

Beneficial Use Impairment Removal Project

Niagara River Area of Concern Marsh Anuran and Avian Population Monitoring Work Plan: 2014-2018



Final: January 13, 2014

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1.0 INTRODUCTION

1.1 BACKGROUND

In 1987 the governments of the United States (U.S.) and Canada identified several areas within the Great Lakes region where environment degradation had occurred due to historic pollution and habitat degradation. 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 U.S. 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 in 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 U.S. 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 marsh anurans 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.

1.2 STUDY AREA

This study focuses 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).



**Anuran
Survey Area
(Figure 2)**

**Grand Island
(Figure 3B)**

**Buffalo
(Figure
3A)**

Legend

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



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:



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). Per the scope of work, this Work Plan describes 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 U.S. side of the NR AOC (Figure 1). This Work Plan specifically identifies methods used for conducting 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; while focal marsh birds 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 draft of this Work Plan was used during 2014 spring/summer sampling efforts and the Work Plan has been edited to include preliminary information gained from the 2014 survey effort (NewEarth 2015). Final versions of annual marsh anuran and marsh bird survey reports should be reviewed prior to conducting future survey activities.

2.0 SURVEY INFORMATION SOURCES

Per NYFO and NYSDEC recommendations, the field survey protocol presented herein is based primarily upon methods presented in the *North American Amphibian Monitoring Program - Protocol Description* by Weir and Mossman (2005); *The Marsh Monitoring Program Annual Report, 1995-2007* by Archer and Jones (2009); *New York State Marsh Bird Monitoring Program Pilot Study 2009-2011* by Yard et al. (2012); *Occupancy, Detection, and Habitat Associations of Secretive Marsh Bird Species in New York State* by Osborne et al. (2011); and, *Standardized North American Marsh Bird Monitoring Protocol* by Courtney J. Conway (2011).

3.0 METHODS

3.1 MARSH ANURAN SAMPLING DESIGN

All survey planning and field efforts must be closely coordinated with the appropriate primary points of contact (POC) at the USFWS and NYSDEC identified in Appendix A prior to initiation of field work.

3.1.1 Survey Routes

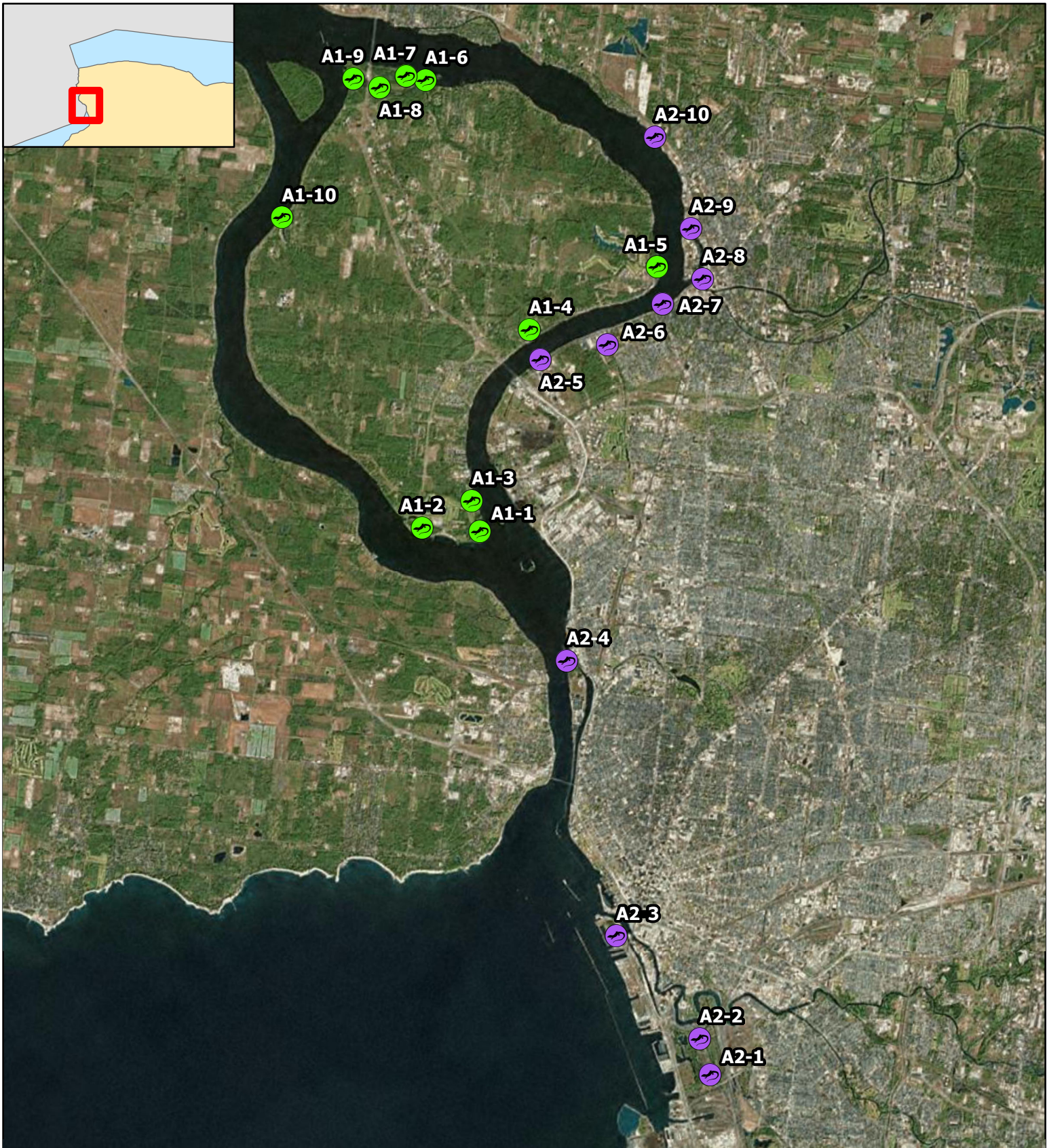
Survey routes used in the 2014 field effort were established using GoogleEarth™ software and ground-truthed during a reconnaissance level survey conducted in the spring of 2014 to determine suitability (NewEarth 2015). Survey routes were determined by grouping survey points in a way that all points within a route could be visited during a single evening survey event; resulting in two survey routes with ten survey points per route (Figure 2). Survey route A1 consists of survey points located along the perimeter of Grand Island, Buckhorn Marsh (in Buckhorn Marsh State Park), and Beaver Island (in Beaver Island State Park); while survey route A2 consists of survey points along the easternmost shoreline of the Niagara River from its mouth

near Smokes Creek at the southern extent of the NR AOC, to East Pier Marina at the northern extent of the survey route. Five of the ten survey points on survey route A1 and five of the ten points on route A2 are located near previously surveyed points established by NYSDEC as part of the Niagara River Marsh Monitoring Program (NR MMP). Future survey routes and point locations may be modified based on the results of previous survey efforts, changes in habitat, access issues, etc., but must be coordinated with and approved by NYFO and NYSDEC staff.

3.1.2 Location of Survey Points

Following recommendations of NYSDEC and based on similar survey efforts in the region, survey points for the 2014 effort were stratified by habitat with most points occurring at least 800 meters (m) apart. Points were located in marsh habitat dominated by emergent vegetation and were located in marshes abutting the Niagara River or abutting tributaries within 800 m of the Niagara River. Survey points were established, photographed and marked with pink and blue vinyl flagging during the reconnaissance level survey. 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 A1-1). The coordinates for each survey point are provided in Appendix C of this Work Plan. To reduce the potential for disrupting the calling rates and breeding activities of marsh anurans, when practicable, points were established along the edges of emergent marsh vegetation and not within the interior of the marsh.

In addition, based on an evaluation of the 2014 survey effort it was determined that up to six additional survey points should be added to future survey efforts in order to better capture marsh habitat that may not have been sampled due to the minimum 800 m spacing requirement between points. The 800 m spacing is suitable in remote, quiet areas, or in locations where there are many marshes with calling frogs in close proximity. But the spacing is less appropriate in the Niagara Project area where there are few high quality marshes within a highly developed landscape, and where noise significantly limits the distance which surveyors can detect calls. Future survey points may be established in new or existing survey areas, and may be closer than 800 m apart, so long as surveyors are not duplicating calling amphibians from adjacent points.



Legend

- Route A1 Survey Point
- Route A2 Survey Point

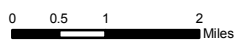


Figure 2. Anuran Survey Locations
 Niagara River Area of Concern Marsh
 Anuran and Avian Population Monitoring
 Niagara and Erie Counties, NY

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

Prepared By:
 **NewEarth**
 ECOLOGICAL CONSULTING, LLC

3.1.3 Sampling Periods

Because peak amphibian calling periods are more strongly associated with temperature and precipitation than with date, visits should be scheduled to occur on four separate evenings according to minimum night air temperatures of 41 °F, 50 °F, and 63 °F as shown in Table 1 (Archer and Jones 2009). 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, surveys must be at least 15 days apart and completed between early April and Late July. Optimal seasonal timing varies from year to year, depending on weather conditions and breeding chronology of marsh anurans. For the purposes of this study survey timing presented in Table 1 should be followed in all years. However, weather conditions should be monitored closely and survey event timing adjusted accordingly within these time periods to capture the best conditions. Warm weather events in early spring should be targeted, even if cold periods follow. If deviation from the proposed timeline is necessary due to changes in breeding (chorusing) phenology, a revised timeline must be approved by NYFO and NYSDEC and documented.

Table 1. Anuran Target Species and Survey Timing for the NR AOC

Survey Event	Timing of Survey	Temperature Threshold
1	mid-late April	41 °F
2	mid-late May	41 °F
3	mid June	50 °F
4	mid July	63 °F

3.1.4 Nightly Sampling Conditions

Surveys should be conducted during evenings with little wind, preferably in moist conditions with one of the above corresponding minimum temperatures. Surveys should not be conducted if sustained wind speeds are above 12 miles per hour (mph) or level 3 on the Beaufort scale (provided with data sheet in Appendix B), or during periods of heavy rain. All surveys should be conducted between 30 minutes after sunset and 1:00 a.m.

3.1.5 Point Inaccessibility and Relocation

Temporary point inaccessibility may occur due to reasons outside of the surveyors' control (e.g., a road is closed due to an accident or for construction). A route can be considered complete if 90 percent of the survey points are visited (i.e., 9 of 10 survey points along the route). If a point is missed, it should be recorded in the appropriate section of the data form (Appendix B). If more than one survey point is missed during a survey period, the route should be re-surveyed on another night during the same sampling period.

Point relocation may be necessary if a survey point is determined to be unsafe or if access to the point has been suspended indefinitely (e.g., landowner retracts permissions). Points should not be relocated due to lack of anuran calls or changes in habitat. If a survey point can be moved a short distance without impacting the >800 m spacing between points, it can be completed without re-

numbering the survey points. If a survey point cannot be relocated without adjusting the spacing of points, a new point should be created (through coordination with NYFO and NYSDEC) and given a new unique identifier. All new point locations and relocations must be coordinated through NYFO and NYSDEC.

3.2 MARSH BIRD SAMPLING DESIGN

3.2.1 Survey Routes

As with the anuran sampling design, survey routes for the 2014 marsh bird effort were established using GoogleEarth™ software and ground-truthed to determine suitability during a reconnaissance level survey conducted in the spring of 2014 (NewEarth 2015). 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; resulting in two survey routes (Figures 3A and 3B) with seven survey points each. Survey route B1 consists of survey points located near the mouth of the Niagara River at Tiff Nature Preserve, Times Beach Nature Preserve, and the southern end of Grand Island; while survey route B2 consists of survey points located on Beaver Island (in Beaver Island State Park, Sunken Island, and Buckhorn Marsh (in Buckhorn Marsh State Park). Four of the seven survey points on survey route B1, and three of the seven points on route B2, are located near previously surveyed points established by NYSDEC as part of the NR MMP.

Each survey route should be surveyed by a single observer during either a morning or evening survey event (see section 3.2.4 titled *Time of Day* for a definition of survey window). Survey routes were designed to include fewer survey points per route (vs. fewer routes and more points per route), increasing the number of routes to be surveyed. Including fewer points per survey route typically results in more detections because marsh birds are most vocal in the two hours surrounding sunrise and the two hours surrounding sunset (Conway 2011). Survey points were established along each route in a manner to facilitate conducting surveys in ascending numerical order (e.g., survey points in the order 2-1, 2-2, 2-3, 2-4, 2-5 and 2-6) during the first and third survey event, and descending numerical order (e.g. survey points in the order 2-6, 2-5, 2-4, 2-3, 2-2, and 2-1) during the second survey event.

3.2.2 Location of Survey Points

To reduce the potential for disrupting the calling rates and breeding activities of marsh birds, points were established along the edges of emergent marsh vegetation and not within the interior of the marsh. Points were established, photographed, and marked with blue and pink vinyl flagging during the 2014 spring reconnaissance level survey and the latitude and longitude of each were recorded using a handheld GPS receiver. A unique identification number was assigned to each 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). The coordinates to each survey point are provided in Appendix C, and survey point locations are shown on Figure 3.



Legend

● Route B1 Survey Point



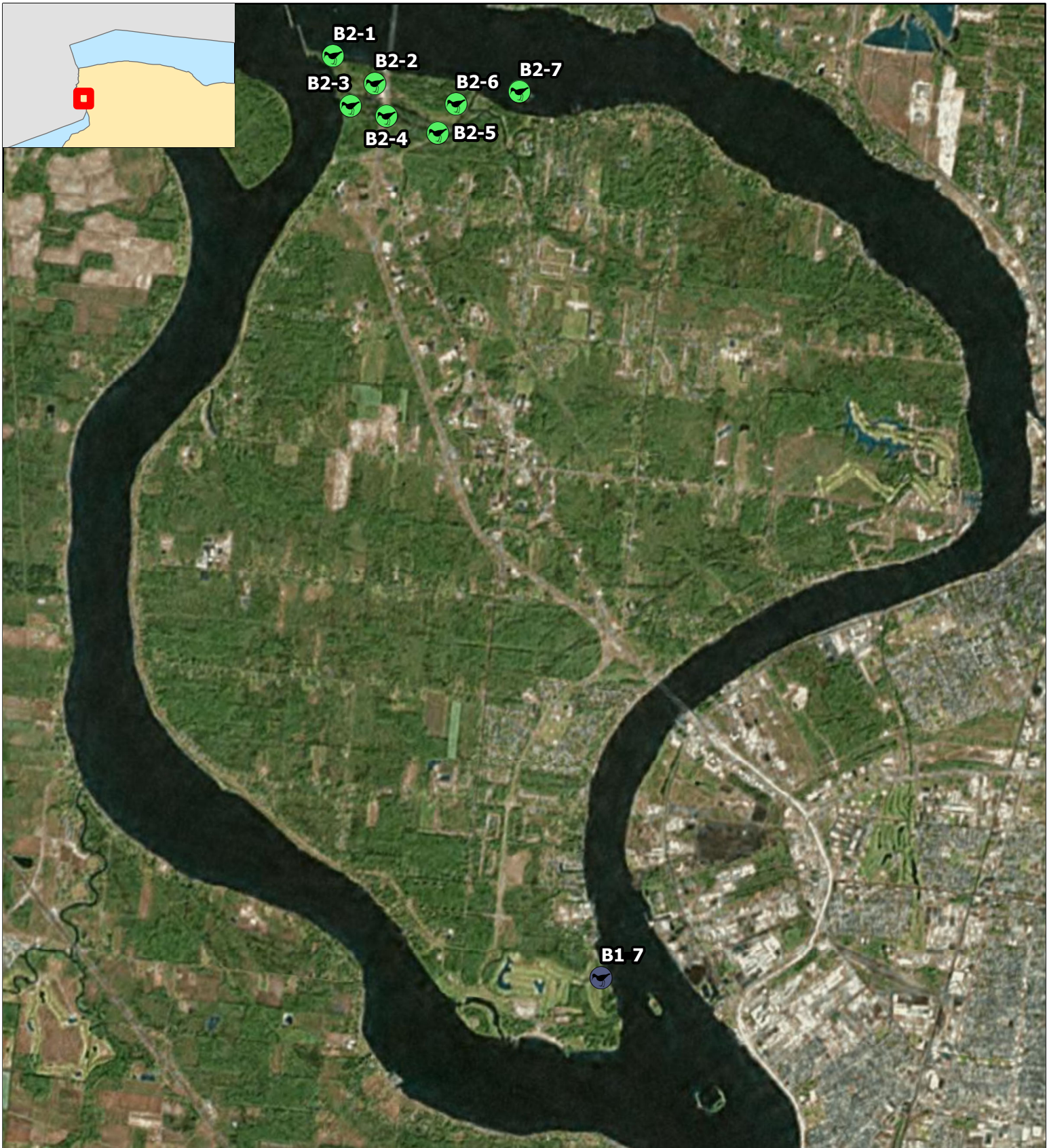
0 0.075 0.15 0.3
Miles

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

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

Prepared By:





Legend

- Route B1 Survey Point
- Route B2 Survey Point



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

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

Prepared By:



3.2.3 Point Spacing

The majority of the emergent marshes located within the NR AOC are relatively small in size (typically less than 16 hectares). For this reason, all emergent marshes encompassing at least 0.5 hectares (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 and generally greater than 0.5 ha in size. For larger marshes, points were placed at 400 meter (m) spacing, or approximately 1 point per 16 ha when appropriate.

3.2.4 Time of Day

Surveys must be conducted during one of two optimal survey windows, which for the Niagara River portion of New York are generally conducted from 30 minutes before sunrise to 3 hours after sunrise, or 2 hours before sunset to 30 minutes after sunset. These times generally coincide with peak marsh bird calling hours throughout northern latitudes (Conway 2011). In order to reduce bias, points should be 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.

3.2.5 Number of Surveys Per Year and Dates Conducted

Surveys should be conducted for at least three survey events each year. The primary goal of the marsh bird survey effort associated with this Work Plan is to estimate trends over time in the number of breeding adults for each marsh bird species in order to establish population estimates within the NR AOC. To accomplish this goal, all three surveys must be completed prior to the initiation of juvenile vocalizations (Conway 2011). To determine 90 percent certainty of presence or absence for some secretive marsh bird species, at least three surveys must be conducted (Conway 2011). In addition to establishing presence or absence trends, three or more surveys per year allows for estimation of the proportion of survey routes occupied by each species (Conway 2011).

Optimal seasonal timing varies from year to year, depending on weather conditions and breeding chronology of focal marsh birds. For the purposes of this study the timeline presented in Table 2 should be followed in all years. However, weather conditions should be monitored closely and survey event timing adjusted accordingly within these time periods to capture the best conditions. If deviation from the proposed timeline is necessary, a revised timeline must be approved by NYFO and NYSDEC and documented.

Table 2. Survey Timeline for Focal Marsh Bird Species in the NR AOC

Survey Event	Timing of Survey	Target Species
1	mid-late May	Pied-billed Grebe, American Bittern, Virginia Rail
2	early-mid June	Sora, King Rail, American Coot
3	mid-late June	Least Bittern, Common Gallinule

The three 15-day windows were established to capture the variation in breeding phenology among coexisting species (i.e., the differences in timing of breeding for least bittern and sora). By establishing the three survey windows the goal is to increase 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.

3.3 MARSH ANURAN SURVEY PROTOCOL

The following standardized survey methods for marsh anurans have been adapted from a number of sources, including the *North American Amphibian Monitoring Program - Protocol Description* by Weir and Mossman (2005); *The Marsh Monitoring Program Annual Report, 1995-2003* by Crewe et al. (2005); and, *The Marsh Monitoring Program Annual Report, 1995-2007* by Archer and Jones (2009). Biologists conducting surveys must be approved by the primary POC at USFWS and NYSDEC, and at a minimum must have experience identifying anurans to the species level through breeding season vocalizations. For safety purposes, two biologists should attend all field surveys.

3.3.1 Surveyor Skills and Experience

Observers must have the ability to identify all common anuran vocalizations with the potential to occur within the NR AOC. Observers and recorders should also be trained to estimate distance to and calling indexes of calling anurans and be familiar with wetland plants of western New York.

3.3.2 Calling Survey Technique

This protocol uses a calling survey technique where an observer listens for anuran vocalizations along a previously determined survey route. Each survey route is composed of 10 survey points randomly located within anuran breeding habitat (e.g., wetlands, ponds, shoreline) within the NR AOC. A survey route should be completed by one observer (an assistant can be used to fill out data forms but should not observe calling anurans) in a single night. At each survey point an observer listens for 5 minutes (data will be recorded in two time brackets: the first 3 minutes and the remaining 2 minutes), and then records the amphibian calling index for each species heard. The 5 minute listening period has an initial waiting period of two minutes after arrival. Use of recordings of frog calls or other artificial measures to elicit frog responses is not permitted.

3.3.3 Recording Information on the Anuran Call Survey Data Form

Target Species

Target species within the NR AOC include the American toad and nine species of frogs (see Table 3). When a species is encountered at a survey point an amphibian calling code will be assigned to the species in the appropriate *species* row and *survey point* column.

Table 3. List of Marsh Anurans in the NR AOC

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

Amphibian Calling Index

The amphibian calling index has been 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 B). When recording the amphibian calling index, level 1 should be assigned when calls do not overlap and calling individuals can be discretely counted; level 2 should be assigned if calls of individuals overlap, but the number of individuals can still be reasonably estimated; and, level 3 should be assigned when an estimate of individuals cannot be made because of significant overlap in calls making them seem continuous (i.e., a full chorus).

Background Noise

Background noise should be documented by recording the number of cars that passed during the listening period and noting any other sources of noise. Car counting should be conducted by an observer assistant. The observer should indicate whether background noise impaired his/her ability to hear by placing "yes" or "no" in the *was noise a factor* row? Noise levels should be identified using the noise index (1-4 scale) provided in the instructions portions of the data form. If a significant noise disturbance lasts for longer than one minute, the observer may discontinue the listening period to avoid sampling during the excessive noise. If such a break is taken it should be noted in the *did you take a break?* row on the data form. After the major disturbance ends, the observer should resume listening for the time remaining. A survey break should only be used for significant noise disturbance lasting longer than one minute, and should not be used for background noise.

Recording Weather Conditions

The observer should record the time, sky code, and wind code, at the beginning and end of each survey to verify that the sampling conditions were met on the evening of the survey (Weir and Mossman 2005). Air temperature should be recorded at each survey point to verify sampling conditions were met on the sampling night; at least eight of the ten stops must meet temperature guidelines. Additionally, observed moon or moonlight should be noted by placing a "yes" or "no" in the *moon or moonlight visible?* field on the data form.

3.3.4 Recording Information on the Habitat Monitoring Data Form

Habitat monitoring is an important part of this Work Plan because data gathered regarding marsh habitat can inform 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. Upon completion of each annual monitoring event surveyors will complete a Habitat Monitoring Data Form (Appendix B). In addition to detailed information on the vegetation present, the following habitat related characteristics will also be recorded for each survey effort.

Photographic Documentation of Survey Points

The photographic record of survey points should be updated on an annual basis and should be taken at the same direction as identified in the 2014 survey final field report. Survey points should be re-marked (when necessary) and new photographs should be taken to aid in easy identification of survey points from year to year. Ideally, new photographs should be taken following the last survey of each year, at the time habitat measurement data is being collected.

Date of Last Natural Disturbance

Natural disturbance data should be recorded on the habitat monitoring data form (Appendix B) following the last survey of each year. Record 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. Record 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.

3.3.5 Equipment Needed

A comprehensive list of recommended survey equipment for marsh anuran monitoring is provided in Appendix E of this Work Plan. Additionally, since some survey areas may require a boat to access, a boating protocol is also provided (Appendix E)

3.4 MARSH BIRD SURVEY PROTOCOL

The following standardized survey methods for marsh birds have been adapted from a number of sources, including the *New York State Marsh Bird Monitoring Program Pilot Study 2009-2011* by Yard et al. (2012); *Occupancy, Detection, and Habitat Associations of Secretive Marsh Bird Species in New York State* by Osborne et al. (2011); and, *Standardized North American Marsh Bird Monitoring Protocol* by Courtney J. Conway (2011).

3.4.1 Surveyor Skills and Experience

Observers must have the ability to identify all common calls of primary and secondary focal species as well as non-focal marsh birds with the potential to occur within the NR AOC. Observers and recorders should also be trained to estimate distance to calling marsh birds and be familiar with wetland plants of western New York.

3.4.2 Passive and Broadcast Monitoring

Due to the secretive nature of marsh birds they are seldom observed and vocalizations are heard infrequently. For these reasons the survey methods outlined in this Work Plan require surveyors to broadcast calls to elicit vocalizations during surveys. To incorporate methodologies without the biases associated with call-broadcast (Conway 2011) and to survey for secondary target species, surveyors must record birds during a 5-minute passive period before initiating call-broadcast surveys. Therefore, following a 2-minute settling period, surveyors will record all focal species (see Table 4.) detected during an initial 5-minute passive survey period and a following 8-minute call-broadcast period, in which marsh bird calls for primary species will be broadcast into the marsh.

Table 4. List of Focal Marsh Birds in the NR AOC

Common Name	Scientific Name
Primary Focal Birds	
American Bittern	<i>Botarus lentiginosus</i>
American Coot	<i>Fulica americana</i>
Common Gallinule	<i>Gallinula galeata</i>
King Rail	<i>Rallus elegans</i>
Least Bittern	<i>Ixobrychus exilis</i>
Pied-billed Grebe	<i>Podilymbus podiceps</i>
Sora	<i>Porzana carolina</i>
Virginia Rail	<i>Rallus limicola</i>

Table 4. List of Focal Marsh Birds in the NR AOC (Continued)

Common Name	Scientific Name
<u>Secondary Focal Birds</u>	
Black Tern	<i>Chlidonias niger</i>
Common Tern	<i>Sterna hirundo</i>
Forster's Tern	<i>Sterna forsteri</i>
Green Heron	<i>Butorides virescens</i>
Marsh Wren	<i>Cistotoruus palustris</i>
Sedge Wren	<i>Cistothorus platensis</i>
Swamp Sparrow	<i>Melospiza georgiana</i>
Willow Flycatcher	<i>Empidonax traillii</i>
Wilson's Snipe	<i>Gallinago delicata</i>

The recorded calls should be obtained from the NYFO or NYSDEC marsh bird survey coordinator (see Appendix A for contact information) and the same recorded call sequence should be used during each survey event. Primary focal species included in the call-broadcast sequence include least bittern, sora, Virginia rail, king rail, American bittern, common gallinule, American coot, and pied-billed grebe. Calls must be played in this order sequence. The call-broadcast sequence includes 30 seconds of calls for each of the focal marsh bird species, with 30 seconds of silence between calls of each species. The 30 seconds of calls for each species consists of a mix of the most common calls for the species, separated by 5 to 6 seconds of silence between each call type for the species. For instance, the entire survey sequence consists of the following:

- 5 minutes of silence (includes tone at 4 minutes to alert surveyor that calls will begin in 1 minute)
- 30 seconds of calls for Least Bittern
 - Three Least Bittern *coo-coo-coo* calls
 - Six seconds of silence
 - Three Least Bittern *coo-coo-coo* calls
 - Six seconds of silence
 - Four series of Least Bittern *kak* calls
- 30 seconds of silence
- 30 seconds of calls for Sora
 - Two Sora *whinny* calls
 - Five seconds of silence
 - Three Sora *per-weep* calls
 - Five seconds of silence
 - Four Sora *keep* calls
- 30 seconds of silence
- 30 seconds of calls for Virginia Rail
 - One Virginia Rail *grunt* series
 - Five seconds of silence

- Two Virginia Rail *tick-it* series
- Five seconds of silence
- Two Virginia Rail *kicker* calls
- 30 seconds of silence
- 30 seconds of calls for King Rail
- One King Rail *clatter* series
- 6 Seconds of Silence
- One King Rail *kek* series
- Five seconds of silence
- Four King Rail *kek-burr* calls
- 30 seconds of silence
- 30 seconds of calls for American Bittern
- Four American Bittern *Pump-er-lunk* calls
- Five seconds of silence
- Four American Bittern *Pump-er-lunk* calls
- Five Seconds of Silence
- Four American Bittern *Pump-er-lunk* calls
- 30 seconds of silence
- 30 seconds of calls for Common Gallinule
- One Common Gallinule *wipe-out* series
- Six seconds of silence
- Two Common Gallinule *keep* calls
- Six seconds of silence
- One Common Gallinule *wipe-out* series
- 30 seconds of silence
- 30 seconds of calls for American Coot
- One American Coot *hic-cup* series
- Six seconds of silence
- Four American Coot *honk* calls
- Six seconds of silence
- One American Coot *hic-cup* series
- 30 seconds of silence
- 30 seconds of calls for Pied-billed Grebe
- One Pied-billed Grebe *Ow-hoop* series
- Five seconds of silence
- One Pied-billed Grebe *chatter* series
- Five seconds of silence
- One Pied-billed Grebe *chatter* series
- 30 seconds of silence
- Verbal “Stop”

3.4.3 Broadcast Equipment and Placement

A broadcast player (e.g. game caller, mp3 player or cd player with speaker) should be chosen based on its suitability for broadcasting calls with a sound pressure of 80-90 dB at 1m in front of the speaker. A sound-level meter should be used to adjust the volume of the broadcast player at the beginning of each day. If sound quality is distorted at a level of 80-90 dB, a higher quality broadcasting system should be used.

The broadcast speaker should be placed upright, on the ground, or on the bow of the boat (when conducting surveys from boat). The speaker should be aimed in the direction that provides optimal coverage of the marsh complex. If the ground is wet, the speaker should be placed on an object as close to the ground as possible. Surveyors should stand at a minimum 2 m to the side of the speaker while listening for vocal responses.

3.4.4 Estimating Distance to Focal Species

Surveyors should estimate the distance (during both passive and broadcast monitoring) to each focal species and record on the appropriate datasheet (Appendix B). Because marsh birds often move towards the broadcast source (Conway 2011) distances should be recorded when an individual is first detected. Surveyors should use maps or a range finder to determine the distance of land marks, which will aid in the estimation of distance to focal marsh birds.

3.4.5 Recording Information on the Marsh Birds Survey Data Form

Copies of datasheets are available in Appendix B of this Work Plan. Prior to the initiation of each survey, record the day, month and year at the top of the datasheet. Also include the full name of all persons present during the survey effort. If more than one person is present, write down who recorded the data and who identified calling birds. Survey crews should consist of one observer and one data recorder. Make note if the data recorder assists the observer in identifying birds.

Primary Focal, Broadcast Species

Record the unique identification number (e.g. B2-1) and time when you first arrive at a survey point. When a focal species is detected, write the four letter species code (located in the instructions portion of the marsh bird data form) in the "Species" column on the provided data form. In addition to the four-letter code, record an "H" in each detection column for which that individual was detected aurally and an "S" in each column for which that individual was detected visually (including fly-overs). For example, if an individual Least Bittern (LEBI) vocalizes during the first minute of passive listening, record an "H" in the first column. Only record an individual once per minute, regardless of if the individual calls once or several times during that minute. If an individual continues to call into a second minute of passive listening, then also record an "H" in the second column. If that individual continues to call during the 30-second broadcast for American bittern or the 30-second silent period following the American bittern broadcast, put an "H" in the column for "AMBI", and so forth. So, if an individual continues calling throughout the entire survey period, you should have recorded an "H" in every column

for that individual. If an individual is heard and seen, put both a "H" and "S" in the appropriate column(s). If you hear a call from the same species but a different individual (or from a different species), start a new row on the data form and follow the same protocol detailed above.

When determining if an individual is a new observation or an individual that was already detected, surveyors should use their best professional judgment. In general, observers should be conservative and assume that a call is 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 should record "no birds" in the *Species* column of the data form. If the observer hears a marsh bird and is unable to identify the bird to the species level, the surveyor should record "unknown" in the *Species* column and record all data for the individual as described above. In addition, describe (e.g. soft "kak-kak-grr") the unknown call in the *Comments* column of the data form. Some species of marsh birds give paired duets and surveyors can often distinguish pairs of birds during surveys (Conway 2011). When pairs are observed record each member of the pair on its own individual row of the data form and record "pair" in the *Comments* column for each individual.

Secondary Focal Species (Non-Broadcast)

Whenever possible, secondary focal species including Black Tern, Forster's Tern, Green heron, Marsh Wren, Sedge Wren, Willow Flycatcher, Wilson's Snipe, Swamp Sparrow and Common Tern should be recorded the same way as the primary focal species discussed above; however, broadcast equipment is not to be used to solicit responses from secondary focal species. If an observer becomes overwhelmed by the number of secondary focal species detected, recording methods can be adjusted (*see the how to record data when too many birds are calling* section).

Non-Focal Species

Because time spent seeking, observing, and recording non-focal species may detract from the quality of observations for primary and secondary focal species, surveyors will not be expected to record non-focal species during the survey period (see Johnson *et al.* 2009; Conway 2011 for discussion). However, all incidental observations between points and routes may be recorded in a personal field notebook.

Types of Calls

Estimates of population trends based on data from calls that have low observer bias (i.e., calls that are distinctive and easily recognizable to the species level) might increase power (in a statistical sense) to detect true population trends due to reduced variation in counts throughout the sampling period of this study. For this reason, it is important that surveyors record all types of calls given for each focal marsh bird detected in the *Calls* column of the provided data form (Appendix B). Examples of common marsh bird calls can be listened to at the North American Marsh Bird Monitoring Program website:

[http://www.cals.arizona.edu/research/azfwru/NationalMarsh bird/](http://www.cals.arizona.edu/research/azfwru/NationalMarsh%20bird/). A copy of the calls is also provided in Appendix D.

Birds Detected at Prior Survey Point or Between Points

If a new bird is detected immediately following the survey period at a particular point (or between points), the species should be recorded on a separate row with "yes" recorded in the *Outside* column under the *Observed During* header. Recording detections outside of the survey period may provide useful information on species that are particularly uncommon and unlikely to be recorded during the short survey period.

If a focal species is detected that is believed to have been recorded at a previous survey point, the individual should be recorded (as with any new observation); however, a "Y" should be entered in the *Previously Detected* column on the data form. When uncertain if a bird was already detected, always be conservative and record "Y" in the *Previously Detected* column.

Recording birds that were detected outside of the standardized survey times (i.e. outside of the 10-min survey at a point) can be useful because these birds are secretive and rarely vocalize. For inventory purposes, surveyors should not ignore these detections, especially if, for example, they represent the only Black Rail detected all day or all year. However, a problem arises if one of these birds detected outside of the standardized survey period is then detected at a subsequent point during the standardized survey period. For example, if: 1) the surveyor detects a Black Rail after the 10-min survey period at point #3 and records that bird on its own row on the datasheet (and writes "No" in the Detected at a Previous Point column and "yes" in the Outside Survey column), and 2) the surveyor then detects the same Black Rail during the 10-min survey period at point #4. Recording "Yes" in the Detected at a Previous Point column for the entry at point #4 creates a problem because: For many analyses (including estimates of population trend) analysts may want to ignore all entries that have a "Yes" in the Detected at a Previous Point column and all entries that have a "Yes" in the Outside Survey column so that all individual birds are counted only once. In the scenario above, the Black Rail would have been ignored altogether from trend analyses. Hence, for the situation described above, the surveyor should write "No" in the Detected at a Previous Point column for the entry at point #4, and then go back and change the "No" to "Yes" in the Detected at a Previous Point column for the initial entry for this bird at point #3 (when the bird was detected after the 10-min survey period).

How to Record Data When Too Many Birds Are Calling

Because many of the primary and secondary focal species occur at relatively low densities within the NR AOC, it is likely most survey points will have little to no calling marsh birds during the survey period. However, the possibility exists for some survey points or survey routes to have numerous marsh birds calling, resulting in difficulty detecting and recording individuals during each 1-minute segment in both the passive and call-broadcast portions of the survey effort. Below is a list of solutions to consider if marsh bird detections become overwhelming during a survey period.

- 1) The implementation of two person teams will alleviate most of the concern with becoming overwhelmed by conducting surveys in high density marsh bird areas. The ability of the observer to communicate clearly and work efficiently with the data recorder is essential in these high call volume areas.
- 2) A circle has been include in the *Direction* column on the data form, which allows the data recorder to place a "tick" mark on the circle, indicating the direction of the individual from the observer. The distance estimate recorded on the *Distance* column of the data form combined with the "tick" mark on the *Direction* column of the data form, should allow the observer and recorder to differentiate one individual from another.

Recording Ambient Noise Levels

Background noise levels should be recorded in the *Background Noise* column for each survey point. Background noise should be categorized at each survey point using a scale from 0 to 4, as described below (and presented in the instructions portion of the data form):

0 = no background noise during virtually all of the survey,

1 = faint background noise during at least half of the survey,

2 = moderate background noise (probably cannot hear some birds beyond 100m during >30 seconds of the survey),

3 = loud background noise (probably cannot hear some birds beyond 50m during >30 seconds of the survey),

4 = intense background noise (probably cannot hear some birds beyond 25m during >30 seconds of the survey).

Weather Conditions and Restrictions

Since weather conditions can affect detection probability of marsh birds (Conway 2011), surveys should only be conducted during appropriate conditions. Surveys should only be conducted when wind speeds are less than 20 km/hr (12 mph), and not during periods of heavy fog or sustained rain. A pocket wind meter should be used to obtain an accurate measure of wind speed in the field. A survey should be postponed if the observer believes winds are affecting calling probability (even if winds are <20 km/hr). The following recommendations for conducting surveys in windy locations should be considered:

- 1) Be flexible with your schedule. Postpone surveys until you have a day that meets acceptable weather criteria and provides the timeframe needed to complete the survey. If wind speeds increase above the acceptable level or rains become sustained after a survey begins you should stop the survey and return within five days to finish the survey route

by returning to the unfinished point (at the time it was stopped) and completing all remaining survey points. If the survey cannot be completed within five days, the entire survey route should be repeated another day.

Record ambient temperature, wind speed and sky conditions for each survey point, using the appropriate columns provided on the data form. Use the same wind speed codes (Beaufort) and sky condition codes (National Weather Service) as described for the North American Marsh Bird Monitoring Protocol (Conway 2011); which are provided in the instructions portion of the data form.

3.4.6 Recording Data on the Habitat Monitoring Data Form

As with the anuran population monitoring, habitat monitoring is an important part of marsh bird population monitoring because data gathered regarding marsh habitat and water level conditions can inform 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 bird populations. Upon completion of each annual monitoring event surveyors will complete a Habitat Monitoring Data Form (Appendix B). In addition to detailed information on the vegetation present, the following habitat related characteristics will also be recorded for each survey effort.

Photographic Documentation of Survey Points

The photographic record of survey points should be updated on an annual basis and photographs should be taken at the same cardinal directions as presented in the 2014 survey final report. Survey points should be re-marked (when necessary) and new photographs should be taken to aid in easy identification of survey points from year to year. Ideally, new photographs should be taken following the last survey of each year, at the time habitat measurement data is being collected.

Date of Last Natural Disturbance

Natural disturbance data should be recorded on the habitat monitoring data form following the first survey of each year. A habitat monitoring data form should be completed for each survey point. Record 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 also be recorded on the habitat monitoring data form following the first survey of each year. Record 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.

3.4.7 Equipment Needed

A comprehensive list of recommended survey equipment and a boating safety protocol are provided in Appendix E.

3.5 COORDINATION EFFORTS

3.5.1 Survey Coordination Procedures

POCs at NYSDEC and the NYFO should be involved early on in the planning process and must be provided at least one week prior notice before conducting marsh anuran and/or marsh bird surveys. See list of contacts in Appendix A for agency POCs.

Surveys should also be coordinated with landowners and nature preserve and state park officials at least one week prior to a planned survey event. Notification should be given to the Times Beach Nature Preserve by contacting Ms. Michelle DePasquale and Mr. Chuck Shweikert (see Appendix A for contact information). An event form must also be completed and submitted (online) to the Parks Department at <http://www2.erie.gov/parks/index.php?q=park-event-0> at least one week prior to conducting surveys.

Coordination with Tiff Nature Preserve should go through Mr. David Spiering, preserve ecologist, by calling or emailing at least one week prior to a scheduled survey event. Additional coordination may be required, prior to the first survey of each year, to obtain permission to add a lock to the Preserve gate, which would allow access beyond normal business hours (e.g., for evening or early morning survey events). Additional coordination may be needed when conducting surveys at the Tiff Nature Preserve, as preserve employees may also be conducting marsh anuran and marsh bird surveys during the same survey window.

Notification should be given to Buckhorn Island and Beaver Island State Parks by contacting the Park Manager, Mr. Andrew Hilman (see Appendix A for contact information) at least one week prior to each survey event. Additional coordination may be required, prior to the first survey of each year, to obtain a key which would provide access to gated portions of Buckhorn Island State Park. A key may be signed out at the Beaver Island State Park Office.

Within 3-days following each survey event, the biologist leading the field effort will provide a concise email summary of the event to the primary points of contact at NYSDEC and the NYFO. Information provided will include a list of observers and recorders used during the survey effort, sites visited and survey dates, general weather conditions, and any information of interest pertaining to marsh anuran/birds observed at each of the survey points.

3.6 DATA MANAGEMENT

Prior to departing a site following a survey, all data forms, maps and the handheld GPS must be reviewed by the biologist that collected the data to ensure all required information has been collected. Upon return to the office, field data must be entered into the USFWS and NYSDEC approved project database. Quality Assurance/Quality Control (QAQC) measures must be performed on all data prior to transfer to the USFWS and NYSDEC. Due to the sensitivity of information, all electronic and hard copy data collected during the 2014-2018 survey effort will only be released to the POC at USFWS and NYSDEC (Appendix A). Any persons requesting information on the project or project data should be referred to the POC at USFWS.

3.7 REPORTING

An annual survey report must be provided to the POC's at USFWS and NYSDEC within 90-days following the full field survey effort unless an alternate schedule is approved by the USFWS POC. The report should be provided electronically and must include an introduction, methods, results, a comparison of current field season results with those from previous surveys completed for this study, recommendations, literature cited as well as any relevant figures and maps. Raw data in the form of completed field data forms and Excel spreadsheets must be included as Appendix.

4.0 LITERATURE CITED

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APPENDIX A: LIST OF IMPORTANT POINTS OF CONTACT

Name	Title/Role	Office	Cell	Email	Address	Notes
USFWS NYFO						
Amy Roe	Wildlife Biologist	607.753.9334	315.663.5047	amy_roe@fws.gov	3817 Luker Road, Cortland, NY 13045	Primary point of contact for NYFO
NYSDEC						
Connie Adams	Biologist	716.851.7010 ext. 7045		connie.adams@dec.ny.gov	270 Michigan Avenue, Buffalo, NY 14203	Primary point of contact for NYSDEC
Jennifer Tait	Biologist	716.851.7130		jennifer.tait@dec.ny.gov	270 Michigan Avenue, Buffalo, NY 14203	
Mark Filipski	RAP Liaison	716.851.7070		mark.filipski@dec.ny.gov	270 Michigan Avenue, Buffalo, NY 14203	
NewEarth Ecological Consulting						
Stacie Grove	Principal Environmental Biologist	207.286.3259	207.329.4458	sgrove@newearthecological.com	169 Watson Mill Road, Saco, ME 04072	Primary point of contact for NewEarth
Times Beach Nature Preserve						
Mary Rossi	Principal Environmental Compliance Specialist	716.858.7583		mary.rossi@erie.gov	95 Franklin St., Room 1076, Buffalo, NY 14202	Primary POC for Times Beach Nature Preserve
Michelle DePasquale		716.858-8355	716.858.7037	Michelle.DePasquale@erie.gov		Contact prior to each survey and submit request form

Name	Title/Role	Office	Cell	Email	Address	Notes
Chuck Schweikert		716.693.2971		Charles.Schweikert@erie.gov		contact prior to each survey
Tift Nature Preserve						
David Spiering	Ecologist	716.896.5200 ext. 202		dspiering@sciencebuff.org	1200 Fuhrmann Blvd., Buffalo, NY 14203	Primary POC for Tift Nature Preserve
Buckhorn Island and Beaver Island State Parks						
Andrew (Andy) Hilman	Park Manager	716.773.3271			2136 W Oakfield Rd, Grand Island, NY 14072	Primary POC for State Parks, and gate keys
Blue Water Marina (Kayak Rental)						
Dan Steadman	Owner	716.773.7884		http://www.bluewatermarinagi.com/	340 East River Road, Grand Island, NY 14072	Primary POC for Rentals

APPENDIX B: EXAMPLE DATA 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., <i>Typha latifolia</i>)	% 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 Monitoring Data Form For NR AOC Marsh Bird and Anuran Surveys

Habitat characteristics (for 50-m radius area)

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

Table with 6 columns: Perimeter Characteristic, <5%, 6-25%, 26-50%, 51-75%, >75%. Rows include 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 vegetation² (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

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:										

<p>Instructions:</p> <p>Please be sure to complete the entire datasheet.</p> <p>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.</p> <p>Visit stops in 1-10 order. If unforeseen circumstances require you to skip a stop, write that on the datasheet.</p> <p>At the start of each survey point record the time, wind, and sky conditions (see codes to the right).</p> <p>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.</p> <p>At each stop, also report the environmental data requested: air temperature, noise conditions, moonlight, and number of cars that passed while listening.</p> <p>There are two kinds of noise disturbance questions:</p> <ul style="list-style-type: none"> • 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. 	<table border="1"> <tr> <th colspan="2" style="text-align: center;">Index and Code Definitions</th> </tr> <tr> <th colspan="2">Amphibian Calling Index</th> </tr> <tr> <td>1</td> <td>Individuals can be counted; there is space between calls</td> </tr> <tr> <td>2</td> <td>Calls of individuals can be distinguished but there is some overlapping of calls</td> </tr> <tr> <td>3</td> <td>Full chorus, calls are constant, continuous and overlapping</td> </tr> <tr> <th colspan="2">Amphibian Calling Index Modifiers</th> </tr> <tr> <td>A</td> <td>Amphibians Calling Within Target Area Only</td> </tr> <tr> <td>B</td> <td>Amphibians Calling Outside Target Area Only</td> </tr> <tr> <td>C</td> <td>Amphibians Calling Inside and Outside of Target Area</td> </tr> <tr> <th colspan="2">Sky codes</th> </tr> <tr> <td>0</td> <td>Few clouds</td> </tr> <tr> <td>1</td> <td>Partly cloudy (scattered) or variable sky)</td> </tr> <tr> <td>2</td> <td>Cloudy or overcast</td> </tr> <tr> <td>4</td> <td>Fog or smoke</td> </tr> <tr> <td>5</td> <td>Drizzle or light rain (not affecting hearing ability)</td> </tr> <tr> <td>7</td> <td>Snow</td> </tr> <tr> <td>8</td> <td>Showers (is affecting hearing ability) do not conduct survey</td> </tr> <tr> <th colspan="2">Wind Codes</th> </tr> <tr> <td>0</td> <td>Calm (<1mph) smoke rises vertically</td> </tr> <tr> <td>1</td> <td>Light Air (1-3 mph) smoke drifts, weather vane inactive</td> </tr> <tr> <td>2</td> <td>Light Breeze (4-7 mph) leaves rustle, can feel wind on face</td> </tr> <tr> <td>3</td> <td>Gentle Breeze (8-12 mph) leaves and twigs move around, small flag extends</td> </tr> <tr> <td>4*</td> <td>Moderate Breeze (13-18 mph) moves thin branches, raises loose papers * Do not conduct survey, unless in Great Plains states</td> </tr> <tr> <td>5**</td> <td>Fresh Breeze (19 mph or greater) small trees begin to sway **Do not conduct survey –ALL REGIONS</td> </tr> <tr> <th colspan="2">Noise Index</th> </tr> <tr> <td>0</td> <td>No appreciable effect (e.g. owl calling)</td> </tr> <tr> <td>1</td> <td>Slightly affecting sampling (e.g. distant traffic, dog barking, 1 car passing)</td> </tr> <tr> <td>2</td> <td>Moderately affecting sampling (e.g. nearby traffic, 2-5 cars passing)</td> </tr> <tr> <td>3</td> <td>Seriously affecting sampling (e.g. continuous traffic nearby, 6-10 cars)</td> </tr> <tr> <td>4</td> <td>Profoundly affecting sampling (e.g. continuous traffic passing, construction noise)</td> </tr> </table>	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)
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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	<i>Botaurus lentiginosus</i>	Primary
AMCO	American Coot	<i>Fulica americana</i>	Primary
BLTE	Black Tern	<i>Chlidonias niger</i>	Secondary
COGA	Common Gallinule	<i>Gallinula galeata</i>	Primary
COTE	Common Tern	<i>Sterna hirundo</i>	Secondary
FOTE	Forster's Tern	<i>Sterna forsteri</i>	Secondary
GRHE	Green Heron	<i>Butorides virescens</i>	Secondary
KIRA	King Rail	<i>Rallus elegans</i>	Primary
LEBI	Least Bittern	<i>Ixobrychus exilis</i>	Primary
MAWR	Marsh Wren	<i>Cistotoruus palustris</i>	Secondary
PBGR	Pied-billed Grebe	<i>Podilymbus podiceps</i>	Primary
SEWR	Sedge Wren	<i>Cistothorus platensis</i>	Secondary
SORA	Sora	<i>Porzana carolina</i>	Primary
SWSP	Swamp Sparrow	<i>Melospiza georgiana</i>	Secondary
VIRA	Virginia Rail	<i>Rallus limicola</i>	Primary
WIFL	Willow Flycatcher	<i>Empidonax traillii</i>	Secondary
WISN	Wilson's Snipe	<i>Gallinago delicata</i>	Secondary

APPENDIX C: COORDINATES FOR SURVEY POINTS

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 D: LIST OF COMMON CALLS FOR MARSH BIRD SPECIES

Species	Standardized Call name	Sibley Name(s)	BNA Name(s)	Possible Function	Sample on BNA
AMBI	pump-er-lunk	bloonk-adoonk	pump-er-lunk or dunk-a-doo	Mate attraction, territorial signal	
AMBI	Chu-peep	Chu-peep	Chu-peep	During copulation ceremony	
AMBI	Kok	Kok-kok-kok	Kok-kok-kok or haink	When flushed	Y
AMCO	Burr-up		Puhk-cowah; cooah	Perturbation (puhk-cowah; cooah female)	Y
AMCO	Hic-up	priKI	Pow-ur	Perturbation (pow-ur male)	Y
AMCO	Honk				
COMO	Wipe-out	Pep-pep-pehr-peeher	Cackle – ka-ka-ka-ka-ka-kee-kree-kree-kree		Y
COMO	Keep	Kulp-keek	Squawk, yelp, cluck		Y
COMO	Giddy-up				
KIRA	Clatter	Clapper	Cheup-cheup-cheup, jupe-jupe-jupe, gelp-gelp-gelp-;chac-chac-chac	Mate communication	Y
KIRA	Kek	Ket	Kik-kik-kik	Mate attraction	Y
KIRA	Kek-hurrah	Grunting			
KIRA	Kek-burr	Ket-ket-karr			Y
KIRA	Squawk				
LEBI	Coo	Poo-poo-poo	Coo or cooing; tut-tut-tut	Mate attraction	Y
LEBI	Kak	Rick-rick-rick	Gack-gack	Mate communication, alarm call	Y
LEBI	Ert	Kuk	Tut-tut-tut; quoh, hah or cackle	Alarm call	Y
LEBI	Ank-ank		Ank-ank	When flushed	Y

Species	Standardized Call name	Sibley Name(s)	BNA Name(s)	Possible Function	Sample on BNA
PBGR	Owhoop	Ge ge gadum gadum gwaaaow	Series of wut, whut, or kuk notes followed by 4-20 kaow or cow notes	Courtship or communication between pair, territorial	Y
PBGR	Hyena	Chatter	Ek-ek-ek,hn-hn-hn	Greeting call	Y
SORA	Whinny	Whinny	Descending whinny	Territorial defense, mate communication	Y
SORA	Per-wheep	kooEE	Per-weep; ker-wee; ter-ee	Mate attraction?	Y
SORA	Keep	Keek	Kee or weep	Alarm call	Y
VIRA	Grunt	Grunt	Grunt	Mate communication	Y
VIRA	Kick-it	Gik-gik-gik-gik-gidik-gidik-gidik	Tick-it	Mate attraction	Y
VIRA	Kicker	Chi chi chi treer	Kicker	Solicitation	Y
VIRA	Squawk	Skew; kweek	Kiu	Alarm call, territorial dispute	Y
VIRA	Kikik	Kikik ik-ik, pit-ti-ti-tip			Y

APPENDIX E: EQUIPMENT LIST AND BOATING SAFETY PROTOCOL

Marsh Anuran Survey Equipment List

<input type="checkbox"/> Pens, pencils, markers etc.	<input type="checkbox"/> Digital Camera
<input type="checkbox"/> Clipboard	<input type="checkbox"/> Lap-top, mouse and power cord
<input type="checkbox"/> Field log book	<input type="checkbox"/> Handheld GPS Unit and transfer cable
<input type="checkbox"/> Compass	<input type="checkbox"/> Car GPS unit and power cord
<input type="checkbox"/> Vinyl flagging (for marking observation points)	<input type="checkbox"/> Thumb drive (for data transfer)
<input type="checkbox"/> Surveyor Stakes (for marking obs. points)	<input type="checkbox"/> Cell phone - wall/vehicle cord 7 pwr. adapters
<input type="checkbox"/> Kestrel 3000 Wind Meter	

Documents

<input type="checkbox"/> Proof of vehicle inspection, registration and insurance	<input type="checkbox"/> Notice for car window – field work in progress
<input type="checkbox"/> Project Description/Sampling protocol(s)	<input type="checkbox"/> New York State Gazetteer
<input type="checkbox"/> Survey transect/point station maps	<input type="checkbox"/> Write in rain paper/documents
<input type="checkbox"/> Data forms and form storage folder	<input type="checkbox"/> Notepad

Safety Gear/First Aid

<input type="checkbox"/> Health & safety plan	<input type="checkbox"/> Cell phone
<input type="checkbox"/> First aid/tool kit	<input type="checkbox"/> Orange safety vests (when needed)
<input type="checkbox"/> Sunscreen	<input type="checkbox"/> Cooler for drinks
<input type="checkbox"/> Bug repellent/head net/gloves	<input type="checkbox"/> Snacks, drinks, food, etc.

Personal

<input type="checkbox"/> Waterproof knee boots or waders	<input type="checkbox"/> Long field pants
<input type="checkbox"/> Hiking boots	<input type="checkbox"/> Long-sleeve field shirts
<input type="checkbox"/> Season appropriate outer wear	<input type="checkbox"/> Rain gear
<input type="checkbox"/> Reading glasses	<input type="checkbox"/> Baseball cap and/or other seasonal headgear

Transportation

<input type="checkbox"/> 4 wheel drive vehicle with the ability to transport a small watercraft	<input type="checkbox"/> Small motorized boat (preferable) or kayak
-------------------------------------------------------------------------------------------------	---------------------------------------------------------------------

Notes:

Marsh Bird Survey Equipment List

<input type="checkbox"/> Pens, pencils, markers etc.	<input type="checkbox"/> Sound-level Meter
<input type="checkbox"/> Clipboard	<input type="checkbox"/> Lap-top, mouse and power cord
<input type="checkbox"/> Field log book	<input type="checkbox"/> Handheld GPS Unit and transfer cable
<input type="checkbox"/> Binoculars and harness	<input type="checkbox"/> Car GPS unit and power cord
<input type="checkbox"/> Digital camera	<input type="checkbox"/> Thumb drive (for data transfer)
<input type="checkbox"/> Compass	<input type="checkbox"/> Cell phone - wall/vehicle cord 7 pwr. adapters
<input type="checkbox"/> MP3 Player and Speaker capable of outputting 90dB at 1 m	<input type="checkbox"/> Vinyl flagging (for marking observation points)
	<input type="checkbox"/> Surveyor Stakes (for marking obs. points)

Documents

<input type="checkbox"/> Proof of vehicle inspection, registration and insurance	<input type="checkbox"/> Notice for car window – field work in progress
<input type="checkbox"/> Project Description/Sampling protocol(s)	<input type="checkbox"/> Field guides (Sibley’s, Peterson’s Frogs)
<input type="checkbox"/> Survey transect/point station maps	<input type="checkbox"/> Bird species codes
<input type="checkbox"/> Data forms and form storage folder	<input type="checkbox"/> New York State Gazetteer
<input type="checkbox"/> Notepad	<input type="checkbox"/> Write in rain paper/documents

Safety Gear/First Aid

<input type="checkbox"/> Health & safety plan	<input type="checkbox"/> Cell phone
<input type="checkbox"/> First aid/tool kit	<input type="checkbox"/> Orange safety vests (when needed)
<input type="checkbox"/> Sunscreen	<input type="checkbox"/> Cooler for drinks
<input type="checkbox"/> Bug repellent/head net/gloves	<input type="checkbox"/> Snacks, drinks, food, etc.

Personal

<input type="checkbox"/> Waterproof knee boots or waders	<input type="checkbox"/> Long field pants
<input type="checkbox"/> Hiking boots	<input type="checkbox"/> Long-sleeve field shirts
<input type="checkbox"/> Season appropriate outer wear	<input type="checkbox"/> Rain gear
<input type="checkbox"/> Reading glasses	<input type="checkbox"/> Baseball cap and/or other seasonal headgear

Transportation

<input type="checkbox"/> 4 wheel drive vehicle with the ability to transport a small watercraft	<input type="checkbox"/> Small motorized boat (preferable) or kayak
-------------------------------------------------------------------------------------------------	---------------------------------------------------------------------

Notes:

Water and Boating Safety Protocol for NR AOC Marsh Bird and Anuran Surveys

This Water and Boating Safety Protocol presents information and guidelines on the safe performance of work on or near water. Employees must recognize the inherent hazards associated with working in and around water, whether directly exposed through wading/swimming, or potentially exposed while present on surface watercraft (i.e., boat, kayak, canoe, vessel, craft) or near water bodies.

- Notify your organizations POC (e.g., Project Manager) of your boating plans, travel route, stops, and anticipated return time (call to adjust time if you're going to be late). Check in with them before and after conducting work on the water.
- Do not boat alone.
- Each person must wear a US Coast Guard Approved personal flotation device (lifejacket—PFD). It is the law. Having the PFD in the boat is not acceptable; it must be worn.
- Recognize your limits and avoid situations that are beyond your boating and swimming ability.
- Do not enter/use a boat if you are unable to swim.
- Learn the essential canoeing/kayaking strokes and practice them until they become “second nature.” The safest boater is a skillful boater.
- Think and plan ahead. Know what hazards you are likely to encounter—rocks, down trees, waterfalls, sharp turns, potential water or ice dam releases, waters that can turn into nasty chop if the wind comes up.
- Be suitably prepared and equipped—proper footgear, sun protection, raingear, spare dry clothing, rescue line, extra paddle, duct tape, first-aid, map, knife, etc. as your particular trip may require.
- Utilize a waterproof bag to store necessary field equipment, safety gear and clothing.
- Know and respect the water you choose to paddle. Check River classifications and be sure to find out what the water conditions are or will be at time of launch. Check weather forecasts for the area. Consider recent rains, local and upstream, both air and water temperatures, winds, and likely conditions, i.e., afternoon winds, late-afternoon showers, chilling nighttime temperatures.
- Beware of cold water and weather extremes. Dress appropriately.
- Ensure all safety and maintenance checks have been performed and the boat(s) and trailer are in good working condition.
- Properly secure each vessel when transporting and transport only on a vehicle suitable for the boat size.
- Equip your canoe (optional for kayaks) with bow and stern lines, 1/4-inch or 3/8-inch lines 10 to 15 feet long. Fasten securely and leave the free end unknotted and accessible. Do not use these lines to tie in gear.
- Understand your responsibility to help your partner and other members in your group.
- Keep boats a safe distance apart. Allow the boat in front of you to clear a potentially hazardous stretch before you enter it yourself.

Water Safety Checklist

PRIOR TO USING WATERCRAFT

- Vessels are properly secured for transport, and are being transported on/in a suitable vehicle.
- All staff entering/using boats are able to swim and are fully aware of boat operation/handling and appropriate boating safety measures and precautions.
- Project Manager or Organizations Representative has been made aware of boating plans and anticipated return time.
- Each vessel has been inspected and is in solid working order.
- All employees are **wearing** USCG approved life vests (PFDs).
- Staff are wearing and/or have included in their boat safety and equipment bag the appropriate attire and equipment for the weather and water conditions, and have planned for possible changes in conditions.

FOLLOWING WORK ON THE WATER

- Project Manager or POC has been notified of return.
 - All equipment has been cleaned and properly stored.
 - Vessels are properly secured for transport, and are being transported on/in a suitable vehicle.
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