

Beneficial Use Impairment Removal Project

Niagara River Area of Concern Heron and Osprey Nesting Success and Productivity Monitoring Work Plan: 2014-2018



Photo Credit: Justin L. Sweitzer

Final: March 23, 2015

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Work Plan: 2014-2018

Final – March 23, 2015

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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; each are managed separately. 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).

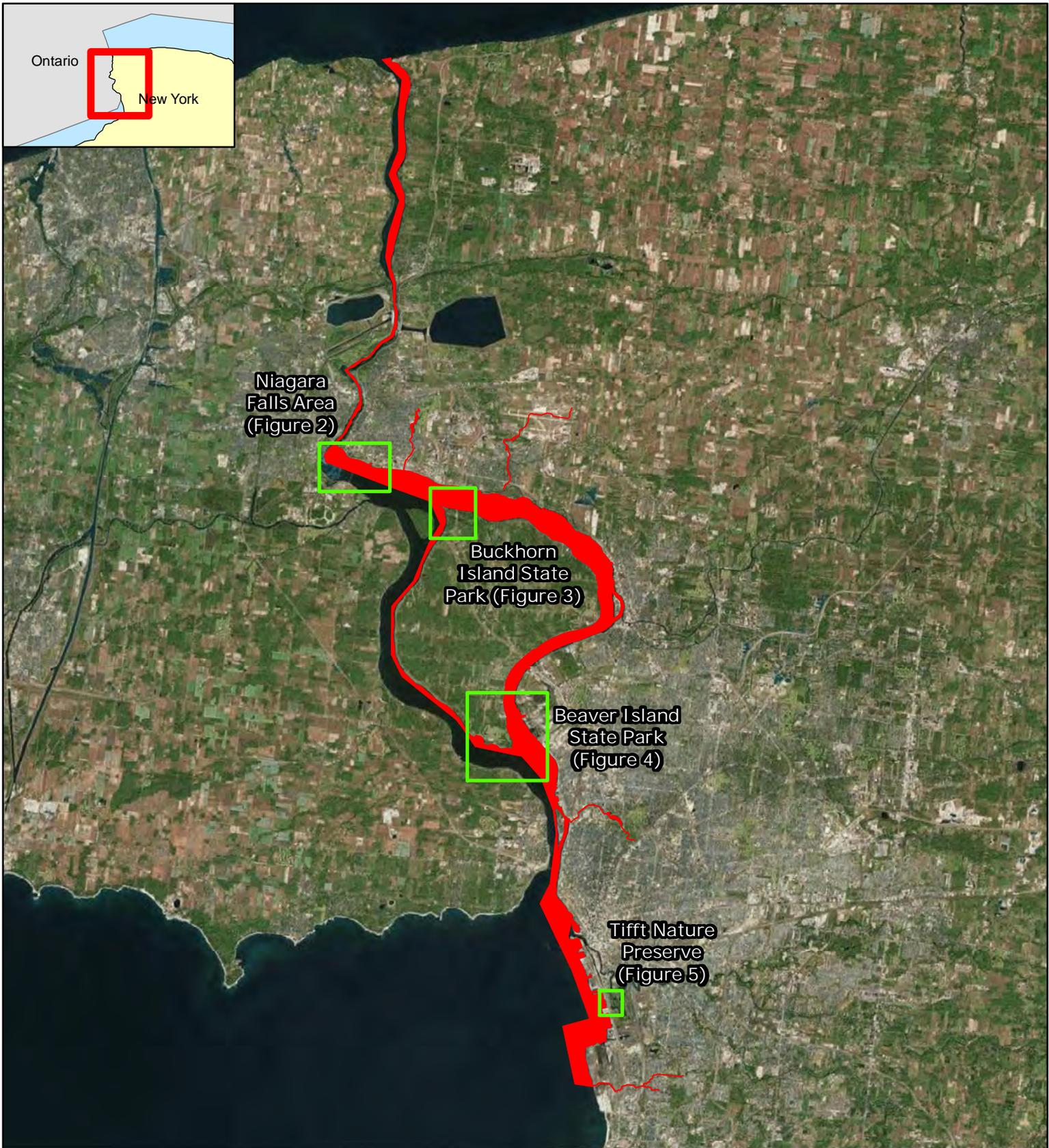
The New York State Department of Environmental Conservation (NYSDEC) is currently funded by the U.S. Environmental Protection Agency (USEPA) to coordinate the Niagara River RAP. Because the Niagara River AOC is a binational AOC, the NYSDEC is coordinating technical assessments and regulatory efforts 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 2012, the U.S. Fish and Wildlife Service (USFWS) New York Field Office (NYFO) was contacted by the USEPA Great Lakes National Program Office (GLNPO) to conduct assessments to evaluate trends of nesting success and productivity of NR AOC herons and Osprey in order to support a determination of the status of the "Degradation of Fish and Wildlife Populations" BUI. These species are identified as sentinel native species and represent the top of the aquatic 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 Heron and Osprey Nesting Success and Productivity Monitoring (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 monitoring nesting success and productivity of Osprey (*Pandion haliaetus*) and heron species of particular interest and known to occur in the NR AOC [e.g., Great Egret (*Ardea alba*), Great Blue Heron (*Ardea herodias*) and Black-crowned Night-heron (*Nycticorax nycticorax*)].

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. Final versions of annual heron and Osprey nesting success and productivity monitoring reports should be reviewed prior to conducting future survey activities.

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

- Study Area
- Potential Heron and Osprey Nesting Areas

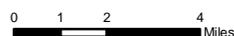


Figure 1. Site Location -
 Heron/Osprey Nest
 Monitoring Surveys
 Niagara River Area Of Concern
 Heron and Osprey Monitoring
 Niagara and Erie Counties, NY

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

Prepared By:



2.0 SURVEY INFORMATION SOURCES

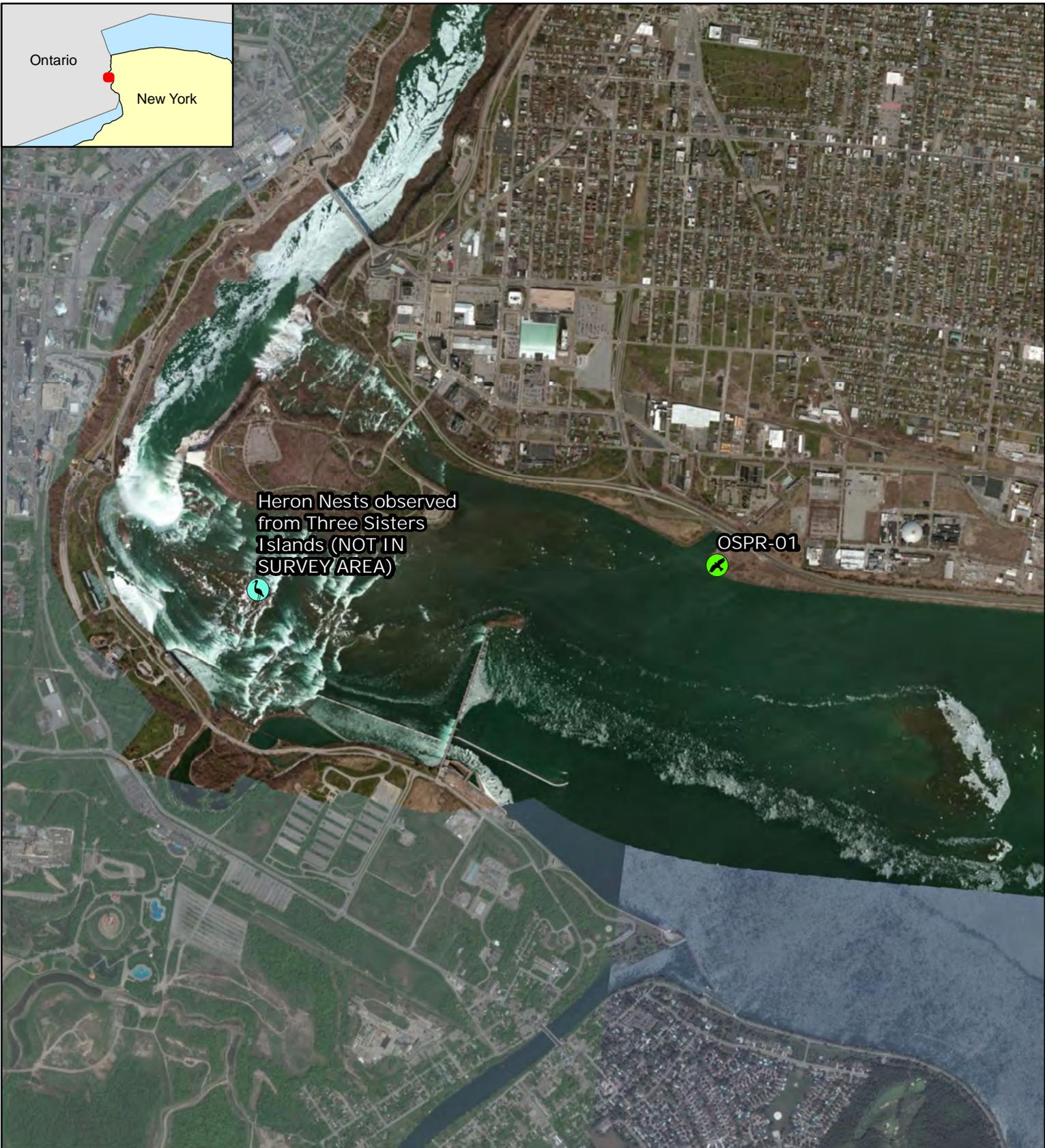
Per NYFO recommendations, the field survey protocol presented herein is based primarily upon methods presented in the *Survey Protocol for Measurement of Nesting Productivity at Pacific Great Blue Heron Nesting Colonies* by Vennesland and Norman (2006), and *Assessing Nesting Success and Productivity in Raptors* by Steenhof and Newton (2007). The referenced protocols were adapted based on information from several sources and studies (including Moul et al. 2001, Vennesland 2000, Vennesland and Butler 2004) which outline methods for measuring nesting success and productivity in raptors and evaluate the advantages and disadvantages to various field techniques, as well as input from USFWS and NYSDEC staff familiar with activities of the target species within the NR AOC project area. In addition, life history information for Osprey, heron, and (due to the potential threat from this species to heron rookery nesting success) Double-crested Cormorant (*Phalacrocorax auritus*), were reviewed to facilitate survey planning and implementation (Hatch and Weseloh 1999, Hothem, et al. 2010, Mccrimmon et al. 2011, Poole et al. 2002, and Vennesland and Butler 2011).

3.0 METHODS

All field surveys must be closely coordinated with the appropriate primary points of contact (POC's) at the USFWS and NYSDEC identified in Appendix A prior to initiating any work. Biologists conducting surveys must be approved by USFWS and NYSDEC, and at a minimum must have experience in the breeding/nesting ecology of Osprey, Great Egret, Great Blue Heron, Black-crowned Night-heron, and Double-crested Cormorant, and the identification of adults, young, and their nests. For safety purposes, two biologists should attend all field surveys. Relevant literature on Osprey, heron, and cormorant behavior, life history, and nesting success and productivity survey methods must be reviewed prior to the initiation of survey work (see Survey Information Sources and Literature Cited sections of this Work Plan). In addition, Appendix C includes useful summaries of the reproduction and nesting activities of the target heron species.

3.1 IDENTIFICATION OF HERON AND OSPREY NEST/COLONY LOCATIONS

Existing heron and Osprey colony/nest locations in the New York portion of the NR AOC have been located through many sources, including field survey efforts, NYSDEC staff, landowners, naturalist groups, government agencies, and academic institutions. Based on the most recent information available (as of July 2014), 12 potential Osprey nest locations and three potential heron rookeries exist within the U.S. side of the NR AOC (Figures 2-5).



Heron Nests observed from Three Sisters Islands (NOT IN SURVEY AREA)

OSPR-01

Legend

-  Potential Osprey Nest Site
-  Potential Heron Nest Site



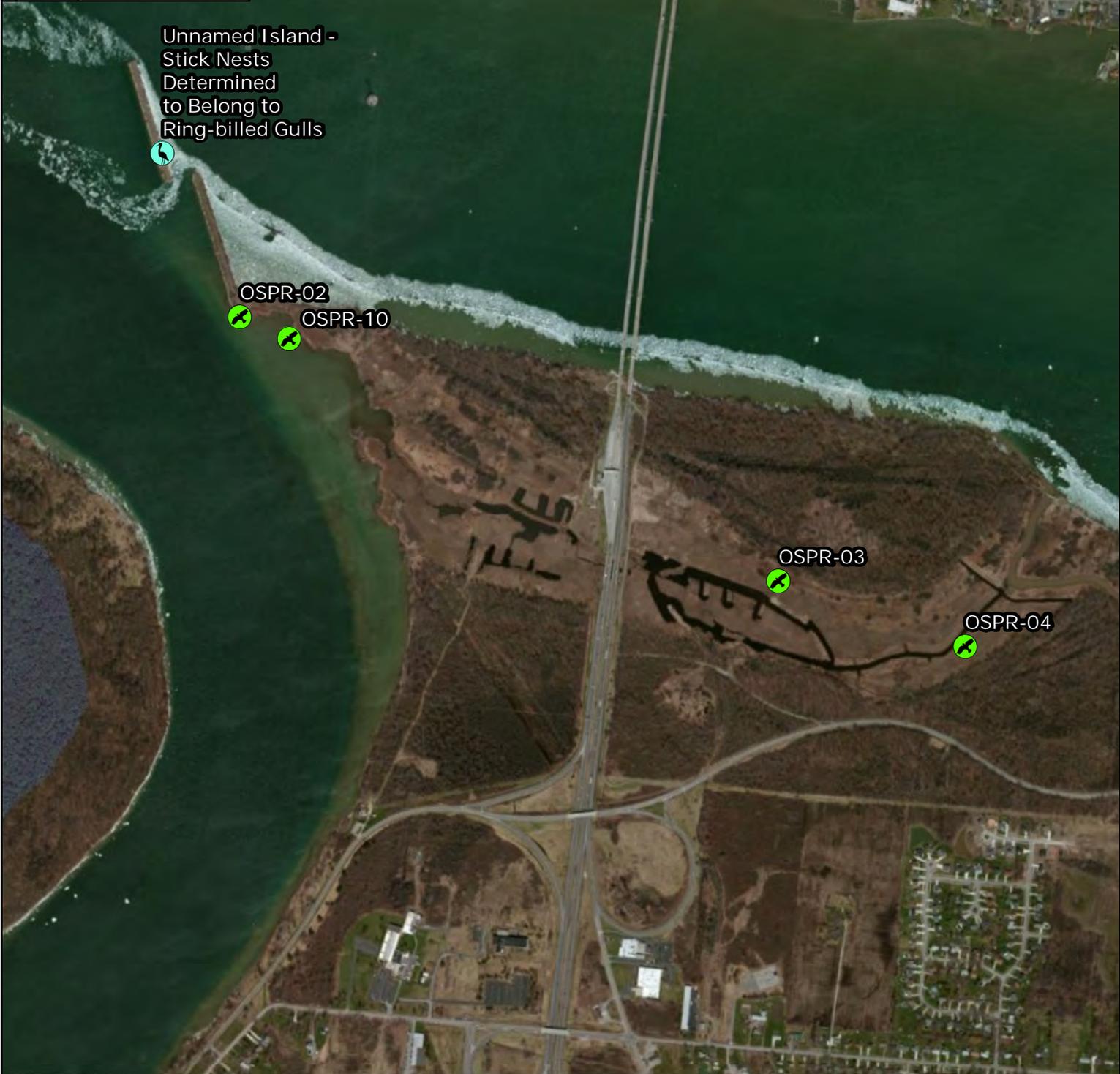
0 0.075 0.15 0.3 Miles

Figure 2. Potential Heron/Osprey Nest Locations Niagara Falls Area

Niagara River Area of Concern Heron and Osprey Survey, Niagara and Erie Counties, NY

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





Legend

-  Potential Osprey Nest Site
-  Potential Heron Nest Site



0 0.05 0.1 0.2 Miles

Figure 3. Potential Heron/Osprey Nest Locations Buckhorn Island State Park

Niagara River Area of Concern Heron and Osprey Survey, Niagara and Erie Counties, NY

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





Legend

-  Potential Osprey Nest Site
-  Potential Heron Nest Site

N

 0 0.0750.15 0.3
 Miles

Figure 4. Potential Heron/Osprey Nest Locations Beaver Island State Park

Niagara River Area of Concern Heron and Osprey Survey, Niagara and Erie Counties, NY

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

Prepared By:





Legend

-  Potential Osprey Nest Site
-  Potential Heron Nest Site



0 0.025 0.05 0.1 Miles

Figure 5. Potential Heron/Osprey Nest Locations Tift Nature Preserve

Niagara River Area of Concern Heron and Osprey Survey, Niagara and Erie Counties, NY

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

Prepared By:



The NYSDEC is currently responsible for monitoring nesting heron and Osprey and their staff maintains information on nesting history at each of these sites. However, while most nest sites within the NR AOC are well documented, existing nests may be destroyed/relocated, new nests might be formed, and previously undocumented suitable nesting locations could be identified. Therefore, prior to conducting any nest productivity surveys, pre-field survey efforts must be performed to confirm the condition of known nests and to identify potential new nest locations. Efforts must be closely coordinated with NYSDEC to glean information from internal agency databases, and additional sources of information should be reviewed/consulted as needed to locate potential locations, including satellite imagery, local bird list-serves, rare bird alerts, and local organizations that focus on avian activity (i.e., eBird, Audubon, Buffalo Ornithological Society, Cornell, etc.). Any new sites should be given a unique site identification number and added to the list of locations for potential future nest monitoring efforts (Tables 1 and 3).

3.1.1 Access to Survey Areas

When nest sites are identified on private property, landowner permissions must be obtained prior to an initial site visit. If access is not granted, observations will be made from publicly accessible property when feasible. For sites identified on local, state or federal government lands or properties owned by non-profit organizations, access approval should be obtained on a yearly basis, prior to initiation for field survey efforts (see Coordination Efforts). If a vehicle needs to be left away from a designated public parking area, a sign will be placed on the vehicle with the contact information for the person and organization responsible for conducting the surveys. A boat will be necessary to access and monitor some of the nest sites (see Appendix D for boat safety information).

3.1.2 Identification of Remote Observation Sites

Observers will avoid entering heron and Osprey nest areas during breeding/nesting activities to minimize disturbance to the birds and instead will use observation sites that offer optimum views, and when possible are at least 100m (328 ft) from the nests. To facilitate heron and egret nest identification efforts, several fixed vantage points were used during rookery monitoring efforts (Figure 4) and when possible should be used in future survey efforts since the locations are tied to a panoramic photo series from 2014. However, these points may be added to or relocated as needed during the survey and in subsequent survey efforts in order to maximize the observer's views of nests. Observation site locations will be documented on field maps of the study area, a global positioning system (GPS) location of each observation site will be collected, and the locations will be labeled and transferred into a geographic information system (GIS) data base and Google Earth™ file (see Mapping section). As leaves emerge, some nests may no longer be visible, and observers will need to adjust their vantage points accordingly. If birds at a nest site are found to be sensitive to disturbance, observations should be restricted to only those sites that do not cause disturbance to birds. Any changes or additions to the observation site locations must be updated in the existing project data bases, GIS, and Google Earth™ files.

3.2 HERON SURVEY PROTOCOL

Per USFWS requirements (USFWS 2014), the 2014-2018 heron survey effort will specifically target three heron species; Great Egret, Great Blue Heron, and Black-crowned Night-heron.

Three locations have been identified for these species and are proposed for observation during the survey effort (Table 1) and shown in Figures 2-5. These locations include a known active rookery (Motor Island), a formerly active rookery (Strawberry Island), and Buckhorn Weir, a manmade weir structure located near Buckhorn Island State Park that may or may not have once been a heron rookery, but is currently occupied by Double-crested Cormorant and ring-billed gulls. Additional locations may be added as they are discovered over the course of the survey effort and as time and the scope of the effort allows. The three sites identified in Table 1 should be revisited at least once at the start of breeding activities. If observers confirm that heron are not present/active at a site, the site may be eliminated from survey efforts for that particular breeding season, but must be revisited annually to assess heron use. All data gathered on heron nests and during completion of this survey will be documented in full on the appropriate data forms provided in Appendix B. All fields on the data sheets must be recorded in full and while at the site. Any field of the data form that is not applicable should be identified as “NA”. Photographs should be collected at each site as needed to document the nest and when possible significant events in the nesting chronology.

While working in the AOC, observers will make note of the trajectory of any high-flying Great Egret, Great Blue Heron, and Black-crowned Night-heron that aren’t flying towards or away from known colonies, especially those that are carrying sticks or food. As time allows, observers should investigate repeated observations of these species in an effort to identify additional nest sites. New sites will be given a unique site identification number and included in Table 1 for potential nest monitoring efforts.

Table 1. Proposed Sites for Heron Nest Monitoring

Site Name	Site ID	Nearest Town	Latitude	Longitude
Buckhorn Weir	H-1	Grand Island	43° 4'3.78"N	79° 0'22.08"W
Motor Island (aka Pirate’s Island)	H-2	Grand Island	42°57'51.24"N	78°56'3.83"W
Strawberry Island	H-3	Grand Island	42°57'18.54"N	78°55'27.38"W

3.2.1 Nesting Productivity Monitoring

Heron colonies should be evaluated for the purpose of nest monitoring at least five times during the breeding season and will be evaluated from remote observation points as discussed in Section 3.1. Table 2 provides the typical nesting chronology for the heron species included in this survey (McGowan and Corwin 2008). The first visit will be conducted after the adults have arrived on site and initiated courtship/breeding activities, but before incubation has initiated. Most Great Egret, Great Blue Heron, and Black-crowned Night-heron will begin incubation in late May or early June (Table 2). The timing of the remaining visits will depend on information gained during each previous site visit and will be scheduled to maximize the probability of determination of nesting success for the most number of nests. Surveys should not take place on, or within two days following July 4th (or the date of firework displays associated with the July 4th holiday), in order to provide time for bird activity to return to normal following the high level of disturbance that is typically associated with this holiday event.

In general, the visits are expected to take place approximately every three weeks during the incubation and nestling periods. Depending on the synchronicity of nests, a sixth visit may be necessary to confirm fledging of any late-starting nests and to confirm activity in any early failures. Colonies will be visited in the afternoon, when herons are most likely to be attending their nests. Preferably, all observations will be made on warm, windless days.

Table 2. Nesting Chronology for Target Heron Species

Species	Egg Dates	Incubation Period	Nestling Period
Great Egret	5/23-6/4	23-26 days	3 weeks (branching), 5-6 weeks fledging
Great Blue Heron	4/15-6/9	25-29 days	60 days
Black-crowned Night-Heron	4/1-7/23	24-26 days	2-3 weeks (branching), 6 weeks (fledging)

Source: McGowan and Corwin, 2008.

Characterizing Nests

For each nest, the observer should make note of the species occupying the nest, even if it is not one of the focal species (e.g. if a nest is being used by Double-crested Cormorants instead of herons, it should be noted on the data form). If a nest is not active, data should still be recorded for the nest. Observers will make note of the status, using the following notation scheme modified from Vennesland and Norman (2006):

- AD Adult Present at Nest, Not Incubating
- IN Incubating/Brooding
- YN Young are visible in the nest
- YB Young are present, but have left nest
- NV Not Visible
- FL Failed Nest
- IA Nest Inactive (Status Unknown)

For nests that contain young, the approximate age of the nestlings will be recorded as follows (1 = 0-2 Weeks; 2 = 2-5 weeks; 3 = 5-8 weeks). Due to the sensitivity of colonies, time spent within the colony will be minimized. At each nest, observers will spend the minimum amount of time necessary to accurately assess the activity at the nest. Nests will only be listed as failed if there is visible evidence (e.g. the nest is knocked over) that the nest is no longer in use.

Ageing Young

An attempt will be made to age nestlings so that future visits can be timed to maximize the likelihood of determining success of each nest. For Great Blue Herons, nestlings 0-2 weeks old are still covered in down. After two weeks, feathering begins to emerge. By five weeks of age, nestlings can stand erect, but primary feathers are still in pins. By six weeks of age, primaries should have grown, but birds may still be flightless. (Vennesland et al. 2011, Baicich and Harrison 1997). In Great Egrets and Black-crowned Night-Herons, the nestling period is slightly more advanced. Feathers start appearing after one week, and by four weeks of age, primaries have grown in (Hothem et al. 2010, Mccrimmon et al. 2011, Baicich and Harrison 1997). Appendix D provides illustrations of Great Blue Heron nestlings for reference.

Determining Nesting Success

Nests will be considered to have been active if herons are seen attending the nest at least once during the breeding season. Nests will be considered to be incubating/brooding if at least one adult is present and sitting on the nest. Because of difficulty in determining nesting success once young leave the nest, young will be considered to have fledged once they are seen on branches near the nest site or reach six weeks of age (Great Blue Heron) or four weeks of age (Great Egret and Black-crowned Night-Heron). Nests will be considered to have failed if incubating/brooding or nestlings are observed, and the nest is never determined to have fledged; or if failure can be determined after the season has ended (e.g. predated/abandoned eggs in the nest). Nests in which adults are observed attending to a nest, but meet neither the “fledged” nor “fail” will be considered to have uncertain status as it cannot be determined whether adults ever laid in the nest or not.

3.2.3 Nest Site Surveys

After the nesting season has ended and all birds have departed, sites deemed to be actively used by any of the target heron species should be entered to collect additional data on the nesting area and to gain a better count of nest sites. When visiting sites all trees and shrub clusters, with or without nests, will be marked with a handheld GPS and entered into Google Earth and ESRI ArcGIS databases. Tracking trees/shrubs without nests will help in the long-term evaluation of rookery site use.

There can be a significant amount of overlap in the height and nest size used by heron and Double-crested Cormorant in a rookery, but generally speaking, heron nests are found in two fairly distinct strata of vegetation, above 20 ft and below 20 ft. Within these strata, in general larger sized nests at a height > 20 feet tend to be occupied by Great Blue Heron, while large nests below 20 ft are typically occupied by Great Egret. Small nests > 20 ft are typically occupied by Double-crested Cormorant and those at a height < 20 ft are typically occupied by Black-crowned Night Heron. In an effort to determine site use by the target heron species, the number of nests in each tree or shrub community will be tallied based on an estimate of the overall height class location of the nest (< 20 ft or > 20 ft) and the relative size of the nest (small versus large), and was recorded on the Heron Nest Site Data Form (Appendix B). Data collection efforts will also

include information relating to the overall size and health of trees, threats to nesting birds, and direct evidence of heron mortality. This will include nests that were monitored, as well as those that were not active or that may have been identified only after full access within the site following nesting activities.

Following the 2014 survey, observers visited the Motor Island rookery site H-1 (Figure 4) to collect detailed nest site information. Revisits to documented sites such as Motor Island should be conducted periodically as needed to update rookery nest site information. Any changes or additions to the rookery site information must be updated in the existing project data bases, GIS, and Google Earth™ files.

3.2.4 Photographic Documentation

Due to the density of nests typical in heron rookeries it is beneficial to collect photographs of the rookery site prior to leaf out conditions in order to facilitate survey planning and annual nest monitoring activities. Photographs should be taken from all observation points that may be used during the active monitoring period and should capture the best views of the nests that will be monitored throughout the season. Multiple observation stations should be used since the visibility of nests will be significantly diminished once vegetation is in leaf out condition. Photographs will be labeled with the site identification number, bearing to the nest site, and as best possible all individual nests should be assigned a reference number so that they may be better tracked during the nesting season. Photographs may need to be taken in panoramic format or photo-stitched in order to capture and track individual nests across the entire site. Copies of the colony photographs with the individual nests numbered should be printed in a format/size such that nest annotations are easily discernible and used for reference during the monitoring effort. Photographs were collected during the 2014 monitoring effort, but may need to be recollected periodically to document site changes and optimize the observer's view of nests. Additional photographs should also be taken from various locations around the rookery site as needed to document activities on the site and general site setting.

3.3 OSPREY SURVEY PROTOCOL

Twelve potential nest locations have been identified for observation during the survey effort (Table 3) and are shown in Figures 2-5. These locations include all known Osprey platforms whether active or not (O1, O-2, O-3, O-4, O-5, O-6, O-7, O-11), natural active or formerly active nest sites away from dedicated platforms (O-10, O-12), and sites where information sources have identified Osprey activity, but nests have yet to be located (O-8, O-9). Additional locations may be added as they are discovered over the course of the survey effort and as time and the scope of the effort allows. Osprey may relocate to different nest sites throughout the breeding season. Therefore, all sites identified in Table 3 will be revisited throughout the breeding season even if no Osprey were documented on the nest site during prior surveys. All data gathered on Osprey nests during completion of this survey will be documented in full on the appropriate data forms provided in Appendix B. All fields on the data sheets must be recorded in full and while at the site. Any field of the data form that is not applicable should be identified as "NA". Photographs should be collected at each site as needed to document the nest and when possible significant events in the nesting chronology.

Table 3. Proposed Sites for Osprey Nest Monitoring

Site Description	Site ID	General Location	Latitude	Longitude
Platform	O-1	Adams Slip, Niagara Falls	43° 4'42.44"N	79° 2'46.77"W
Platform	O-2	Buckhorn State Park West, Grand Island	43° 3'50.99"N	79° 0'11.12"W
Platform	O-3	Buckhorn State Park Central, Grand Island	43° 3'34.50"N	78°59'6.78"W
Platform	O-4	Buckhorn State Park East, Grand Island	43° 3'30.93"N	78°58'44.83"W
Platform	O-5	Beaver Island State Park, Grand Island	42°57'43.34"N	78°57'36.87"W
Platform	O-6	East River Marsh, Grand Island	42°58'0.25"N	78°56'26.76"W
Platform	O-7	Tifft Nature Preserve, Buffalo	42°50'53.68"N	78°51'27.78"W
Unknown (possibly same pair as using # 12)	O-8	Power Plant, Kenmore	Vicinity of 42°58'12.80"N	Vicinity of 78°55'54.57"W
Unknown	O-9	Sewer Plant, Wheatfield	Vicinity of 43° 4'29.68"N	Vicinity of 78°56'19.69"W
Natural (on Transmission Line Tower)	O-10	Buckhorn State Park West-Relocation, Grand Island	43° 3'49.73"N	79° 0'5.24"W
Platform	O-11	Tifft Nature Preserve, Buffalo	42°51'10.99"N	78°51'30.03"W
Natural (on abandoned crane)	O-12	Tonawanda Coke Plant, Kenmore	42°58'39.13"N	78°56'23.62"W

While working in the AOC, observers will take note of the trajectory of any Ospreys seen in the area, especially those that are carrying sticks or food. As time allows, observers should investigate repeated observations of Ospreys observed away from known nesting locations in an effort to identify additional nest sites. New sites will be given a unique site identification number and included in Table 3 for potential future nest monitoring efforts.

3.3.1 Nesting Productivity Monitoring

Osprey nest sites will be visited for the purpose of nest monitoring at least four times during the breeding season and will be evaluated from remote observation points as discussed in Section 3.1. Table 4 provides the typical nesting chronology for Osprey (McGowan and Corwin 2008, Poole et al. 2002). However, the timing of breeding activities can vary somewhat year to year and survey efforts should be adjusted accordingly based on annual conditions. The first visit will be conducted after the adults have arrived on site and initiated courtship/breeding activities, but

before incubation has initiated. The timing of the remaining visits will depend on information gained during each previous site visit and will be scheduled to maximize the probability of determination of nesting success for the most number of nests. Surveys should not take place on, or within two days following July 4th (or the date of firework displays associated with the July 4th holiday), in order to provide time for bird activity to return to normal following the high level of disturbance that is typically associated with this holiday event.

In general, the visits are expected to take place approximately every three weeks during the incubation and nestling periods. The final visit should be timed so that nearly all nesting activity has been completed (nests have either fledged or failed) and to make a final determination of nesting success. Based on Osprey nest monitoring efforts from 2010 through 2012, peak nesting activity for Osprey in the general project area takes place in mid-late April (New York Power Authority 2013). Young, first time, breeding pairs are likely to arrive several weeks after mature pairs and may arrive on site through mid-May (Poole et al. 2002). Nest sites will not be approached during the active breeding/nesting period. Osprey observations are considerably less time and weather dependent compared to herons however, visibility must be good enough to ensure that observers can accurately determine the presence of adults or nestlings in the nest. In the event that the presence of adults/young on the nest cannot be confirmed, the survey will be postponed until another day.

Table 4. Nesting Chronology for Osprey

Species	Egg Dates	Incubation Period	Nestling Period (hatch to fledge)
Osprey	4/21-6/4	35-43 days	50-60 days

Source: McGowan and Corwin, 2008, Poole et al., 2002.

Characterizing Nests

At each nest, the observer will make note of the status, using the following notation scheme modified from Vennesland and Norman (2006):

- AD Adult Present at Nest, Not Incubating
- IN Incubating/Brooding
- YN Young are visible in the nest, or adult is seen carrying food
- NV Not Visible
- FL Failed Nest
- IA Nest Inactive (Status Unknown)

The status of most nests will be determinable shortly after arriving at the observation site. In the event that no adults or young are visible, the observer will wait one hour for adults to return to the nest. If no adults are observed returning to the nest site, the nest will be listed as inactive. Nests will only be listed as failed if there is visible evidence (e.g. the nest is knocked over) that the nest is no longer in use.

Ageing Young

An attempt will be made to age nestlings to better determine timing of future visits and for evaluation of nesting success. For nests that contain young, the approximate age of the nestlings will be recorded as follows (1 = 0-2 Weeks; 2 = 2-5 weeks; 3 = 5-8 weeks). Nestlings 0-2 weeks old are covered in down. At 2 weeks, nestlings will begin to appear feathered. By five weeks old, young should be nearly full grown (Poole et al. 2002).

Determining Nesting Success

Nests will be considered to have been active if Ospreys are seen attending the site at least once during the breeding season. Nests will be considered to be incubating/brooding if at least one adult is observed sitting on the nest. Because of difficulty in determining nesting success once young leave the nest, young will be considered to have fledged once they reach five weeks of age. Nests will be considered to have failed if incubating/brooding or nestlings are observed, and the nest is never determined to have fledged. Nests in which adults are observed attending to a nest, but meet neither the “fledged” nor “fail” will be considered to have uncertain status as it cannot be determined whether adults ever laid eggs in the nest or not.

3.3.2 Nest Mapping

Osprey nest locations were mapped in 2014, however new locations may be identified through subsequent survey events. After the season has ended and all birds have departed their nests, all new nest locations will be marked with a handheld GPS and entered into Google Earth and ESRI ArcGIS databases. This will include nests that were monitored, as well as those that were not active or that may have been identified only after full access within the site following nesting activities. In the event that nest locations are inaccessible, nest trees will be plotted using aerial imagery. Any changes or additions to the Osprey nest location information must be updated in the existing project data bases, GIS, and Google Earth™ files.

3.3.3 Photographic Documentation

Photographs will be taken annually of all known potential Osprey nest sites and any newly discovered sites to facilitate the long-term evaluation of changes in the nest and/or nest site. Photographs will be collected from the observation site location that offers the best view of the nest site and will be labeled with the observation site number, nest site identification number, and bearing to the nest site from the observation point. Additional photographs should also be taken from various locations around the nest site as needed to document nesting activities, as well as the overall nest location and setting.

3.4 COORDINATION EFFORTS

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 surveys (see Appendix A for contact information). Prior to accessing private property, visits must be confirmed with appropriate landowners.

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 surveys during the same survey window.

Notification should also be given to Buckhorn Island and Beaver Island State Parks by contacting the Park Manager, Mr. Andrew Hilman at least one week prior to each survey event (see Appendix A for contact information). 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 POC's at USFWS and NYSDEC. Information provided will include staff, sites visited and survey dates, general weather conditions, status of nests, and any concerns regarding the nest sites/activities or the survey approach and schedule.

3.5 EQUIPMENT

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

3.6 DATA MANAGEMENT

Prior to departing a nest/colony site following a survey, all data forms, maps and the handheld GPS will be reviewed by the biologist that collected the data to ensure all required information has been collected. Upon return to the office, field data will be entered into the USFWS and NYSDEC approved Excel spreadsheet for the project. Quality Assurance/Quality Control (QAQC) measures will be performed on the 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 the primary points of contact at USFWS and NYSEDC (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 will be provided to the POC's at USFWS and NYSDEC within 90-days following the full field survey effort or based on a schedule approved by the USFWS POC. The report will be provided electronically and will include an introduction, methods, results, recommendations, literature cited as well as any relevant figures and maps. The report will include a comparison of the current field season results to previous surveys completed for the study. All electronic files of data collected each year will also be provided and will include report text, Excel spreadsheet of field data, GIS files, data forms, and appropriately labeled GPS points and photographs.

4.0 LITERATURE CITED

- Baicich, P. and C.J.O. Harrison. 1997. A Guide to the Nests, Eggs, and Nestlings of North American Birds. Second Edition. Natural World Academic Press.
- Filipski, M. 2012. Remedial Action Plan Stage 2 Addendum, Niagara River Area of Concern. New York State Department of Environmental Conservation. January 2012.
- Hatch, Jeremy J. and D. V. Weseloh. 1999. Double-crested Cormorant (*Phalacrocorax auritus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/441doi:10.2173/bna.441>
- Hothem, Roger L., Brianne E. Brussee and William E. Davis, Jr. 2010. Black-crowned Night-Heron (*Nycticorax nycticorax*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/074>
- McGowan K. and K. Corwin (Eds.). 2008. The Second Atlas of Breeding Birds in New York State, Cornell University Press, December 2008.
- Mccrimmon, Jr., Donald A., John C. Ogden and G. Thomas Bancroft. 2011. Great Egret (*Ardea alba*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/570>
- Moul, I.E., R.G. Vennesland, M.L. Harris and R.W. Butler. 2001. Standardizing and interpreting nesting records for Great Blue Herons in British Columbia. Canadian Wildlife Service, No.217.
- NewEarth Ecological Consulting (NewEarth). 2015. Beneficial Use Impairment Removal Project, Niagara River Area of Concern, Heron and Osprey Nesting Success and Productivity Surveys; Year 1 Survey Report.
- New York Power Authority (NYPA). 2013. Osprey Nesting Platform Monitoring Report, Niagara Power Project (FERC No. 2216): 2012. Prepared by Gomez and Sullivan/Kleinschmidt Associates. 1/7/2013.
- New York State Department of Environmental Conservation (NYSDEC). 1994. Niagara River Remedial Action Plan. September, 1994. NYSDEC Division of Water, Albany, New York.
- Poole, Alan F., Rob O. Bierregaard and Mark S. Martell. 2002. Osprey (*Pandion haliaetus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/683doi:10.2173/bna.683>

- Steenhof, K. and I. Newton. 2007. Assessing Nesting Success and Productivity, Chapter 11. in Raptor Research and Management Techniques, Bird, D.M, KL. Bildstein, D.R. Barber~ and A. Zimmerman (eds). Hancock House Publishers, Blaine, Washington. <http://raptors.hancockwildlife.org/staticpages/index.php?page=RRi\1T-Book>
- US Fish and Wildlife Service (USFWS). 2014. Statement of Work: Niagara River Area of Concern (NR AOC) Heron and Osprey Nesting Success and Productivity Surveys.
- Vennesland, R.G. 2000. The effects of disturbance from humans and predators on the breeding decisions and productivity of the Great Blue Heron in south-coastal British Columbia. M.Sc. Thesis. Simon Fraser University, BC.
- Vennesland, R.G. and R.W. Butler. 2004. Factors influencing Great Blue Heron nesting productivity on the Pacific coast of Canada from 1998 to 1999. *Waterbirds* 27: 289-296.
- Vennesland, R. and D. Norman. 2006. Survey Protocol for Measurement of Nesting Productivity at Pacific Great Blue Heron Nesting Colonies. Prepared by The Heron Working Group. Available at: <http://www.heronworkinggroup.org/Heron%20Working%20Group%20Great%20Blue%20Heron%20Colony%20Survey%20Protocol%20-%20FINAL%20-%20November%202006.pdf>
- Vennesland, Ross G. and Robert W. Butler. 2011. Great Blue Heron (*Ardea herodias*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/025>

Appendix A
List of Important Contacts

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
Chuck Schweikert		716.693.2971		Charles.Schweikert@erie.gov		contact prior to each survey

Name	Title/Role	Office	Cell	Email	Address	Notes
Online Event Registration						Must complete form 1 week prior to event
Tifft Nature Preserve						
David Spiering	Ecologist	716.896.5200 ext. 202		dspiering@sciencebuff.org	1200 Fuhrmann Blvd., Buffalo, NY 14203	Primary POC for Tifft 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
102nd Street Landfill						
Joseph Branch	Manager			joseph_branch@oxy.com		
Cherry Farm Landfill						
Pending - from Connie at NYDEC						
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
Data Forms and Instructions

NIAGARA RIVER HERON NEST 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.

Start Time: Record the start time at the beginning of each survey. Record in military time (e.g., 0600 = 6 am, 1300 = 1 pm).

End Time: Record the end time at the beginning of each survey. Record in military time (e.g., 0600 = 6 am, 1300 = 1 pm).

Observer(s) (List All): List all observer and recorder names.

Colony: Enter the colony number

Observation Point: Enter the observation point identifier

Wind: Use the Beaufort Wind Scale below and record the average Force rating number.

Temp: Record as Fahrenheit

Cloud Cover: Record as approximate (nearest 10%) cloud cover

Events that may have affected nesting: Describe any known events that may have changed nest chronology or success since the last visit

Comments: Make any other notes about the survey that were not previously addressed

Observation Information

Nest Number: Record the nest number as listed in the photo.

Species: Check the species that is occupying the nest. (BCNH = Black-crowned Night Heron, GBHE = Great Blue Heron, GREG = Great Egret, NONE = No Species Present, OTHER = species not listed, describe in comments)

Status: Check the current status of the nest

Number of Adults: Record the number of adults present at the nest

Number of Young: Record the number of young present at the nest

Age of Young: Record as follows: 1 = 0-2 Weeks; 2 = 2-5 Weeks; 3 = 5-8 weeks

Comments: Record any additional comments about the nest that haven't been addressed.

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.

Appendix C
Great Blue Heron Nestling Illustrations

1-2 WEEKS OF AGE
(Illustration by Donald Gunn)



2-4 WEEKS OF AGE
(Illustration by Donald Gunn)



4-6 WEEKS OF AGE
(Illustration by Donald Gunn)



6-8 WEEKS OF AGE
(Illustration by Donald Gunn)



Reproduction and Nesting Information

BCNH

There is one brood per season, colonial nesting, presumed to be monogamous. At the time of pair formation, the legs of both sexes turn pink. Copulation usually takes place on or near the nest, and begins the first or second day after the pair is formed. The eggs are laid at 2 day intervals, beginning 4-5 days after pair formation. The clutch size is 3-5 eggs. Incubation, which lasts 24-26 days, is carried out by both adults. After 2 weeks, the young leave the nest, although they don't go far. By 3 weeks, they can be found clustered at the tops of trees if they are disturbed. By Week 6-7 they fly well and depart for the feeding grounds.

GBHE

There is one brood per season, colonial nesting, presumed to be monogamous. Great blue herons typically breed from March to May in the northern part of their range. Females lay between 2 and 7 pale blue eggs. Birds living further north tend to have more eggs. Both parents incubate the eggs. The eggs hatch after 25 to 30 days of incubation and fledge after about 2 months.

GREG

There is one brood per season, colonial nesting, presumed to be monogamous. The breeding season begins mid-April. The eggs are a pale greenish blue, and are incubated by both the male and female for about 23 to 26 days. Nestlings are virtually helpless and covered with a layer of long white down feathers and begin to fly at about 42 days after hatching. With a clutch size of only 3-4 eggs, great egrets will lay replacement eggs if any of the first eggs are damaged.

OSPR

There is one brood per season, solitary nesting, presumed to be monogamous. Eggs are laid in April and May. Two to four eggs are laid over a period of several days, each 1 to 2 days apart. Both the male and female incubate the eggs, which hatch after approximately 40 days. Because incubation starts when the first egg is laid, the eggs hatch asynchronously in the order in which they were laid. When osprey chicks hatch, they are covered in white down with brown streaks on the face, back, and wings. This is replaced by charcoal-colored down after approximately 10 days. Feathers begin to replace the down at approximately two weeks. By one month after hatching, chicks have reached 70 to 80% of the adult size. Osprey chicks fledge between 48 and 76 days old.

Sources: Hothem, et al. 2010, Mccrimmon et al. 2011, Poole et al. 2002, and Vennesland and Butler 2011.

Appendix D
Equipment List and Boat Safety Protocol

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.
-