B2-2	B2	43° 3' 41.832" N	78° 59' 30.451" W
B2-3	B2	43° 3' 31.893" N	78° 59' 42.139" W
B2-4	B2	43° 3' 29.595" N	78° 59' 21.973" W
B2-5	B2	43° 3' 25.369" N	78° 58' 53.447" W
B2-6	B2	43° 3' 37.612" N	78° 58' 45.396" W
B2-7	B2	43° 3' 45.515" N	78° 58' 11.930" W

APPENDIX C

2104 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):		Additional notes:	
Route Number:			
Survey Date (mm/dd/yyyy):			
Window Number:		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):										
Air Temperature: Select Scale: °C °F										
Was noise a factor? (use index)										
Did you take a break? (check if yes)										
Wind (Use Wind Scale)										
Sky (Use Sky Codes)										
Moon or Moonlight Visible (Y or N)										
Number of cars that passed (within 50 m)										
Snow cover (Y or 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										
Green frog										
Northern leopard frog										
Pickerel frog										

Comments:

Instructions:

Please be sure to complete the entire datasheet.

Each datasheet represents one person's frog call observations. If you have an assistant, he/she can assist with the environmental data (e.g. air temp, count cars, etc.) but not with what frogs are heard.

Visit stops in 1-10 order. If unforeseen circumstances require you to skip a stop, write that on the datasheet.

At the start of each survey point record the time, wind, and sky conditions (see codes to the right).

At each stop listen for 5 minutes, recording the amphibian calling index for each species heard during an initial 3 minute listening period in the first column of the survey point, followed by the findings of a subsequent 2 minute listening period in the second column of each survey point. Report only the species you are confident that you heard. If a species varies in calling intensity over the listening periods, report the highest calling index level you heard for each listening period.

At each stop, also report the environmental data requested: air temperature, noise conditions, moonlight, and number of cars that passed while listening.

There are two kinds of noise disturbance questions:

- Was noise a factor? The "Noise index" is a numerical ranking of the level of background noise disturbance encountered. See codes to the right.
- "Did you take a break?" If an unexpected noise disturbance happens (such as a train) that lasts a minute or more, you may interrupt the 5 minute listening period to ignore the sudden disturbance. Finish up the listening time after the disturbance has passed. Do not include this type of noise in the "was noise a factor" question.

Index and Code Definitions

Amphibian Calling Index

1	Individuals can be counted; there is space between calls
2	Calls of individuals can be distinguished but there is some overlapping of calls
3	Full chorus, calls are constant, continuous and overlapping

Amphibian Calling Index Modifiers

A	Amphibians Calling Within Target Area Only
B	Amphibians Calling Outside Target Area Only
C	Amphibians Calling Inside and Outside of Target Area

Sky codes

0	Few clouds
1	Partly cloudy (scattered) or variable sky)
2	Cloudy or overcast
4	Fog or smoke
5	Drizzle or light rain (not affecting hearing ability)
7	Snow
8	Showers (is affecting hearing ability) do not conduct survey

Wind Codes

0	Calm (<1mph) smoke rises vertically
1	Light Air (1-3 mph) smoke drifts, weather vane inactive
2	Light Breeze (4-7 mph) leaves rustle, can feel wind on face
3	Gentle Breeze (8-12 mph) leaves and twigs move around, small flag extends
4*	Moderate Breeze (13-18 mph) moves thin branches, raises loose papers * Do not conduct survey, unless in Great Plains states
5**	Fresh Breeze (19 mph or greater) small trees begin to sway **Do not conduct survey –ALL REGIONS

Noise Index

0	No appreciable effect (e.g. owl calling)
1	Slightly affecting sampling (e.g. distant traffic, dog barking, 1 car passing)
2	Moderately affecting sampling (e.g. nearby traffic, 2-5 cars passing)
3	Seriously affecting sampling (e.g. continuous traffic nearby, 6-10 cars)
4	Profoundly affecting sampling (e.g. continuous traffic passing, construction noise)

2014 Marsh Anuran Survey Data_Route 1

Survey Date	Survey Window	Route #	Point #	Latitude	Longitude	Start Time	Time Bracket (3 or 2 min.	Air Temp. (°F)	Noise Factor	Break taken (y/n)
5/19/2014	1	A1	1	42.960586°	-78.939183°	2115	3	57	2	N
5/19/2014	1	A1	1	42.960586°	-78.939183°	2115	2	57	2	N
5/19/2014	1	A1	2	42.959789°	-78.957014°	2124	3	54	1	N
5/19/2014	1	A1	2	42.959789°	-78.957014°	2124	3	54	1	N
5/19/2014	1	A1	2	42.959789°	-78.957014°	2124	2	54	1	N
5/19/2014	1	A1	2	42.959789°	-78.957014°	2124	2	54	1	N
5/19/2014	1	A1	3	42.967270°	-78.942821°	2148	3	55	3	N
5/19/2014	1	A1	3	42.967270°	-78.942821°	2148	2	55	3	N
5/19/2014	1	A1	4	43.007470°	-78.931331°	2215	3	55	3	N
5/19/2014	1	A1	4	43.007470°	-78.931331°	2215	2	55	3	N
5/19/2014	1	A1	5	43.024986°	-78.894481°	2226	3	55	2	N
5/19/2014	1	A1	5	43.024986°	-78.894481°	2226	2	55	2	N
5/19/2014	1	A1	6	43.060872°	-78.972527°	2250	3	55	2	N
5/19/2014	1	A1	6	43.060872°	-78.972527°	2250	2	55	2	N
5/19/2014	1	A1	7	43.061312°	-78.978670°	2305	3	55	2	N
5/19/2014	1	A1	7	43.061312°	-78.978670°	2305	3	55	2	N
5/19/2014	1	A1	7	43.061312°	-78.978670°	2305	2	55	2	N
5/19/2014	1	A1	8	43.057976°	-78.986420°	2325	3	52	2	N
5/19/2014	1	A1	8	43.057976°	-78.986420°	2325	2	52	2	N
5/19/2014	1	A1	9	43.059374°	-78.994671°	2348	3	51	2	N
5/19/2014	1	A1	9	43.059374°	-78.994671°	2348	2	51	2	N
5/19/2014	1	A1	10	43.026314°	-79.011535°	10	3	51	2	N
5/19/2014	1	A1	10	43.026314°	-79.011535°	10	2	51	2	N
6/3/2014	2	A1	10	43.026314°	-79.011535°	2133	3	68	1	N
6/3/2014	2	A1	10	43.026314°	-79.011535°	2133	2	68	1	N
6/3/2014	2	A1	9	43.059374°	-78.994671°	2155	3	68	1	N
6/3/2014	2	A1	9	43.059374°	-78.994671°	2155	2	68	1	N
6/3/2014	2	A1	8	43.057976°	-78.986420°	2214	3	68	2	N
6/3/2014	2	A1	8	43.057976°	-78.986420°	2214	2	68	2	N
6/3/2014	2	A1	7	43.061312°	-78.978670°	2237	3	65	2	N
6/3/2014	2	A1	7	43.061312°	-78.978670°	2237	3	65	2	N
6/3/2014	2	A1	7	43.061312°	-78.978670°	2237	2	65	2	N
6/3/2014	2	A1	6	43.060872°	-78.972527°	2251	3	63	2	N
6/3/2014	2	A1	6	43.060872°	-78.972527°	2251	2	63	2	N
6/3/2014	2	A1	5	43.024986°	-78.894481°	2312	3	60	1	N
6/3/2014	2	A1	5	43.024986°	-78.894481°	2312	2	60	1	N
6/3/2014	2	A1	4	43.007470°	-78.931331°	2327	3	60	1	N
6/3/2014	2	A1	4	43.007470°	-78.931331°	2327	2	60	1	N
6/3/2014	2	A1	3	42.967270°	-78.942821°	2347	3	60	2	N
6/3/2014	2	A1	3	42.967270°	-78.942821°	2347	2	60	2	N

2014 Marsh Anuran Survey Data_Route 1

Survey Date	Survey Window	Route #	Point #	Latitude	Longitude	Start Time	Time Bracket (3 or 2 min.	Air Temp. (°F)	Noise Factor	Break taken (y/n)
6/3/2014	2	A1	2	42.959789°	-78.957014°	7	3	58	2	N
6/3/2014	2	A1	2	42.959789°	-78.957014°	7	3	58	2	N
6/3/2014	2	A1	2	42.959789°	-78.957014°	7	2	58	2	N
6/3/2014	2	A1	1	42.960586°	-78.939183°	22	3	58	3	N
6/3/2014	2	A1	1	42.960586°	-78.939183°	22	2	58	3	N
6/25/2014	3	A1	1	42.960586°	-78.939183°	2129	3	69	1	N
6/25/2014	3	A1	1	42.960586°	-78.939183°	2129	2	69	1	N
6/25/2014	3	A1	2	42.959789°	-78.957014°	2141	3	69	1	N
6/25/2014	3	A1	2	42.959789°	-78.957014°	2141	2	69	1	N
6/25/2014	3	A1	3	42.967270°	-78.942821°	2203	3	69	2	N
6/25/2014	3	A1	3	42.967270°	-78.942821°	2203	2	69	2	N
6/25/2014	3	A1	4	43.007470°	-78.931331°	2222	3	68	2	N
6/25/2014	3	A1	4	43.007470°	-78.931331°	2222	2	68	2	N
6/25/2014	3	A1	5	43.024986°	-78.894481°	2235	3	68	3	N
6/25/2014	3	A1	5	43.024986°	-78.894481°	2235	2	68	3	N
6/25/2014	3	A1	6	43.060872°	-78.972527°	2251	3	67	2	N
6/25/2014	3	A1	6	43.060872°	-78.972527°	2251	2	67	2	N
6/25/2014	3	A1	7	43.061312°	-78.978670°	2302	3	67	1	N
6/25/2014	3	A1	7	43.061312°	-78.978670°	2302	2	67	1	N
6/25/2014	3	A1	8	43.057976°	-78.986420°	2318	3	67	1	N
6/25/2014	3	A1	8	43.057976°	-78.986420°	2318	3	67	1	N
6/25/2014	3	A1	8	43.057976°	-78.986420°	2318	2	67	1	N
6/25/2014	3	A1	8	43.057976°	-78.986420°	2318	2	67	1	N
6/25/2014	3	A1	9	43.059374°	-78.994671°	2334	3	67	2	N
6/25/2014	3	A1	9	43.059374°	-78.994671°	2334	2	67	2	N
6/25/2014	3	A1	10	43.026314°	-79.011535°	2351	3	67	0	N
6/25/2014	3	A1	10	43.026314°	-79.011535°	2351	2	67	0	N

2014 Marsh Anuran Survey Data_Route 1

Survey Window	Route #	Point #	Wind (Beaufort)	Sky (Sky Code)	Moon Light (y/n)	# of Cars	Snow Cover (y/n)	Genus	Specific Epithet	Calling Index
1	A1	1	1	1	N	0	N	*None*	*None*	0
1	A1	1	1	1	N	0	N	*None*	*None*	0
1	A1	2	2	1	N	0	N	*Pseudacris*	*crucifer*	1
1	A1	2	2	1	N	0	N	*Lithobates*	*palustris*	1
1	A1	2	2	1	N	0	N	*Pseudacris*	*crucifer*	1
1	A1	2	2	1	N	0	N	*Lithobates*	*palustris*	1
1	A1	3	1	1	N	0	N	*None*	*None*	0
1	A1	3	1	1	N	0	N	*None*	*None*	0
1	A1	4	1	1	N	4	N	*None*	*None*	0
1	A1	4	1	1	N	2	N	*Pseudacris*	*crucifer*	1
1	A1	5	2	1	N	0	N	*Lithobates*	*palustris*	1
1	A1	5	2	1	N	0	N	*Lithobates*	*palustris*	1
1	A1	6	1	1	N	0	N	*None*	*None*	0
1	A1	6	1	1	N	0	N	*None*	*None*	0
1	A1	7	1	1	N	0	N	*Pseudacris*	*crucifer*	1
1	A1	7	1	1	N	0	N	*Lithobates*	*palustris*	1
1	A1	7	1	1	N	0	N	*Pseudacris*	*crucifer*	1
1	A1	8	1	1	N	0	N	*None*	*None*	0
1	A1	8	1	1	N	0	N	*None*	*None*	0
1	A1	9	1	1	N	0	N	*Pseudacris*	*crucifer*	1
1	A1	9	1	1	N	0	N	*Pseudacris*	*crucifer*	1
1	A1	10	1	1	N	0	N	*None*	*None*	0
1	A1	10	1	1	N	1	N	*None*	*None*	0
2	A1	10	3	0	Y	3	N	*None*	*None*	0
2	A1	10	3	0	Y	1	N	*None*	*None*	0
2	A1	9	3	0	Y	0	N	*None*	*None*	0
2	A1	9	3	0	Y	0	N	*None*	*None*	0
2	A1	8	3	0	Y	0	N	*Lithobates*	*clamitans*	1
2	A1	8	3	0	Y	0	N	*Lithobates*	*clamitans*	1
2	A1	7	1	0	Y	0	N	*Hyla*	*versicolor*	1
2	A1	7	1	0	Y	0	N	*Lithobates*	*catesbeianus*	1
2	A1	7	1	0	Y	0	N	*Lithobates*	*catesbeianus*	1
2	A1	6	2	0	Y	0	N	*None*	*None*	0
2	A1	6	2	0	Y	0	N	*None*	*None*	0
2	A1	5	1	0	Y	0	N	*Lithobates*	*palustris*	0
2	A1	5	1	0	Y	0	N	*Lithobates*	*palustris*	0
2	A1	4	1	0	Y	1	N	*Lithobates*	*clamitans*	2
2	A1	4	1	0	Y	0	N	*Lithobates*	*clamitans*	2
2	A1	3	1	0	Y	0	N	*None*	*None*	0
2	A1	3	1	0	Y	0	N	*None*	*None*	0

2014 Marsh Anuran Survey Data_Route 1

Survey Window	Route #	Point #	Wind (Beaufort)	Sky (Sky Code)	Moon Light (y/n)	# of Cars	Snow Cover (y/n)	Genus	Specific Epithet	Calling Index
2	A1	2	1	0	Y	0	N	*Anaxyrus*	*americanus*	2
2	A1	2	1	0	Y	0	N	*Lithobates*	*catesbeianus*	2
2	A1	2	1	0	Y	0	N	*Anaxyrus*	*americanus*	2
2	A1	1	1	0	Y	0	N	*None*	*None*	0
2	A1	1	1	0	Y	0	N	*None*	*None*	0
3	A1	1	2	2	N	0	N	*None*	*None*	0
3	A1	1	2	2	N	0	N	*None*	*None*	0
3	A1	2	2	1	N	0	N	*Lithobates*	*catesbeianus*	1
3	A1	2	2	1	N	0	N	*Lithobates*	*catesbeianus*	1
3	A1	3	2	1	N	0	N	*Lithobates*	*catesbeianus*	1
3	A1	3	2	1	N	0	N	*Lithobates*	*catesbeianus*	1
3	A1	4	2	1	N	5	N	*Lithobates*	*clamitans*	1
3	A1	4	2	1	N	5	N	*Lithobates*	*clamitans*	1
3	A1	5	2	1	N	0	N	*None*	*None*	0
3	A1	5	2	1	N	0	N	*Lithobates*	*catesbeianus*	1
3	A1	6	2	1	N	0	N	*None*	*None*	0
3	A1	6	2	1	N	0	N	*None*	*None*	0
3	A1	7	2	1	N	0	N	*Lithobates*	*catesbeianus*	1
3	A1	7	2	1	N	0	N	*Lithobates*	*catesbeianus*	1
3	A1	8	2	1	N	0	N	*Lithobates*	*catesbeianus*	1
3	A1	8	2	1	N	0	N	*Lithobates*	*clamitans*	2
3	A1	8	2	1	N	0	N	*Lithobates*	*catesbeianus*	1
3	A1	8	2	1	N	0	N	*Lithobates*	*clamitans*	2
3	A1	9	2	1	N	0	N	*None*	*None*	0
3	A1	9	2	1	N	0	N	*None*	*None*	0
3	A1	10	2	1	N	0	N	*None*	*None*	0
3	A1	10	2	1	N	0	N	*None*	*None*	0

2014 Marsh Anuran Survey Data_Route 1

Survey Window	Route #	Point #	Index Modifier	Days Since Last Rain Event	Comments
1	A1	1		1 - showers on 5/18	Cold night; previous night much warmer
1	A1	1		1 - showers on 5/18	Cold night; previous night much warmer
1	A1	2	a	1 - showers on 5/18	Cold night; previous night much warmer
1	A1	2	a	1 - showers on 5/18	Cold night; previous night much warmer
1	A1	2	a	1 - showers on 5/18	Cold night; previous night much warmer
1	A1	2	a	1 - showers on 5/18	Cold night; previous night much warmer
1	A1	3		1 - showers on 5/18	Cold night; previous night much warmer
1	A1	3		1 - showers on 5/18	Cold night; previous night much warmer
1	A1	4		1 - showers on 5/18	Cold night; previous night much warmer
1	A1	4	a	1 - showers on 5/18	Cold night; previous night much warmer
1	A1	5	a	1 - showers on 5/18	Cold night; previous night much warmer
1	A1	5	a	1 - showers on 5/18	Cold night; previous night much warmer
1	A1	6		1 - showers on 5/18	Cold night; previous night much warmer
1	A1	6		1 - showers on 5/18	Cold night; previous night much warmer
1	A1	7	a	1 - showers on 5/18	Cold night; previous night much warmer
1	A1	7	a	1 - showers on 5/18	Cold night; previous night much warmer
1	A1	7	a	1 - showers on 5/18	Cold night; previous night much warmer
1	A1	8		1 - showers on 5/18	Cold night; previous night much warmer
1	A1	8		1 - showers on 5/18	Cold night; previous night much warmer
1	A1	9	a	1 - showers on 5/18	Cold night; previous night much warmer
1	A1	9	a	1 - showers on 5/18	Cold night; previous night much warmer
1	A1	10		1 - showers on 5/18	Cold night; previous night much warmer
1	A1	10		1 - showers on 5/18	Cold night; previous night much warmer
2	A1	10		1	
2	A1	10		1	
2	A1	9		1	
2	A1	9		1	
2	A1	8	a	1	
2	A1	8	a	1	
2	A1	7	b	1	
2	A1	7	a	1	
2	A1	7	a	1	
2	A1	6		1	
2	A1	6		1	
2	A1	5		1	
2	A1	5		1	
2	A1	4	a	1	
2	A1	4	a	1	
2	A1	3		1	
2	A1	3		1	

2014 Marsh Anuran Survey Data_Route 1

Survey Window	Route #	Point #	Index Modifier	Days Since Last Rain Event	Comments
2	A1	2	a	1	
2	A1	2	a	1	
2	A1	2	a	1	
2	A1	1		1	
2	A1	1		1	
3	A1	1		0 - showers off and on throughout the evening	
3	A1	1		0 - showers off and on throughout the evening	
3	A1	2	c	0 - showers off and on throughout the evening	
3	A1	2	c	0 - showers off and on throughout the evening	
3	A1	3	a	0 - showers off and on throughout the evening	
3	A1	3	a	0 - showers off and on throughout the evening	
3	A1	4	a	0 - showers off and on throughout the evening	
3	A1	4	a	0 - showers off and on throughout the evening	
3	A1	5		0 - showers off and on throughout the evening	
3	A1	5	a	0 - showers off and on throughout the evening	
3	A1	6		0 - showers off and on throughout the evening	
3	A1	6		0 - showers off and on throughout the evening	
3	A1	7	a	0 - showers off and on throughout the evening	
3	A1	7	a	0 - showers off and on throughout the evening	
3	A1	8	a	0 - showers off and on throughout the evening	
3	A1	8	c	0 - showers off and on throughout the evening	
3	A1	8	c	0 - showers off and on throughout the evening	
3	A1	8	c	0 - showers off and on throughout the evening	
3	A1	9		0 - showers off and on throughout the evening	
3	A1	9		0 - showers off and on throughout the evening	
3	A1	10		0 - showers off and on throughout the evening	
3	A1	10		0 - showers off and on throughout the evening	

2014 Marsh Anuran Survey Data_Route 2

Survey Window	Route #	Point #	Latitude	Longitude	Start Time	Interval (3 or 2 minute)	Air Temp. (^{o}F)	Noise Factor	Break taken (y/n)	Wind (Beaufort)
1	A2	1	42.844154°	-78.848766°	2108	3	60	2	N	1
1	A2	1	42.844154°	-78.848766°	2108	2	60	2	N	1
1	A2	2	42.852051°	-78.853260°	2130	3	60	2	N	2
1	A2	2	42.852051°	-78.853260°	2130	2	60	2	N	2
1	A2	3	42.872947°	-78.882569°	2145	3	57	3	N	1
1	A2	3	42.872947°	-78.882569°	2145	2	57	3	N	1
1	A2	4	42.933766°	-78.907816°	2209	3	57	2	N	1
1	A2	4	42.933766°	-78.907816°	2209	2	57	2	N	1
1	A2	5	43.000962°	-78.926892°	2228	3	59	3	N	1
1	A2	5	43.000962°	-78.926892°	2228	2	59	3	N	1
1	A2	6	43.006182°	-78.906749°	2240	3	59	2	N	1
1	A2	6	43.006182°	-78.906749°	2240	3	59	2	N	1
1	A2	6	43.006182°	-78.906749°	2240	2	59	2	N	1
1	A2	6	43.006182°	-78.906749°	2240	2	59	2	N	1
1	A2	7	43.016853°	-78.891352°	2252	3	59	2	N	1
1	A2	7	43.016853°	-78.891352°	2252	2	59	2	N	1
1	A2	8	43.023462°	-78.880013°	2303	3	59	2	N	1
1	A2	8	43.023462°	-78.880013°	2303	2	59	2	N	1
1	A2	9	43.034511°	-78.885400°	2314	3	59	1	N	1
1	A2	9	43.034511°	-78.885400°	2314	3	59	1	N	1
1	A2	9	43.034511°	-78.885400°	2314	2	59	1	N	1
1	A2	10	43.054223°	-78.899799°	2325	3	57	1	N	1
1	A2	10	43.054223°	-78.899799°	2325	3	57	1	N	1
1	A2	10	43.054223°	-78.899799°	2325	2	57	1	N	1
2	A2	10	43.054223°	-78.899799°	2120	3	62	2	N	1
2	A2	10	43.054223°	-78.899799°	2120	2	62	2	N	1
2	A2	9	43.034511°	-78.885400°	2132	3	62	1	N	1
2	A2	9	43.034511°	-78.885400°	2132	2	62	1	N	1
2	A2	8	43.023462°	-78.880013°	2142	3	61	1	N	1
2	A2	8	43.023462°	-78.880013°	2142	2	61	1	N	1
2	A2	7	43.016853°	-78.891352°	2155	3	61	1	N	1
2	A2	7	43.016853°	-78.891352°	2155	2	61	1	N	1
2	A2	6	43.006182°	-78.906749°	2205	3	61	2	N	1
2	A2	6	43.006182°	-78.906749°	2205	2	61	2	N	1
2	A2	5	43.000962°	-78.926892°	2205	3	60	2	N	1
2	A2	5	43.000962°	-78.926892°	2205	2	60	2	N	1
2	A2	4	42.933766°	-78.907816°	2235	3	56	1	N	1
2	A2	4	42.933766°	-78.907816°	2235	2	56	1	N	1
2	A2	4	42.933766°	-78.907816°	2235	2	56	1	N	1
2	A2	3	42.872947°	-78.882569°	2256	3	56	1	N	1

2014 Marsh Anuran Survey Data_Route 2

Survey Window	Route #	Point #	Latitude	Longitude	Start Time	Interval (3 or 2 minute)	Air Temp. (°F)	Noise Factor	Break taken (y/n)	Wind (Beaufort)
2	A2	3	42.872947°	-78.882569°	2256	2	56	1	N	1
2	A2	2	42.852051°	-78.853260°	2311	3	56	1	N	1
2	A2	2	42.852051°	-78.853260°	2311	3	56	1	N	1
2	A2	2	42.852051°	-78.853260°	2311	3	56	1	N	1
2	A2	2	42.852051°	-78.853260°	2311	2	56	1	N	1
2	A2	2	42.852051°	-78.853260°	2311	2	56	1	N	1
2	A2	1	42.844154°	-78.848766°	2335	3	56	1	N	1
2	A2	1	42.844154°	-78.848766°	2335	3	56	1	N	1
2	A2	1	42.844154°	-78.848766°	2335	3	56	1	N	1
2	A2	1	42.844154°	-78.848766°	2335	2	56	1	N	1
2	A2	1	42.844154°	-78.848766°	2335	2	56	1	N	1
2	A2	1	42.844154°	-78.848766°	2335	2	56	1	N	1
2	A2	1	42.844154°	-78.848766°	2335	2	56	1	N	1
3	A2	1	42.844154°	-78.848766°	2128	3	74	1	N	2
3	A2	1	42.844154°	-78.848766°	2128	2	74	1	N	2
3	A2	1	42.844154°	-78.848766°	2128	2	74	1	N	2
3	A2	2	42.852051°	-78.853260°	2149	3	69	1	N	3
3	A2	2	42.852051°	-78.853260°	2149	3	69	1	N	3
3	A2	2	42.852051°	-78.853260°	2149	2	69	1	N	3
3	A2	2	42.852051°	-78.853260°	2149	2	69	1	N	3
3	A2	3	42.872947°	-78.882569°	2227	3	68	2	N	3
3	A2	3	42.872947°	-78.882569°	2227	2	68	2	N	3
3	A2	4	42.933766°	-78.907816°	2253	3	69	1	N	2
3	A2	4	42.933766°	-78.907816°	2253	2	69	1	N	2
3	A2	5	43.000962°	-78.926892°	2312	3	69	3	N	2
3	A2	5	43.000962°	-78.926892°	2312	2	69	3	N	2
3	A2	6	43.006182°	-78.906749°	2322	3	70	2	N	2
3	A2	6	43.006182°	-78.906749°	2322	2	70	2	N	2
3	A2	7	43.016853°	-78.891352°	2335	3	70	2	N	2
3	A2	7	43.016853°	-78.891352°	2335	2	70	2	N	2
3	A2	8	43.023462°	-78.880013°	2344	3	70	2	N	3
3	A2	8	43.023462°	-78.880013°	2344	2	70	2	N	3
3	A2	9	43.034511°	-78.885400°	2353	3	70	1	N	2
3	A2	9	43.034511°	-78.885400°	2353	2	70	1	N	2
3	A2	10	43.054223°	-78.899799°	4	3	70	1	N	3
3	A2	10	43.054223°	-78.899799°	4	2	70	1	N	3

2014 Marsh Anuran Survey Data_Route 2

Survey Window	Route #	Point #	Sky (Sky Code)	Moon Light (y/n)	# of Cars	Snow Cover (y/n)	Genus	Specific Epithet	Calling Index	Index Modifier
1	A2	1	1	N	0	N	*None*	*None*	0	
1	A2	1	1	N	0	N	*None*	*None*	0	
1	A2	2	1	N	0	N	*Pseudacris*	*crucifer*	1	a
1	A2	2	1	N	0	N	*Pseudacris*	*crucifer*	1	a
1	A2	3	1	N	0	N	*Anaxyrus*	*americanus*	1	a
1	A2	3	1	N	0	N	*Anaxyrus*	*americanus*	1	a
1	A2	4	1	N	0	N	*None*	*None*	0	
1	A2	4	1	N	0	N	*Pseudacris*	*crucifer*	1	a
1	A2	5	1	N	10	N	*None*	*None*	0	
1	A2	5	1	N	8	N	*None*	*None*	0	
1	A2	6	1	N	3	N	*Anaxyrus*	*americanus*	2	c
1	A2	6	1	N	3	N	*Pseudacris*	*crucifer*	1	a
1	A2	6	1	N	3	N	*Anaxyrus*	*americanus*	2	c
1	A2	6	1	N	3	N	*Pseudacris*	*crucifer*	1	a
1	A2	7	1	N	12	N	*None*	*None*	0	
1	A2	7	1	N	9	N	*Pseudacris*	*crucifer*	1	a
1	A2	8	1	N	9	N	*None*	*None*	0	
1	A2	8	1	N	8	N	*None*	*None*	0	
1	A2	9	1	N	0	N	*Anaxyrus*	*americanus*	1	a
1	A2	9	1	N	0	N	*Pseudacris*	*crucifer*	1	a
1	A2	9	1	N	0	N	*Anaxyrus*	*americanus*	1	a
1	A2	10	4	N	0	N	*Anaxyrus*	*americanus*	1	b
1	A2	10	4	N	0	N	*Pseudacris*	*crucifer*	1	b
1	A2	10	4	N	0	N	*Pseudacris*	*crucifer*	1	b
2	A2	10	2	N	0	N	*None*	*None*	0	
2	A2	10	2	N	0	N	*None*	*None*	0	
2	A2	9	2	N	0	N	*None*	*None*	0	
2	A2	9	2	N	0	N	*None*	*None*	0	
2	A2	8	2	N	17	N	*None*	*None*	0	
2	A2	8	2	N	11	N	*None*	*None*	0	
2	A2	7	2	N	0	N	*None*	*None*	0	
2	A2	7	2	N	0	N	*Anaxyrus*	*americanus*	1	b
2	A2	6	2	N	2	N	*None*	*None*	0	
2	A2	6	2	N	0	N	*None*	*None*	0	
2	A2	5	1	N	9	N	*None*	*None*	0	
2	A2	5	1	N	7	N	*None*	*None*	0	
2	A2	4	2	N	0	N	*Anaxyrus*	*americanus*	1	a
2	A2	4	2	N	0	N	*Anaxyrus*	*americanus*	1	a
2	A2	4	2	N	0	N	*Lithobates*	*clamitans*	1	a
2	A2	3	2	N	0	N	*Anaxyrus*	*americanus*	1	a

2014 Marsh Anuran Survey Data_Route 2

Survey Window	Route #	Point #	Sky (Sky Code)	Moon Light (y/n)	# of Cars	Snow Cover (y/n)	Genus	Specific Epithet	Calling Index	Index Modifier
2	A2	3	2	N	0	N	*Anaxyrus*	*americanus*	1	a
2	A2	2	2	N	0	N	*Lithobates*	*catesbeianus*	1	a
2	A2	2	2	N	0	N	*Lithobates*	*clamitans*	1	a
2	A2	2	2	N	0	N	*Lithobates*	*pipiens*	1	a
2	A2	2	2	N	0	N	*Lithobates*	*catesbeianus*	1	a
2	A2	2	2	N	0	N	*Lithobates*	*clamitans*	1	a
2	A2	1	2	N	0	N	*Anaxyrus*	*americanus*	1	a
2	A2	1	2	N	0	N	*Lithobates*	*catesbeianus*	1	a
2	A2	1	2	N	0	N	*Lithobates*	*clamitans*	1	a
2	A2	1	2	N	0	N	*Anaxyrus*	*americanus*	1	a
2	A2	1	2	N	0	N	*Lithobates*	*catesbeianus*	1	a
2	A2	1	2	N	0	N	*Lithobates*	*clamitans*	1	a
2	A2	1	2	N	0	N	*Lithobates*	*pipiens*	1	a
3	A2	1	2	N	0	N	*Lithobates*	*clamitans*	1	a
3	A2	1	2	N	0	N	*Lithobates*	*catesbeianus*	1	a
3	A2	1	2	N	0	N	*Lithobates*	*clamitans*	1	a
3	A2	2	2	N	0	N	*Lithobates*	*catesbeianus*	1	a
3	A2	2	2	N	0	N	*Lithobates*	*clamitans*	1	a
3	A2	2	2	N	0	N	*Lithobates*	*catesbeianus*	1	a
3	A2	2	2	N	0	N	*Lithobates*	*clamitans*	1	a
3	A2	3	2	N	0	N	*None*	*None*	0	
3	A2	3	2	N	0	N	*None*	*None*	0	
3	A2	4	2	N	0	N	*None*	*None*	0	
3	A2	4	2	N	0	N	*None*	*None*	0	
3	A2	5	2	N	25	N	*None*	*None*	0	
3	A2	5	2	N	9	N	*None*	*None*	0	
3	A2	6	2	N	2	N	*None*	*None*	0	
3	A2	6	2	N	1	N	*None*	*None*	0	
3	A2	7	2	N	7	N	*None*	*None*	0	
3	A2	7	2	N	9	N	*None*	*None*	0	
3	A2	8	2	N	10	N	*None*	*None*	0	
3	A2	8	2	N	9	N	*None*	*None*	0	
3	A2	9	2	N	0	N	*Lithobates*	*catesbeianus*	1	a
3	A2	9	2	N	0	N	*None*	*None*	0	
3	A2	10	2	N	0	N	*None*	*None*	0	
3	A2	10	2	N	0	N	*None*	*None*	0	

2014 Marsh Anuran Survey Data_Route 2

Survey Window	Route #	Point #	Days Since Last Rain Event	Comments
1	A2	1	0 - rained earlier	good night for surveys, warm and moist
1	A2	1	0 - rained earlier	good night for surveys, warm and moist
1	A2	2	0 - rained earlier	Virginia Rail (heard)
1	A2	2	0 - rained earlier	
1	A2	3	0 - rained earlier	noise pollution due to power plant across rive
1	A2	3	0 - rained earlier	noise pollution due to power plant across rive
1	A2	4	0 - rained earlier	light and noise pollution
1	A2	4	0 - rained earlier	light and noise pollution
1	A2	5	0 - rained earlier	light and noise pollution
1	A2	5	0 - rained earlier	light and noise pollution
1	A2	6	0 - rained earlier	some American toad calls from outside of sur
1	A2	6	0 - rained earlier	
1	A2	6	0 - rained earlier	
1	A2	6	0 - rained earlier	
1	A2	7	0 - rained earlier	
1	A2	7	0 - rained earlier	
1	A2	8	0 - rained earlier	light and noise pollution
1	A2	8	0 - rained earlier	light and noise pollution
1	A2	9	0 - rained earlier	
1	A2	9	0 - rained earlier	
1	A2	9	0 - rained earlier	
1	A2	10	0 - rained earlier	all calls were from outside of survey area
1	A2	10	0 - rained earlier	all calls were from outside of survey area
1	A2	10	0 - rained earlier	all calls were from outside of survey area
2	A2	10	2	
2	A2	10	2	
2	A2	9	2	
2	A2	9	2	
2	A2	8	2	
2	A2	8	2	
2	A2	7	2	
2	A2	7	2	all calls were from outside of survey area
2	A2	6	2	
2	A2	6	2	
2	A2	5	2	
2	A2	5	2	
2	A2	4	2	
2	A2	4	2	
2	A2	4	2	
2	A2	3	2	

2014 Marsh Anuran Survey Data_Route 2

Survey Window	Route #	Point #	Days Since Last Rain Event	Comments
2	A2	3	2	
2	A2	2	2	
2	A2	2	2	
2	A2	2	2	
2	A2	2	2	
2	A2	2	2	
2	A2	1	2	
2	A2	1	2	
2	A2	1	2	
2	A2	1	2	
2	A2	1	2	
2	A2	1	2	
2	A2	1	2	
3	A2	1	0 - rained earlier	
3	A2	1	0 - rained earlier	
3	A2	1	0 - rained earlier	Temperature dropped after 1st survey point du
3	A2	2	0 - rained earlier	
3	A2	2	0 - rained earlier	
3	A2	2	0 - rained earlier	
3	A2	2	0 - rained earlier	
3	A2	3	0 - rained earlier	
3	A2	3	0 - rained earlier	
3	A2	4	0 - rained earlier	
3	A2	4	0 - rained earlier	
3	A2	5	0 - rained earlier	
3	A2	5	0 - rained earlier	
3	A2	6	0 - rained earlier	
3	A2	6	0 - rained earlier	
3	A2	7	0 - rained earlier	
3	A2	7	0 - rained earlier	
3	A2	8	0 - rained earlier	
3	A2	8	0 - rained earlier	
3	A2	9	0 - rained earlier	
3	A2	9	0 - rained earlier	
3	A2	10	0 - rained earlier	
3	A2	10	0 - rained earlier	

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):	JUSTIN SWEITZER BEN GRIFFITH	Additional notes:	Need Reflective Vests for Roadside Surveys
Route Number:	A1		
Survey Date (mm/dd/yyyy):	05/19/2014		
Window Number:	1	Days since last rainfall:	1 - showers on 5/18/14

Data collected at each point	Survey Point Number									
	1	2	3	4	5	6	7	8	9	10
Start Time (military):	2115	2124	2148	2215	2226	2250	2305	2325	2348	0010
Air Temperature: Select Scale: °C (°F)	57	54	55	55	55	55	55	52	51	51
Was noise a factor? (use index)	2	1	3	3	2	2	2	2	2	1
Did you take a break? (check if yes)										
Wind (Use Wind Scale)	1	2	1	1	2	1	1	1	1	1
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	4/2	0	0	0	0	0	1/1
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										
Gray tree frog										
Spring peeper		IA IA		IA			IA IA		IA IA	
Western/Boreal chorus frog										
Mink frog										
Wood frog										
American bull frog										
Green frog										
Northern leopard frog										
Pickerel frog		IA IA			IA IA		IA			

Comments: moved A1-1 and renamed other points

Low frog activity tonight. Observed calling pickerel frogs and chorus frogs in several of them wetlands earlier in season, but very little calling tonight. No chorus frogs (early season caller).

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):	JUSTIN SWEITZER BEN GRIFFITH (ASST.)	Additional notes:	Good night for surveys warm and moist
Route Number:	A2		
Survey Date (mm/dd/yyyy):	05/21/2014		
Window Number:	1	Days since last rainfall:	0 - rained earlier in day

Data collected at each point	Survey Point Number									
	1	2	3	4	5	6	7	8	9	10
Start Time (military):	2108	2130	2145	2209	2228	2240	2252	2303	2314	2325
Air Temperature: Select Scale: °C (°F)	60	60	57	57	59	59	59	59	59	57
Was noise a factor? (use index)	2	2	3	2	3	2	2	2	1	1
Did you take a break? (check if yes)	–	–	–	–	–	–	–	–	–	
Wind (Use Wind Scale)	1	2	1	1	1	1	1	1	1	1
Sky (Use Sky Codes)	1	1	1	1	1	1	1	1	1	4
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	10 | 8	3 | 3	12 | 9	9 | 8	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			1A 1A			2C 2C			1A	1B
Gray tree frog										
Spring peeper		1A 1A		1A		1A 1A	1A		1A 1A	1B 1B
Western/Boreal chorus frog										
Mink frog										
Wood frog										
American bull frog										
Green frog										
Northern leopard frog										
Pickerel frog										

Comments:

A2-2: VIRA

light & noise pollution @ A2-3

light & noise pollution @ A2-4 (park illuminated)

Moved point A2-8 to cove by marina due to access/safety
- light pollution and noise pollution @ new point A2-8

* A2-10: calls from outside of target area.

* A2-6: some American toad calls from outside of target area.

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) :	BENJAMIN GRIFFITH STACIE GROVE	Additional notes:	
Route Number:	A1		
Survey Date (mm/dd/yyyy):	06/03/13		
Window Number:	2	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):	0022	0007	2347	2327	2312	2251	2237	2214	2155	2133
Air Temperature: Select Scale: °C (°F)	58	58	60	60	60	63	65	68	68	68
Was noise a factor? (use index)	3	2	2	1	1	2	2	2	1	1
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	2	1	3	3	3
Sky (Use Sky Codes)	0	0	0	0	0	0	0	0	0	0
Moon or Moonlight Visible (Y or N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Number of cars that passed (within 50 m)	0 | 0	0 | 0	0 | 0	1 | 0	0 | 0	0 | 0	0 | 0	0 | 0	0 | 0	3 | 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		2A | 2A								
Gray tree frog							1B			
Spring peeper										
Western/Boreal chorus frog										
Mink frog										
Wood frog										
American bull frog		2A					1A | 1A			
Green frog				2A | 2A				1A | 1A			
Northern leopard frog										
Pickerel frog					1A | 1A					

Comments: Gray Treefrog started calling immediately after 9 call
Bullfrog after 3

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):	B GRIFFITH S GROVE	Additional notes:
Route Number:	A2	
Survey Date (mm/dd/yyyy):	06/04/2014	
Window Number:	2	Days since last rainfall: 2

Data collected at each point	Survey Point Number									
	1	2	3	4	5	6	7	8	9	10
Start Time (military):	2335	2311	2256	2235	2216	2205	2155	2142	2132	2120
Air Temperature: Select Scale: °C (°F)	56	56	56	56	60	61	61	61	62	62
Was noise a factor? (use index)	1	1	1	1	2	2	1	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	1	1	1	1	1	1	1	1	1
Sky (Use Sky Codes)	2	2	2	2	1	2	2	2	2	2
Moon or Moonlight Visible (Y or N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Number of cars that passed (within 50 m)	0 0	0 0	0 0	0 0	9 9	2 0	0 0	17 11	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	1A	1A			1A	1A	1A	1A					1B							
Gray tree frog																				
Spring peeper																				
Western/Boreal chorus frog																				
Mink frog																				
Wood frog																				
American bull frog	1A	1A	1A	1A																
Green frog	1A	1A	1A	1A				1A												
Northern leopard frog		1A	1A																	
Pickerel frog																				

Comments:

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):	Justin Sweitzer, Benjamin Griffith	Additional notes:	
Route Number:	A1		
Survey Date (mm/dd/yyyy):	06/25/2014		
Window Number:	3	Days since last rainfall:	0

Data collected at each point	Survey Point Number									
	1	2	3	4	5	6	7	8	9	10
Start Time (military):	2129	2141	2203	2222	2235	2251	2302	2318	2334	2351
Air Temperature: Select Scale: °C (°F)	69°	69°	69°	68°	68°	67°	67°	67°	67°	67°
Was noise a factor? (use index)	1	1	2	2	3	2	1	1	2	0
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	2	2	2	2
Sky (Use Sky Codes)	2	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	5 5	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										
Spring peeper										
Western/Boreal chorus frog										
Mink frog										
Wood frog										
American bull frog		1C 1C	1A 1A		1A		1A 1A	1A 1C		
Green frog				1A 1A				2C 2C		
Northern leopard frog										
Pickerel frog										

Comments:

Fireflies, Bat, Herons, Ducks, Carp, Dobsonfly, Nuthatch Nest, Muskrat/Beaver, Great Horned Owl, Eastern Cottontail, Skunk

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):	Justin Sweitzer Ben Griffith	Additional notes:	
Route Number:	A2		
Survey Date (mm/dd/yyyy):	06/24/2014		
Window Number:	3	Days since last rainfall:	0 - rained during early evening

Data collected at each point	Survey Point Number									
	1	2	3	4	5	6	7	8	9	10
Start Time (military):	2128	2149	2227	2253	2312	2322	2335	2349	2353	2404
Air Temperature: Select Scale: °C (°F)	74	69	68	69	69	70	70	70	70	70
Was noise a factor? (use index)	1	1	2	1	3	2	2	2	1	1
Did you take a break? (check if yes)	N	N	N	N	N	N	N	N	N	N
Wind (Use Wind Scale)	2	3	3	2	2	2	2	3	2	3
Sky (Use Sky Codes)	2	2	2	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	0 0	25 9	2 1	7 9	10 9	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	1A	1A	1A						1A	
Green frog	1A	1A	1A	1A						
Northern leopard frog										
Pickerel frog										

Comments:

APPENDIX D

2104 MARSH BIRD SURVEY DATA AND FORMS

NIAGARA RIVER AREA OF CONCERN MARSH BIRD SURVEY DATA FORM

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

MARSH NAME: ______________ **OBSERVER NAMES (LIST ALL)**: ______________________________

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							
																						○					
																						○					
																						○					
																						○					
																						○					
																						○					
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																						○					

 Version 12/18/2014

NIAGARA RIVER MARSH BIRD SURVEY DATA FORM INSTRUCTIONS

The following instructions provide specific details for filling out the data form to provide consistency in recording survey data.

Header Information

Date: day/month/year (e.g., 15 May 2014). To be completed prior to beginning of survey.
Multiple Observer Survey (circle one**):** Yes or No
Observer Names (List All): List all observer and recorder names and identify what their role is.
Marsh Name: Identify what marsh is being surveyed when the marsh is named.
Boat Type: Describe the boat being used (i.e. manufacturer, length, motor size) or write N/A if a boat was not used.
Water Depth: Record the water depth at each station number. Depth should be recorded in centimeters or meters.

Observation Information

Station Number: Record station number (e.g. 2-1) prior to beginning passive monitoring at each station.
Start Time: Record the start time at the beginning of each survey. Record in military time (e.g., 0600 = 6 am, 1300 = 1 pm).
Temp.: Record as Fahrenheit.
Sky: Record sky codes as follows: 0=clear or a few clouds; 1=partly cloudy or variable sky; 2=cloudy or overcast; 3=sand or dust storm; 4=fog/smoke; 5=drizzle; 6=snow; 7=snow/sleet; 8=showers
Wind: Use the Beaufort Wind Scale below and record the average Force rating number.
Noise: Record noise codes as follows: 0=no noise; 1=faint noise; 2=moderate noise (probably can't hear some birds beyond 100m); 3=loud noise (probably can't hear some birds beyond 50m); 4=intense noise (probably can't hear some birds beyond 25m);
Species: Record each species observed using the 4-letter bird banding code system provided below (e.g. Least Bittern = LEBI). Secondary focal species should be recorded in the comments column.
Observed During: Record an H in the appropriate column when a species is heard, record an S in the column if the species was seen; and record an HS in the column if a species was heard and seen.
Call Type: Record the call type as described in Appendix D of the work plan.
Direction: Record the direction the bird was first observed from the surveyors position by marking on the circle provided (e.g. Q = behind the observer). The observer should be facing the direction of the speaker.
In Target Area: Record if the bird was within the targeted marsh or outside of the targeted marsh by recording Y or N, respectively.
Distance: Record distances in meters.
Distance Aide: Record the distance code used in estimating the distance to an observed bird. Distance codes are as follows**:** 0=none; 1=range finder; 2=distance bands on aerial photography; 3=flags tied to vegetation
Previously Detected (Y/N): Record a Y or N.
Comments: Use this space to record other relevant details not captured elsewhere on the data form. Other details may include behavioral notes, color band observations (recorded from top to bottom and from left to right), and documentation of any photos taken. Rare species observations can be described here as well. Use a blank sheet of paper if needed to add additional notes.
Field Book: Use your personal field log book to note/document all other noteworthy observations such as rare wildlife and logistical problems (copies will be requested).

Force	Beaufort Wind Scale			Name	Conditions on Land
	knots	km/h	mi/h		
0	< 1	< 2	< 1	Calm	Smoke rises vertically.
1	1-3	1-5	1-4	Light air	Smoke drifts and leaves rustle.
2	4-6	6-11	5-7	Light breeze	Wind felt on face.
3	7-10	12-19	8-11	Gentle breeze	Flags extended, leaves move.
4	11-16	20-29	12-18	Moderate breeze	Dust and small branches move.
5	17-21	30-39	19-24	Fresh breeze	Small trees begin to sway.
6	22-27	40-50	25-31	Strong breeze	Large branches move, wires whistle, umbrellas are difficult to control.
7	28-33	51-61	32-38	Near gale	Whole trees in motion, inconvenience in walking.
8	34-40	62-74	39-46	Gale	Difficult to walk against wind. Twigs and small branches blown off trees.
9	41-47	76-87	47-54	Strong gale	Minor structural damage may occur (shingles blown off roofs).
10	48-55	88-102	55-63	Storm	Trees uprooted, structural damage likely.
11	56-63	103-118	64-73	Violent storm	Widespread damage to structures.
12	64+	119+	74+	Hurricane	Severe structural damage to buildings, wide spread devastation.

IBP 4-LETTER SPECIES ACRONYMS FOR MARSH BIRDS IN THE NR AOC

CODE	Common Name	Scientific Name	Primary or Secondary Focal Species
AMBI	American Bittern	*Botarus lentiginosus*	Primary
AMCO	American Coot	*Fulica americana*	Primary
BLTE	Black Tern	*Chlidonias niger*	Secondary
COGA	Common Gallinule	*Gallinula galeata*	Primary
COTE	Common Tern	*Sterna hirundo*	Secondary
FOTE	Forster's Tern	*Sterna forsteri*	Secondary
GRHE	Green Heron	*Butorides virescens*	Secondary
KIRA	King Rail	*Rallus elegans*	Primary
LEBI	Least Bittern	*Ixobrychus exilis*	Primary
MAWR	Marsh Wren	*Cistotoruus palustris*	Secondary
PBGR	Pied-billed Grebe	*Podilymbus podiceps*	Primary
SEWR	Sedge Wren	*Cistothorus platensis*	Secondary
SORA	Sora	*Porzana carolina*	Primary
SWSP	Swamp Sparrow	*Melospiza georgiana*	Secondary
VIRA	Virginia Rail	*Rallus limicola*	Primary
WIFL	Willow Flycatcher	*Empidonax traillii*	Secondary
WISN	Wilson's Snipe	*Gallinago delicata*	Secondary

NIAGARA RIVER AREA OF CONCERN MARSH BIRD SURVEY DATA FORM

DATE (e.g. 15 May 2015): 20 May 2015 **MULTIPLE OBSERVER SURVEY:** YES / NO **BOAT TYPE:** N/A

MARSH NAME: Buckhorn Marsh **OBSERVER NAMES (LIST ALL):** Benjamin Griffith, Justin Switzer

WATER DEPTH (by station #): B2-1 = 5cm, B2-2 = 0, B2-3 = 0, B2-4 = 0, B2-5 = 0, B2-6 = 0.5m, B2-7 = 1.0m

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
																						O					
B2-1	0536	46	1	1	2	VIRA					✓	H	H	H/S	H/S	H/S	H/S		H		grunt	O	Y	25	0	N	SWSP down to 2m
B2-2	0600	46	1	1	4	AMBI			✓												N/A - visual	O	N	100	0	N	SWSP MAWR
B2-3	0628	47	2	1	3	VIRA									✓	H	H	H			grunt	O	Y	5	0	N	SWSP, MAWR
B2-4	0718	48	2	1	4	—																O					SWSP,
B2-5	0740	49	1	1	2	—																O					SWSP
B2-6	0808	53	1	2	2	VIRA								✓							grunt	O	Y	100	0	N	WIFL, SWSP,
B2-7	0845	55	1	2	2	PBGR		✓	H				H/S					H/S	H/S		owl hoop, hyena	O	Y	10	0	N	6 individuals
						COGA									✓						wipe-out	O	Y	50	0	N	CALLING ALL DIRECTIONS
						COGA									✓						wipe-out	O	Y	50	0	N	
						AMCO														✓	N/A	O	Y	5	0	N	
																						O					
																						O					
																						O					
																						O					
																						O					
																						O					

Invert print

NIAGARA RIVER AREA OF CONCERN MARSH BIRD SURVEY DATA FORM

DATE (e.g. 15 May 2015): 21 MAY 2014 **MULTIPLE OBSERVER SURVEY:** (YES) / NO **BOAT TYPE:** N/A

MARSH NAME: TIFFT, TIMES BEACH, BEAVER ISLAND **OBSERVER NAMES (LIST ALL):** BENJAMIN GRIFFITH, JULIA SWEITZER

WATER DEPTH (by station #): BI-1 = 0cm, BI-2 = 30cm, BI-3 = 1.5?, BI-4 = 20cm, BI-5 = 0cm, BI-6 = 0cm, BI-7 =

ADDITIONAL NOTES: BI-8 completed during evening because we ran out of time during morning survey. BI-8 will need to be surveyed as it's own route

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						
BI-1	0517	54	2	1	3	—																O				Vehicle traffic
BI-2	0550	53	2	1	3	LEBI												✓			COO	O	Y	100	0	N	WIFL SWSP, MAWR
BI-3	0615	53	2	1	2	LEBI				✓			S			S	S	S	S		—	O	Y	25	0	N	SWSP MAWR
						VIRA								✓							GRUNT	O	Y	20	0	N	—
						COGA									✓		S/H		S/H		WIPE-out, Giddy up, Help	O	Y	15	0	N	—
BI-4	0643	53	2	1	3	VIRA	✓		H	H					H/S	H/S			H/S		GRUNT	O	Y	20	0	N	MAWR SWSP WIFL
						COGA											✓		H		WIPE-OUT	O	Y	20	0	N	—
BI-5	0712	53	2	2	2	—																O				MAWR COFE
BI-6	0733	53	2	2	2	—																O				
BI-7	0824	54	2/5	1	2	—																O				SWSP
BI-8	1915		2	1	1	—																O				Poor Habitat
																						O				
																						O				
																						O				
																						O				
																						O				

NIAGARA RIVER AREA OF CONCERN MARSH BIRD SURVEY DATA FORM

DATE (e.g. 15 May 2015): 4 Jun 2014 **MULTIPLE OBSERVER SURVEY:** (YES) / NO **BOAT TYPE:** NONE

MARSH NAME: Tifft, Times Beach, Beaver Island **OBSERVER NAMES (LIST ALL):** BENJAMIN GRIFFITH, STACIE GROVE

WATER DEPTH (by station #): 7-2", 6-0", 5-1", 4-6", 3-12", 2-8", 1-0"

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
BI-7	0515	56	O	1	2	VIRA								✓							kicker	O	Y	10	O	N	SWSP
BI-6	0608	56	O	3	O	—																O					COTE
BI-5	0630	55	O	3	1	—																O					COTE, MAWR
BI-4	0657	55	O	3	1	COGA				V	H	H	H	H		H	H				wipeout giddyup	O	Y	25	O	N	MAWR, WIFL SWSP, GRHE
						VIRA							✓	H	H	H	H	H	H		grunt	O	Y	30	O	N	
BI-3	0729	59	O	1	1	COGA	✓								✓			H	H		wipeout	O	Y	25	O	N	GRHE, SWSP MAWR
						VIRA							V		H	H					grunt	O	Y	15	O	N	
						LEBI							✓					S			visual only	O	Y	20	O	N	
BI-2	0753	60	O	1	1	LEBI		✓													visual only	O	Y	40	O	N	WIFL, SWSP MAWR
						COGA											✓				wipeout	O	Y	30	O	N	
						PBGR													✓		hyena	O	Y	50	O	N	
BI-1	0825	62	O	2	3	—																O					WIFL
																						O					
																						O					
																						O					
																						O					

NIAGARA RIVER AREA OF CONCERN MARSH BIRD SURVEY DATA FORM

DATE (e.g. 15 May 2015): 05 Jun 2014 **MULTIPLE OBSERVER SURVEY:** (YES) / NO **BOAT TYPE:** Canoe

MARSH NAME: Buckhorn Marsh **OBSERVER NAMES (LIST ALL):** B. GRIFFITH, S. GRAVE

WATER DEPTH (by station #): 07-12", 06-6", 05-0", 04-0", 02-0", 01-2", 03-0"

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
B2-07	0520	50	1	1	1	PBGR	✓	H	H	H	H	H	H	H	H	H	H	H	H		Owhoop	O	Y	20	O	N	all directions
B2-07	0526	50	0	1	1	SORA							✓								whinny	O	Y	5	O	N	
B2-06	0600	50	0	1	1	—																O					WIFL, SWSP
B2-05	0629	50	0	2	1	—																O					SWSP, WIFL
B2-04	0649	52	1	1	3	—																O					SWSP
B2-02	0710	52	1	1	2	—																O					MAWR, SWSP WIFL
B2-01	0734	54	1	1	2	—																O					WIFL, SWSP
B2-03	0805	54	1	2	2	VIRA						✓			H						grunt	O	Y	20	O	N	SWSP, MAWR WIFL
																						O					
																						O					
																						O					
																						O					
																						O					

NIAGARA RIVER AREA OF CONCERN MARSH BIRD SURVEY DATA FORM

DATE (e.g. 15 May 2015): 26 June 2014 **MULTIPLE OBSERVER SURVEY:** (YES) / NO **BOAT TYPE:** MA

MARSH NAME: Tiff / Times Beach **OBSERVER NAMES (LIST ALL):** Justin Switzer, Ben Griffith

WATER DEPTH (by station #): BI-1: 0, BI-2: 10cm, BI-3: 67cm, BI-4: 9cm, BI-5: 0, BI-6: 0, BI-7: 2cm

ADDITIONAL NOTES: Paused BI-2 from 0545 to 0549 for passing train.

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	0508	64	2	1	3																	O					WIFL
BI-2	0535	64	2	1	2	LEBI					✓										Visual only	O	Y	40	0	N	SWSP, MAWR
BI-3	0604	64	2	1	1	COGA			✓	H	H			H			H	H		H	wipe-out gradually up	O	Y	20	0	N	SWSP
						LEBI						✓	S	S							Visual only	O	Y	30	0	N	—
						VIRA							✓	H	H	H	H	H			squawk, kick, grunt	O	Y	20	0	N	—
						PBGR														✓	Visual only	O	N	100	0	N	—
BI-4	0634	64	2	1	1	LEBI						✓						H			kek	O	Y	50	0	N	SWSP, MAWR
						COGA									✓						Kerp.	O	Y	15	0	N	—
BI-5	0728	64	2	2	1																	O					COTE, SWSP
BI-6	0706	64	2	2	1																	O					COTE, WIFL
BI-7	0815	66	2	1	2																	O					SWSP, COTE
																						O					
																						O					
																						O					
																						O					
																						O					

NIAGARA RIVER AREA OF CONCERN MARSH BIRD SURVEY DATA FORM

DATE (e.g. 15 May 2015): 25 June 2014 **MULTIPLE OBSERVER SURVEY:** YES / NO **BOAT TYPE:** N/A

MARSH NAME: Buckhorn Marsh **OBSERVER NAMES (LIST ALL):** Justin Switzer, Ben Griffith

WATER DEPTH (by station #): BZ-3: 0, BZ-1: 2cm, BZ-2: 0, BZ-4: 7cm, BZ-5: 0, BZ-6: 30cm, BZ-7: 58cm

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							
BZ-3	0512	67	2	1	2																O					SWSP
BZ-1	0549	67	2	1	1																O					SWSP
BZ-2	0610	67	2	1	3	SORA							✓	H	H						keep	O	Y	50	0	N	SWSP
BZ-4	0633	67	2	1	3																O					SWSP
BZ-5	0658	68	2	1	2	AMBI								✓							flyover	O	N	200	0	N	SWSP
BZ-6	0724	68	2	1	1																	O					WIFL, SWSP
BZ-7	0758	68	2	1	1	PBGR	✓		H		H		H				H	H	H	H	owhoop	O	Y	25	0	N	COTE,
																						O					
																						O					
																						O					
																						O					
																						O					
																						O					
																						O					
																						O					
																						O					

2014 Marsh Bird Survey Data_Route 1

Survey Window	Route #	Point #	Genus	Specific Epithet	Observed During													
					0-1	1-2	2-3	3-4	4-5	LEBI	SORA	VIRA	KIRA	AMBI	COGA	AMCO	PBGR	OUTSIDE
1	B1	1	*None*	*None*														
1	B1	2	*Ixobrychus*	*exilis*												X		
1	B1	3	*Ixobrychus*	*exilis*				X			S			S	S	S	S	
1	B1	3	*Rallus*	*limicola*								X						
1	B1	3	*Gallinula*	*galeata*									X		S/H		S/H	
1	B1	4	*Rallus*	*limicola*	X		H	H					H/S	H/S			H/S	
1	B1	4	*Gallinula*	*galeata*											X		H	
1	B1	5	*None*	*None*														
1	B1	6	*None*	*None*														
1	B1	7	*None*	*None*														
1	B1	8	*None*	*None*														
2	B1	7	*Rallus*	*limicola*								X						
2	B1	6	*None*	*None*														
2	B1	5	*None*	*None*														
2	B1	4	*Gallinula*	*galeata*				X	H	H	H	H		H	H			
2	B1	4	*Rallus*	*limicola*							X	H	H	H	H	H	H	
2	B1	3	*Gallinula*	*galeata*	X								H			H	H	
2	B1	3	*Rallus*	*limicola*							X		H	H				
2	B1	3	*Ixobrychus*	*exilis*							X					S		
2	B1	2	*Ixobrychus*	*exilis*		X												
2	B1	2	*Gallinula*	*galeata*											X			
2	B1	2	*Podilymbus*	*podiceps*													X	
2	B1	1	*None*	*None*														
3	B1	1	*None*	*None*														
3	B1	2	*Ixobrychus*	*exilis*					X									
3	B1	3	*Gallinula*	*galeata*			X	H	H			H			H	H		H
3	B1	3	*Ixobrychus*	*exilis*						X	S	S						
3	B1	3	*Rallus*	*limicola*							X	H	H	H	H	H		
3	B1	3	*Podilymbus*	*podiceps*														X
3	B1	4	*Gallinula*	*galeata*							X					H		
3	B1	4	*Ixobrychus*	*exilis*									X					
3	B1	5	*None*	*None*														
3	B1	6	*None*	*None*														
3	B1	7	*None*	*None*														

2014 Marsh Bird Survey Data_Route 1

Survey Window	Route #	Point #	Call Type	Direction	In Target Area (Y/N)	Distance	Distance Aide	Previous Detection (Y/N)	Boat Type
1	B1	1		NA	NA	NA	NA	NA	NA
1	B1	2	coo	None	Y	100	0	N	NA
1	B1	3	NA	None	Y	25	0	N	NA
1	B1	3	grunt	None	Y	20	0	N	NA
1	B1	3	wipe-out, giddy-up, keep	None	Y	15	0	N	NA
1	B1	4	grunt	None	Y	20	0	N	NA
1	B1	4	wipe-out	None	Y	15	0	N	NA
1	B1	5		NA	NA	NA	0	NA	NA
1	B1	6		NA	NA	NA	0	NA	NA
1	B1	7		NA	NA	NA	0	NA	NA
1	B1	8		NA	NA	NA	0	NA	NA
2	B1	7	kicker	120°	Y	10	0	N	NA
2	B1	6		NA	NA	NA	0	NA	NA
2	B1	5		NA	NA	NA	0	NA	NA
2	B1	4	wipe-out, giddy-up	195°	Y	25	0	N	NA
2	B1	4	grunt	195°	Y	30	0	N	NA
2	B1	3	wipe-out	32°	Y	25	0	N	NA
2	B1	3	grunt	23°	Y	15	0	N	NA
2	B1	3	NA- visual only	190°	Y	20	0	N	NA
2	B1	2	NA- visual only	25°	Y	40	0	N	NA
2	B1	2	wipe-out	11°	Y	30	0	N	NA
2	B1	2	hyena	45°	Y	50	0	N	NA
2	B1	1		NA	NA	NA	NA	NA	NA
3	B1	1		NA	NA	NA	NA	NA	NA
3	B1	2	NA - visual only	308°	Y	40	0	N	NA
3	B1	3	wipe-out, giddy-up	100°	Y	20	0	N	NA
3	B1	3	NA - visual only	121°	Y	30	0	N	NA
3	B1	3	squak, kikik, grunt	100°	Y	20	0	N	NA
3	B1	3	NA - visual only	175°	N	100	0	N	NA
3	B1	4	kak	255°	Y	50	0	N	NA
3	B1	4	keep	302°	Y	15	0	N	NA
3	B1	5		NA	NA	NA	0	NA	NA
3	B1	6		NA	NA	NA	0	NA	NA
3	B1	7		NA	NA	NA	0	NA	NA

2014 Marsh Bird Survey Data_Route 1

Survey Window	Route #	Point #	Comments
1	B1	1	Vehicle traffic
1	B1	2	Secondary Species - SWSP, WIFL, MAWR
1	B1	3	Secondary Species - SWSP, MAWR. Visual observation of LEBI only.
1	B1	3	
1	B1	3	
1	B1	4	Secondary Species - SWSP, WIFL, MAWR.
1	B1	4	
1	B1	5	Secondary Species - MAWR, COTE
1	B1	6	
1	B1	7	Secondary Species - SWSP
1	B1	8	Poor habitat, survey completed during evening because the survey crew ran out of time
2	B1	7	Secondary Species - SWSP
2	B1	6	Secondary Species - COTE
2	B1	5	Secondary Species - MAWR, COTE
2	B1	4	Secondary Species - SWSP, WIFL, MAWR,GRHE
2	B1	4	
2	B1	3	Secondary Species - SWSP, MAWR, GRHE
2	B1	3	
2	B1	3	
2	B1	2	Secondary Species - SWSP, WIFL, MAWR
2	B1	2	
2	B1	2	
2	B1	1	Secondary Species - WIFL
3	B1	1	Secondary Species - WIFL
3	B1	2	Secondary Species - SWSP, MAWR; paused survey from 0545 tp 0549 due to train
3	B1	3	Secondary Species - SWSP
3	B1	3	
3	B1	3	
3	B1	3	
3	B1	4	Secondary Species - SWSP, MAWR
3	B1	4	
3	B1	5	Secondary Species - COTE, SWSP
3	B1	6	Secondary Species - COTE, WIFL
3	B1	7	Secondary Species - SWSP, COTE

2014 Marsh Bird Survey Data_Route 2

Survey Window	Route #	Point #	Genus	Specific Epithet	Observed During													
					0-1	1-2	2-3	3-4	4-5	LEBI	SORA	VIRA	KIRA	AMBI	COGA	AMCO	PBGR	OUTSIDE
1	B2	1	*Rallus*	*limicola*					X	H	H	H/S	H/S	H/S	H/S		H	
1	B2	2	*Botaurus*	*lentiginosus*			X											
1	B2	3	*Rallus*	*limicola*									X	H	H	H		
1	B2	4	*None*	*None*														
1	B2	5	*None*	*None*														
1	B2	6	*Rallus*	*limicola*								X						
1	B2	7	*Podilymbus*	*podiceps*		X	H				H/S					H/S	H/S	
1	B2	7	*Gallinula*	*galeata*									X					
1	B2	7	*Gallinula*	*galeata*									X					
1	B2	7	*Fulica*	*americana*														X
2	B2	7	*Podilymbus*	*podiceps*	X	H	H	H	H	H	H	H	H	H	H	H	H	
2	B2	7	*Porzana*	*carolina*							X							
2	B2	6	*None*	*None*														
2	B2	5	*None*	*None*														
2	B2	4	*None*	*None*														
2	B2	2	*None*	*None*														
2	B2	1	*None*	*None*														
2	B2	3	*Rallus*	*limicola*						X			H					
3	B2	3	*None*	*None*														
3	B2	1	*None*	*None*														
3	B2	2	*Porzana*	*carolina*							X	H	H					
3	B2	4	*None*	*None*														
3	B2	5	*Botaurus*	*lentiginosus*								X						
3	B2	6	*None*	*None*														
3	B2	7	*Podilymbus*	*podiceps*	X		H		H		H				H	H	H	H

2014 Marsh Bird Survey Data_Route 2

Survey Window	Route #	Point #	Call Type	Direction	In Target Area (Y/N)	Distance	Distance Aide	Previous Detection (Y/N)	Boat Type
1	B2	1	grunt	207°	Y	25	0	N	NA
1	B2	2	NA - visual only	311°	N	100	0	N	NA
1	B2	3	grunt	336°	Y	5	0	N	NA
1	B2	4		NA	NA	NA	NA	NA	NA
1	B2	5		NA	NA	NA	NA	NA	NA
1	B2	6	grunt	191°	Y	100	0	N	NA
1	B2	7	owhoop, hyena	197°	Y	10	0	N	Canoe
1	B2	7	wipe-out	197°	Y	50	0	N	Canoe
1	B2	7	wipe-out	197°	Y	50	0	N	Canoe
1	B2	7	NA - visual only	282°	Y	5	0	N	Canoe
2	B2	7	ow-hoop	158°	Y	20	0	N	Canoe
2	B2	7	whinny	180°	Y	5	0	N	Canoe
2	B2	6		NA	NA	NA	NA	NA	NA
2	B2	5		NA	NA	NA	NA	NA	NA
2	B2	4		NA	NA	NA	NA	NA	NA
2	B2	2		NA	NA	NA	NA	NA	NA
2	B2	1		NA	NA	NA	NA	NA	NA
2	B2	3	grunt	270°	Y	20	0	N	NA
3	B2	3		NA	NA	NA	NA	NA	NA
3	B2	1		NA	NA	NA	NA	NA	NA
3	B2	2	keep	304°	Y	50	0	N	NA
3	B2	4		NA	NA	NA	NA	NA	NA
3	B2	5	NA - visual only	358°	N	200	0	N	NA
3	B2	6		NA	NA	NA	NA	NA	NA
3	B2	7	owhoop	196°	Y	25	0	N	Canoe

2014 Marsh Bird Survey Data_Route 2

Survey Window	Route #	Point #	Comments
1	B2	1	VIRA came into within 2 m of observers, Secondary Species - SWSP
1	B2	2	Secondary Species - SWSP, MAWR,
1	B2	3	Secondary Species - SWSP, MAWR
1	B2	4	Secondary Species - SWSP
1	B2	5	Secondary Species - SWSP
1	B2	6	Secondary Species - SWSP, WIFL
1	B2	7	6 individuals calling from all directions between 10 and 100 meters
1	B2	7	
1	B2	7	
1	B2	7	observed after survey when paddling back to shore
2	B2	7	
2	B2	7	
2	B2	6	Secondary Species - WIFL, SWSP
2	B2	5	Secondary Species - WIFL, SWSP
2	B2	4	Secondary Species - SWSP
2	B2	2	Secondary Species - SWSP, WIFL, MAWR
2	B2	1	Secondary Species - WIFL, SWSP
2	B2	3	Secondary Species - SWSP, WIFL, MAWR
3	B2	3	Secondary Species - SWSP
3	B2	1	Secondary Species - SWSP
3	B2	2	Secondary Species - SWSP
3	B2	4	Secondary Species - SWSP
3	B2	5	Secondary Species - SWSP
3	B2	6	Secondary Species - WIFL, SWSP
3	B2	7	Secondary Species - COTE

APPENDIX E

2104 HABITAT MONITORING DATA AND FORMS

General Information

Survey Date (DD/MM/YYYY)**:**_____

Observer(s) Name(s): _____

Survey Point (complete for each point):_____

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):_____

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)

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)**:**_____

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): _____

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):_____

[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

March Anuran Survey Point Habtat Data

Site ID	General Location Name	Date Surveyed	Edge Type	General Type	NWI Code	General NWI Type
A1-1	Beaver Island State Park	6/25/2014	upland/marsh	Marsh	PEM1Fd	PEM
A1-2	Beaver Island State Park	6/25/2014	upland/open water	Open Water	R2UBH	OW
A1-3	Beaver Island State Park	6/25/2014	upland/marsh	Marsh	PEM1F	PEM
A1-4	Grand Island East	6/25/2014	upland/marsh	Marsh	PFO1C	PFO
A1-5	Grand Island East	6/25/2014	upland/open water/marsh	Open Water/Marsh	R2UBH/PEM	OW/PEM
A1-6	Buckhorn Island State Park	6/25/2014	upland/open water	Open Water	R2US2C/R2UBH	OW
A1-7	Buckhorn Island State Park	6/26/2014	upland/marsh	Marsh	PEM1Ed	PEM
A1-8	Buckhorn Island State Park	6/25/2014	upland/open water/marsh	Open Water/Marsh	PEM1/Ed	PEM
A1-9	Buckhorn Island State Park	6/26/2014	upland/marsh	Marsh	PEM1/Ed	PEM
A1-10	Grand Island West	6/26/2014	upland/open water	Open Water	R2UBH	OW
A2-1	Tifft Preserve	6/24/2014	upland/open water/marsh	Open Water/Marsh	PUBH/PEM1F	OW/PEM
A2-2	Tifft Preserve	6/24/2014	upland/marsh	Marsh	PUBHx/PEM1F	OW/PEM
A2-3	Times Beach Preserve	6/24/2014	upland/marsh	Marsh	PEM1Es	PEM
A2-4	Squaw Island Park	6/24/2014	upland/open water/marsh	Open Water/Marsh	PUBHx/PEM	OW/PEM
A2-5	E. Shore of Niagara	6/24/2014	upland/marsh	Marsh	PEM1Fx	PEM
A2-6	E. Shore of Niagara	6/24/2014	marsh	Marsh	PEM1A	PEM
A2-7	Niawanda Park (River shore)	6/24/2014	upland/open water	Open Water	R2UBH	OW
A2-8	Wardell Boat Yard	6/24/2014	upland/open water	Open Water	R2UBH	OW
A2-9	East Pier Marina	6/24/2014	upland/marsh	Open Water/Marsh	PEM1F	PEM
A2-10	Gratwick Waterfront Park (River shore)	6/24/2014	upland/open water/marsh	Open Water/Marsh	R2UBH/PEM	OW/PEM

March Anuran Survey Point Habtat Data

		Percent Cover						
Site ID	**Total Percent Cover of Wetland Species**	**Typha (N)**	**Lythrum (I)**	**Phragmites (I)**	**Lonicera (I)**	**Sparganium**	**Cornus**	**Carex**
A1-1	110	10	10					20
A1-2	0							
A1-3	130	60	40					30
A1-4	100	35	14			30	20	
A1-5	45	30	5					
A1-6	0							
A1-7	110	30					10	70
A1-8	60	40						
A1-9	100	70						10
A1-10	0							
A2-1	67	60			5			
A2-2	100	100						
A2-3	80	70		10				
A2-4	37	20						5
A2-5	100			100				
A2-6	110	30		70				
A2-7	0							
A2-8	0							
A2-9	45	20	5	20				
A2-10	28	10				10		1

March Anuran Survey Point Habtat Data

Percent Cover

Site ID	Eupatorium	Bolboschoenus	Schoenoplectus	Dispaucus	Nuphar	Decodan	Persicaria	Butomus	Sambucus
A1-1	10	60							
A1-2									
A1-3									
A1-4									
A1-5							10		
A1-6									
A1-7									
A1-8					10	10			
A1-9	20								
A1-10									
A2-1									2
A2-2									
A2-3									
A2-4			10					2	
A2-5									
A2-6				10					
A2-7									
A2-8									
A2-9									
A2-10					7				

March Anuran Survey Point Habtat Data

Site ID	Open Water interspersion	Vegetation Interspersion	Density of Marsh Veg	Avg Veg Height (m)	Litter Depth (cm)	Water Depth (m)	Distance to Open Water (m)
A1-1	20	80	Moderate	1 to 3	7.5	0	3
A1-2	100	0	None	0	0	0.75	0
A1-3	30	70	Moderate	1 to 3	1	0	5
A1-4	0	100	Moderate	1 to 3	0	0.15	none
A1-5	70	30	Moderate	1 to 3	0	0.12	3
A1-6	100	0	None	0	0	0.1	0
A1-7	0	100	Moderate	0 to 1	0	0	80
A1-8	50	50	Moderate	1 to 3	3	0.25	1
A1-9	0	100	Moderate	1 to 3	5	0	none
A1-10	100	0	None	0	0	0.6	2
A2-1	30	70	Moderate	1 to 3	0	0	1
A2-2	5	95	Moderate	1 to 3	0	0	1
A2-3	0	100	Moderate	1 to 3	10	0	70
A2-4	80	20	Moderate	1 to 3	0	0.8	2
A2-5	0	100	Dense	1 to 3	5	0	none
A2-6	0	100	Moderate	1 to 3	0	0	none
A2-7	40	0	None	0	0	0.17	0
A2-8	40	0	None	0	0	1	0
A2-9	40	60	Moderate	1 to 3	4	0	10
A2-10	80	20	Sparse	0 to 1	0	0.5	5

March Anuran Survey Point Habtat Data

Site ID	Cumulative Number of Detections	Overall Habitat Quality	Reason for Poor Quality Rating
A1-1	0	adequate	
A1-2	5	poor	river shoreline, high energy, no herbaceous wetland spp
A1-3	1	adequate	
A1-4	3	adequate	
A1-5	3	adequate	
A1-6	0	poor	river shoreline, high energy, no herbaceous wetland spp
A1-7	4	adequate	
A1-8	3	adequate	
A1-9	1	adequate	
A1-10	0	poor	canal, narrow band of wetland species present in a few locations, surrounded by lawn/development
A2-1	7	adequate	
A2-2	6	adequate	
A2-3	2	adequate	
A2-4	3	adequate	
A2-5	0	poor	dry, dense invasive Phragmites, surrounded by lawn/development
A2-6	2	poor	dry, dense invasive Phragmites
A2-7	1	poor	river shoreline, high energy, no herbaceous wetland spp, surrounded by lawn/development
A2-8	0	poor	river shoreline, high energy, no herbaceous wetland spp, surrounded by lawn/development
A2-9	3	poor	dry, mostly upland species, surrounded by lawn/development
A2-10	0	poor	river shoreline, high energy, minimal herbaceous wetland spp

Marsh Bird Survey Point Habitat Data

Site ID	General Location Name	Date Surveyed	Edge Type	General Habitat Type	NWI Code	General NWI Type
B1-1	Tifft Street Marsh	6/24/2014	upland/marsh	Marsh	PEM1Fx	PEM
B1-2	Tifft Preserve	6/24/2014	upland/open water/marsh	Open Water/Marsh	PUBH/PEM1F	OW/PEM
B1-3	Tifft Preserve	6/24/2014	open water/marsh	Open Water/Marsh	PUBH/PEM1F	OW/PEM
B1-4	Tifft Preserve	6/24/2014	upland/marsh	Marsh	PUBHx/PEM1F	OW/PEM
B1-5	Times Beach Preserve	6/24/2014	upland/marsh	Marsh	PEM1Es	PEM
B1-6	Times Beach Preserve	6/24/2014	upland/marsh	Marsh	PEM1Es	PEM
B1-7	Beaver Island State Park	6/25/2014	open water/marsh	Open Water/Marsh	PEM1F	PEM
B2-1	Buckhorn Island State Park	6/26/2014	marsh	Marsh	PEM1/Ed	PEM
B2-2	Buckhorn Island State Park	6/26/2014	upland/marsh	Marsh	PEM1/Ed	PEM
B2-3	Buckhorn Island State Park	6/26/2014	upland/marsh	Marsh	PEM1/Ed	PEM
B2-4	Buckhorn Island State Park	6/25/2014	upland/open water/marsh	Open Water/Marsh	PEM1/Ed	PEM
B2-5	Buckhorn Island State Park	6/25/2014	upland/marsh	Marsh	PEM1/Ed	PEM
B2-6	Buckhorn Island State Park	6/26/2014	open water/marsh	Open Water/Marsh	PEM1/Ed	PEM
B2-7	Sunken Island	6/25/2014	open water/marsh	Open Water/Marsh	PEM1C	PEM

Marsh Bird Survey Point Habitat Data

	Percent Cover								
Site ID	**Total Percent Cover of Wetland Species**	**Typha (N)**	**Lythrum (I)**	**Phragmites (I)**	**Lonicera (I)**	**Carex**	**Hibiscus**	**Lemna**	**Unkn Grass**
B1-1	115			100					
B1-2	67	60			5				
B1-3	100	30						70	
B1-4	100	100							
B1-5	80	70		10					
B1-6	100	80							
B1-7	125	50	30			30			
B2-1	80	30				20	30		
B2-2	105	55				20	30		
B2-3	100	70				10			
B2-4	60	40							
B2-5	130	80							
B2-6	90					30			40
B2-7	70	70							

Marsh Bird Survey Point Habitat Data

	Percent Cover										
Site ID	**Persicaria**	**Impatiens**	**Eupatorium**	**Urtica**	**Solidago**	**Coronilla**	**Saggitaria**	**Nymphaea**	**Nuphar**	**Decadon**	**Sambucus**
B1-1					5	10					
B1-2											2
B1-3											
B1-4											
B1-5											
B1-6		20									
B1-7	3						10				
B2-1											
B2-2											
B2-3			20								
B2-4									10	10	
B2-5	20			20			10				
B2-6					10			10			
B2-7											

Marsh Bird Survey Point Habitat Data

Site ID	Open Water interspersion	Vegetation Interspersion	Density of Marsh Veg	Avg Veg Height (m)	Litter Depth (cm)	Water Depth (m)	Distance to Open Water (m)	Distance to Upland (m)
B1-1	0	100	Moderate	1 to 3	0.5	0	none	5
B1-2	30	70	Moderate	1 to 3	0	0	1	1
B1-3	70	30	Moderate	1 to 3	0	0.67	0	100
B1-4	5	95	Moderate	1 to 3	0	0.9	1	0
B1-5	0	100	Moderate	1 to 3	10	0	70	2
B1-6	10	90	Moderate	1 to 3	10	0	50	15
B1-7	30	70	Moderate	1 to 3	1	0.1	3	20
B2-1	0	100	Moderate	1 to 3	3	0	none	none
B2-2	0	100	Moderate	1 to 3	5	0	none	3
B2-3	0	100	Moderate	1 to 3	5	0	none	15
B2-4	50	50	Moderate	1 to 3	3	0.25	1	2
B2-5	0	100	Moderate	1 to 3	3	0	none	15
B2-6	25	75	Moderate	0 to 1	0	0.23	1	25
B2-7	40	60	Sparse	1 to 3	0	0.58	0	200

Marsh Bird Survey Point Habitat Data

Site ID	Distance to Road/Dike (m)	Natural Disturbance	Manmande Disturbance	Cumulative Number of Detections	Overall Habitat Quality	Reason for Poor Quality Rating
B1-1	10	none		0	poor	Dominated by dense phrag, dry marsh and no water nearby, located next to road, noise loud and constant
B1-2	none	none		5	adequate	
B1-3	100	none		10	adequate	
B1-4	20	none		6	adequate	
B1-5	100	none	invasive species control	0	poor	dry marsh, active phrag control in some areas, dense vegetation elsewhere, water fairly far away
B1-6	none	none	invasive species control	0	poor	dry marsh, active phrag control in some areas, dense vegetation elsewhere, water fairly far away
B1-7	25	none		1	adequate	
B2-1	15	none		1	poor	dry marsh, no water nearby
B2-2	20	none		2	poor	dry marsh, no water nearby
B2-3	0	none		2	poor	dry marsh, no water nearby
B2-4	80	none		0	adequate	
B2-5	40	none		0	poor	dry marsh, no water nearby
B2-6	none	none		1	adequate	
B2-7	200	none		5	adequate	

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

General Information

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

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

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

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): 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 4481

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.	X				

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): 0 **Water depth** (m): 0.75

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

Distance to Physical Characteristics

Water edge (m): 0 **Upland area (m):** 5

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

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

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

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