

**FINAL STUDY REPORT
BLACK-CROWNED NIGHT-HERON NESTING SURVEY
RSP 3.31**

CONOWINGO HYDROELECTRIC PROJECT

FERC PROJECT NUMBER 405



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August 2012

EXECUTIVE SUMMARY

Exelon Generation Company, LLC (Exelon) has initiated with the Federal Energy Regulatory Commission (FERC) the process of relicensing the 573-megawatt Conowingo Hydroelectric Project (Conowingo Project). The current license for the Conowingo Project was issued on August 14, 1980 and expires on September 1, 2014. FERC issued the final study plan determination for the Conowingo Project on February 4, 2010, approving the revised study plan with certain modifications. The final study plan determination required Exelon to conduct nesting surveys for black-crowned night-heron.

An initial study report (ISR) was filed on February 22, 2011, containing Exelon's 2010 study findings. An initial study report meeting was held on March 9, 10 and 11, 2011 with resource agencies and interested members of the public. Formal comments on the ISR including requested study plan modifications were filed with FERC on April 27, 2011 by Commission Staff, several resource agencies and interested members of the public. Exelon filed responses to the ISR comments with FERC on May 27, 2011. On June 24, 2011, FERC issued a study plan modification determination order. The order specified what, if any, modifications to the ISRs should be made. For this study, FERC's June 24, 2011 order required no modifications to the original study plan. An updated study report (USR) was filed on January 23, 2012 describing the combined results of the 2010 and 2011 Muddy Run black-crowned night-heron surveys. This final study report is being filed with the Final License Application for the Project.

The black-crowned night-heron, a colonial nesting wading bird, has been documented to have a historical presence as a breeding bird in the Conowingo Project area. Southeast Pennsylvania, particularly the lower Susquehanna River Gorge, is considered an important nesting area for this species. The black-crowned night-heron nesting survey that is the subject of this report was initially requested by the Pennsylvania Game Commission (PGC).

Surveys were conducted according to PGC's protocol prior to leaf out during nesting season in 2010 and 2011 in Pennsylvania and Maryland. Methods included habitat assessment and nesting surveys along the shoreline of Conowingo Pond for nesting herons from boat as well as from point locations on land.

Black-crowned night-herons were not observed in the northernmost extent of the project in Pennsylvania or nesting in the overall project area during surveys. However, herons were observed in the vicinity of the Conowingo Dam tailrace and spillway and on Rowland Island in both 2010 and 2011. Approximately three to six birds were regularly observed foraging below the dam, traveling between Rowland Island and Fisherman's Park and roosting in trees over the water on Rowland Island. Although heron nests were not

observed on Rowland Island during surveys, Rowland Island and the area below Conowingo Dam is considered a potential nesting location for herons in the project area.

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LIST OF ABBREVIATIONS

cfs – cubic feet per second

Exelon – Exelon Generation Company, LLC

ESA - Endangered Species Act

FERC – Federal Energy Regulatory Commission

ILP – Integrated Licensing Process

MDNR - Maryland Department of Natural Resources

MW – Megawatt

NOI – Notice of Intent

PAD – Pre-Application Document

PBAPS – Peach Bottom Atomic Plant Station

PGC - Pennsylvania Game Commission

Project - Conowingo Hydroelectric Project

PSP – Proposed Study Plan

RSP – Revised Study Plan

1 INTRODUCTION

Exelon Generation Company, LLC (Exelon) has initiated with the Federal Energy Regulatory Commission (FERC) the process of relicensing the 573-megawatt (MW) Conowingo Hydroelectric Project (Project). Exelon is applying for license renewal using the FERC's Integrated Licensing Process (ILP). The current license for the Conowingo Project was issued on August 14, 1980 and expires on September 1, 2014.

Exelon filed its Pre-Application Document (PAD) and Notice of Intent (NOI) with FERC on March 12, 2009. On June 11 and 12, 2009, a site visit and two scoping meetings were held at the Project for resource agencies and interested members of the public. Following these meetings, formal study requests were filed with FERC by several resource agencies. Many of these study requests were included in Exelon's Proposed Study Plan (PSP), which was filed on August 24, 2009. On September 22 and 23, 2009, Exelon held a meeting with resource agencies and interested members of the public to discuss the PSP.

Formal comments on the PSP were filed with FERC on November 22, 2009 by Commission staff and several resource agencies. Exelon filed a Revised Study Plan (RSP) for the Project on December 22, 2009. FERC issued the final study plan determination for the Project on February 4, 2010, approving the RSP with certain modifications.

The final study plan determination required Exelon to conduct a black-crowned night-heron nesting survey, which is the subject of this report. Consistent with the RSP and final study plan determination, the objective of this study is to identify locations inhabited by the black-crowned night-heron (also referred to in this report solely as heron) (*Nycticorax nycticorax*), a Pennsylvania state-endangered species by: 1) conducting a review of existing literature, studies, or other data regarding known locations of heron nests and/or breeding activity in the project area; 2) determining the presence/absence of the heron in the project area; 3) verifying existing and new heron nesting locations in the project area; and 4) monitoring heron activity levels in the project area.

An initial study report (ISR) was filed on February 22, 2011, containing Exelon's 2010 study findings. An initial study report meeting was held on March 9, 10 and 11, 2011 with resource agencies and interested members of the public. Formal comments on the ISR including requested study plan modifications were filed with FERC on April 27, 2011 by Commission Staff, several resource agencies and interested members of the public. Exelon filed responses to the ISR comments with FERC on May 27, 2011. On June 24, 2011, FERC issued a study plan modification determination order. The order

specified what, if any, modifications to the ISRs should be made. For this study, FERC's June 24, 2011 order required no modifications to the original study plan. An updated study report (USR) was filed on January 23, 2012 describing the combined results of the 2010 and 2011 Muddy Run black-crowned night-heron surveys. This final study report is being filed with the Final License Application for the Project.

2 BACKGROUND

The black-crowned night-heron is a medium-sized, nocturnal, colonial nesting, wading bird ([Photo 1](#)) generally found in or near waterways such as rivers, marshes, lakes, and ponds (McWilliams and Brauning 2000). They can be identified by their stocky, short-necked appearance, distinctive plumage and unique croaking vocalization (“squawk” or “quawk”). Adults have contrasting black, gray, and white plumage; with black cap and back; gray wings; light to white breast and red eyes (PGC 2009b). Juvenile herons are brown with pale spots above and pale with heavy brown streaking below (Hothem et al 2010). Black-crowned night-herons forage opportunistically and consequently have a diet that is highly varied and may include fish, aquatic insect larvae, crayfish, adult insects, amphibians, and even small birds and mammals (Hothem et al 2010). This species historically nested throughout the state of Pennsylvania, most frequently in the southeastern counties (Lancaster, Dauphin, Cumberland, and York) in the Lower Susquehanna River Valley. These herons, which are migratory, arrive in the southeast in mid-March and early April and nest between mid/late March through late June and early July along lakes, streams, and wooded river islands in a variety of tree species including white pine, river birch, scrub pine, silver maple, boxelder, black willow, slippery elm, cherry, ash, and sycamore (Brauning 1992). Nests are generally shallow cup nests composed of sticks, twigs, grasses, roots or reeds and are found at varied levels of the canopy both in the open or deep in foliage (Hothem et al 2010). Adults take turns incubating clutches of 3 – 5 greenish colored eggs for approximately 24 – 26 days until hatching. Although the black-crowned night-heron is generally nocturnal, they are also known to forage diurnally during the breeding season in order to meet the demands of provisioning their young (Hothem et al. 2011). Young are fledged approximately six or seven weeks after hatching and are at that time able to travel from nesting areas to foraging areas with adults (PGC 2009b).

Overall, the species and the number and size of heron nesting colonies have declined in Pennsylvania (PGC 2009b). Threats to the species are attributed to exposure to contaminants, such as persistent organochlorine pesticides, (Hothem et al 2010), wetland loss (Brauning 1992) (PGC 2009b), human-caused or natural destruction of habitat, and competition with other birds (e.g., great egret) for nesting sites (PGC 2009b).

Water-dependent habitat in the project area that potentially meets the habitat needs of the heron includes wetlands, littoral, and riparian habitat, available among the islands and shoreline of Conowingo Pond ([Figure 2.1-1](#)). Accounts of the species in the project area include foraging birds at the Conowingo Dam tailrace (Brauning 1992), observations of black-crowned night-herons approximately 2 miles north of the Pennsylvania – Maryland border (PGC 2008), documented presence near the project area within the

Peach Bottom Atomic Plant Station (PBAPS) site proper (personal communication with Ron Jansen, PBAPS on July 7, 2011) as part of Wildlife Habitat Council certification (Wildlife Habitat Council 2011), and historic occurrences of heron colonies on Rowland Island and the forested floodplain of Octoraro Creek (MDNR 2006).

Although the black-crowned night-heron is not listed as having federal status under the ESA or Maryland wildlife code, it is listed as State endangered under Game and Wildlife Code in Pennsylvania. The PGC was consulted for environmental review early in the scoping process as well as during the development of study plans for the Project.

Photo 1: An adult heron foraging below Conowingo Dam during daylight hours. (2010) Note the identifiable characteristics (red eyes and black, gray and white plumage).



3 METHODS

3.1 Literature and Existing Data Review

The literature search conducted as part of this study included a review of existing literature, studies, and other data (e.g., agency correspondence) regarding the ecology of the black-crowned night-heron as well as documentation of the known locations of black-crowned night-herons and their nesting areas within the project area. Information gained from this literature review regarding heron ecology and distribution was discussed previously in the introduction to this study report. As noted previously, black-crowned night-herons have been documented within the PBAPS site proper in an on-site pond and stream, as part of Exelon's Wildlife Habitat Council certification (Wildlife Habitat Council 2011). According to Exelon PBAPS staff, from two to four black-crowned night-herons have been present in the pond in recent years (personal communication with Ronald Jansen, PBAPS, on July 7, 2011). However, the PBAPS site is a high security facility that lies outside of the project area, and so was not included in this survey.

References for the literature and data sources reviewed are provided in the References section of this report.

3.2 Survey Area

The Survey Area for this study included the entirety of Conowingo Pond and the tailwater area from Conowingo Dam to approximately 1 mile downstream of the dam ([Figure 3.2-1](#)).

3.3 Field Survey Protocol

Survey methods were developed, as recommended by PGC (November 20, 2009 study request), and following PGC protocol, to meet the overall goal of identifying potential heron nesting locations within the project area. Specifically, PGC recommended:

“Presence or absence of nesting Black-crowned Night-Herons is accomplished by surveying potential nesting habitat for stick nests. Surveys should be conducted from April 20 through May 1 or until leaf out occurs. Visibility of the nests and birds is critical to locating the nesting birds and is extremely difficult after leaf out has occurred. Numerous other birds build stick nests and care should be taken to verify the species using the nest.

The surveys should encompass the trees in, along, or near any stream or wetland. The stick nest survey has been developed to locate the majority of Black-crowned Night-Herons in an area. The consultants working on the project should be alert and make a conscious effort to observe large stick nests that are occupied by Black-crowned Night-Herons or other sensitive species. The nests are found lower to the

ground. In many instances there is limited amount of ground cover under the trees giving the impression of a park like setting.

A brief survey report should be developed and sent to the Pennsylvania Game Commission, Division of Environmental Planning and Habitat Protection, that includes the project description, days and times the surveys were conducted, species heard or seen (herons plus other species), weather conditions, a map of surveyed areas, photographs of the surveyed wetlands, etc.”

Minor departures from the survey protocols initially provided by PGC occurred in both 2010 and 2011. In 2010 the surveys were conducted during the recommended survey period (April 20 – May 1) but “leaf out” was advanced for the time of the year. To ensure survey coverage prior to leaf out in the 2011, a field reconnaissance was conducted on April 6-7, 2011, prior to the survey period indicated by the protocol and agreed to by PGC at the initial study report meeting on March 11, 2011. It should be noted that the PGC survey protocol specifies a relatively short survey time window early in the season to search for nests prior to leaf out whereas nesting activity (e.g., courtship, incubating, brooding) for this species is known to potentially occur in a range of time from late March through July.

3.4 Survey Schedule and Techniques

Field surveys for black-crowned night heron were conducted between April 19 and June 23, 2010 and between April 6 and April 27, 2011. Surveys focused on shoreline, wetland, and island habitat in the project area and were conducted by both boat and land. Boat-based searches were used to determine the species presence and nesting status in the Pennsylvania portion of the Study Area. In 2010, boat-based searches for herons and their nests were conducted along the shoreline and among the islands of Conowingo Pond from Norman Wood Bridge to the Pennsylvania – Maryland state border. In 2011, boat surveys were not possible on Conowingo Pond, due to unsafe boating conditions associated with higher than normal flows on the Susquehanna River and on Conowingo Pond during the prescribed survey period.

All boat-based surveys were conducted by two biologists in addition to the boat operator. Observations were noted in field notebooks that were later transcribed into a daily survey log. GPS was used to orient the boat with respect to survey location. For both boat and land surveys, if herons and/or nests were discovered, they were photographed and documented as to location, composition, condition of nest(s) and activity level of birds present.

Land based surveys were used to determine the species presence in the Maryland portion of the Study Area, with a focus on the Conowingo Dam and tailwater areas. In 2010, surveys from land-based point

locations in the vicinity of the Conowingo Dam tailrace and spillway were used to provide further information regarding the species presence and nesting status in this portion of the project. In 2011, due to high water conditions, land based surveys were used in both the Pennsylvania and Maryland portions of the Survey Area.

There are some minor differences in boat and land survey methodology that should be noted here. Although it is possible to cover approximately the same area by both methodologies, each methodology has advantages and disadvantages relative to each other. Surveys conducted from a boat provide a shoreline view of the entire shoreline of the survey area and allows partial access in between the many outcrops and islands in portions of Conowingo Pond (e.g., islands just south of Norman Wood Bridge). However, access into coves, wetlands, and other ponded areas is limited and views into forest canopy are limited by how close the boat can be safely operated near the shorelines. Land survey methodology provides more in-depth views of coves, wetlands, and ponded areas on the shoreline but coverage of the entire shoreline is limited to areas accessible by foot. For surveying in low light conditions such as dawn/dusk surveys for nocturnal species, it is generally safer to use land-based observation points, particularly in areas with rocky outcrops and submerged boulders, as is the case in the area directly south of Norman Wood Bridge in Conowingo Pond. Thus both methodologies have advantages and disadvantages but can be used in coordination to provide coverage, assuming other environmental conditions to be equal (e.g., safe conditions). It should also be noted that, as stated in Section 2.0 (Background), that black-crowned night-herons are capable of flexing their behavior to forage during daylight hours during the breeding season and in response to changing environmental conditions such as prey availability (Hothem et al. 2010). Therefore, survey coverage in daylight hours as well as dawn/dusk hours is appropriate for this species.

2010 Surveys

Boat based surveys were conducted in the Survey Area on April 19 and April 30, 2010 (see [Table 3.2.1-1](#)). The shoreline of Conowingo Pond was visually scanned with binoculars and spotting scope from a boat, for herons and nests. The boat was operated at slow speeds (5 mph) parallel to the shoreline; as close as water depths would safely allow, while observers scanned all visible levels of shoreline canopy. Data on other species seen and heard from the boat were collected, including data on osprey (Pennsylvania Threatened) and bald eagles (Pennsylvania Threatened). The path of travel for these surveys was from Muddy Creek Boat Launch downstream on the western shoreline ([Photo 2](#)) to the state border and returning upstream along the eastern shoreline ([Photo 3](#)). Mount Johnson Island shoreline was

surveyed in its entirety via a complete circuit of the island. Other islands surveyed included the lower half of Lower Bear, Turkey, Little Chestnut, Big Chestnut, Wolf, Henney, and Sicily ([Photo 4](#)).

In 2010, the Maryland portion of the Survey Area (see [Table 3.2.1-1](#) and [Table 3.2.1-2](#) for Survey Logs) was surveyed using land-based visual surveys using binoculars and spotting scope at observation points set up at Fisherman's Park and the mouth of Octoraro Creek. The Fisherman's Park observation point, located on the west shoreline downstream of the dam, included views of the dam tailrace, the west side of Rowland Island, and portions of the eastern shoreline ([Photo 5](#)). The Octoraro Creek (accessed from Octoraro Creek Park) observation point, located on the east shoreline downstream of the dam, included views of the dam tailrace, the east side of Rowland Island, and portions of the western shoreline ([Photo 6](#)).

2011 Surveys

In 2011, flow conditions on the lower Susquehanna River during the recommended survey period (April 20 to May 1) were abnormally high due to heavy spring rains across the entire drainage. Flow levels were such that Conowingo Pond was determined to be unsafe for boating or conducting boat-based surveys. For this reason, in 2011 all surveys were conducted by land using access points along the pond (see [Figure 3.2-1](#) for locations and [Table 3.2-3](#) for descriptions of observation points).

It must be noted that flow data from the USGS gage at Marietta, showed that flow conditions were as high as approximately 360,000 cubic feet per second (cfs) and as low as 116,000 cfs during the study period. Safe conditions for boat operation on Conowingo Pond were determined to be at any flow below 86,000 cfs, as Conowingo Dam would have limited potential for spilling conditions. Safe flow conditions for boat operation were not reached until approximately May 10, 2011. [Photo 7](#) shows flow conditions below Holtwood Dam on April 21, 2011, and [Photo 8](#) shows flow conditions below Conowingo Dam on April 27, 2011.

In 2011, land-based survey using binoculars and spotting scope covered both Pennsylvania and Maryland portions of the survey area prior to leaf out. Observation points were set up in areas with relatively unrestricted access to shoreline and wetland areas and views along Conowingo Pond (see [Table 3.2-3](#)). Of these points, nine (9) were located in Pennsylvania (see [Photos 9](#) through [16](#)) and five (5) were located in Maryland (see [Photos 17](#) through [19](#)). If herons and/or nests were discovered, they were photographed and documented as to location, composition, condition of nest(s) and activity level of birds present.

Photo 2: Downstream view among the Conowingo Islands in Survey Area in 2010



Photo 3: Upstream view in Pennsylvania portion of the Survey Area in 2010



Photo 4: Downstream view of islands south of Norman Wood Bridge in 2010



Photo 5: View east from Fisherman's Park observation point in 2010



Photo 6: View from an observation point at the mouth of Octoraro Creek in 2010



Photo 7: Flow conditions in the project area below Holtwood Dam on April 21, 2011



Photo 8: Flow conditions in the project area on April 27, 2011 resulted in spill conditions at Conowingo Dam



Photo 9: View below Holtwood Dam in vicinity of Observation Points 1 and 2



Photo 10: View of Lower Bear Island shoreline from Observation Point 3



Photo 11: Wetland associated with Lock 15 canal remnant near Observation Point 3



Photo 12: Downstream view from wetland located near Muddy Creek Boat Launch (Observation Point 4)



Photo 13: A view of Hennery Island and smaller islands from Observation Point 5 at Wissler's Run Park



Photo 14: Upstream view from Observation Point 6 at Susquehannock State Park



Photo 15: Upstream view of Peters Creek at the confluence of the creek and Conowingo Pond (Observation Point 8)



Photo 16: Upstream view of Conowingo Creek from vicinity of Observation Point 10



Photo 17: South end of Rowland Island from Fisherman's Park at dusk



Photo 18: View of Octoraro Creek at confluence with Susquehanna River (below dam) at dawn



Photo 19: Downstream view at dawn of Octoraro Creek at confluence with Susquehanna River (below dam)



4 RESULTS

4.1 Survey Results (Pennsylvania)

No black-crowned night-herons, nests, or other wading bird rookeries were observed in the Survey Area during boat surveys in 2010 or during land surveys in 2011. One unoccupied nest (species undetermined) was identified in 2010 and documented on the east shoreline upstream of Mount Johnson Island. The nest, a large, well-formed, cup shaped stick nest, is located high in the canopy of an ash tree adjacent to a transmission line right-of-way. No birds were present in or near the nest in 2010 or 2011 during black-crowned night-heron nesting surveys or any other surveys associated with the project (e.g. osprey nesting). The nest is not considered to be a heron nest as the size and shape of the nest suggests it may be an abandoned osprey or bald eagle nest.

Other species of special status that were observed to be present in the survey area included ospreys (*Pandion haliaetus*) (Pennsylvania Threatened) and bald eagles (*Haliaeetus leucocephalus*) (Pennsylvania Threatened). Other non-listed species of birds observed frequently during the surveys included turkey vultures (*Cathartes aura*), black vultures (*Coragyps atratus*), double-crested cormorants (*Phalacrocorax auritus*) and great blue herons (*Ardea herodias*). Wading birds observed in the area include green heron (*Butorides virescens*), great blue heron, and spotted sandpiper (*Actitis macularia*). [Table 4.1-1](#) provides a list of other avian species seen or heard during surveys in 2010 and 2011.

4.2 Survey Results (Maryland)

Black-crowned night-herons were observed below Conowingo Dam in both survey years from the observation point established at the south end of Fisherman's Park. Multiple sightings occurred in time ranges from just before dawn to mid-morning when herons were observed flying between the western shore and the south end of Rowland Island ([Photo 20](#)) as well as along the channel toward the dam (see [Figure 4.1-1](#)). An adult in characteristic breeding plumage was observed hunting along the rocky shoreline ([Photo 21](#)) and later roosting in a tree over the water. In 2010, six occurrences were counted and numerous vocalizations of the heron's characteristic guttural "quawk" were heard. In 2011, a maximum of five birds were observed on the south end of Rowland Island in the same location as 2010. Other sightings consisted of individual herons foraging on the rocky shoreline at Fisherman's Park across from Rowland Island ([Photo 22](#)) and at a regular location on the shoreline just below the dam ([Photo 23](#)). No nests or nesting behavior (e.g., flying with sticks) were observed during reconnaissance and surveys at this location in either year. Other species of concern observed frequently in the area included osprey and bald eagle. Other non-listed species frequently observed were double-crested cormorant and great blue heron.

At the Octoraro Creek observation point, near the mouth of Octoraro Creek, no black-crowned night-herons or nests were observed in either survey year. On the eastern side of the dam, great blue herons were observed flying with sticks over Rowland Island to their rookery (located less than ½ mile upstream) during the 2011 survey. Other species observed included bald eagle, belted kingfisher (*Ceryle alcyon*), yellow-billed cuckoo (*Coccyzus americanus*), and willow flycatcher (*Empidonax traillii*). [Table 4.1-1](#) provides a list of other avian species seen or heard during surveys. Black-crowned night-herons were not present at any other observation points in Maryland during survey (Observation Points 10, 11, 12).

Photo 20: The southern end of Rowland Island, where black-crowned night-herons were observed in both the 2010 and 2011 survey years. Photo was taken April 27, 2011 before full leaf out.



Photo 21: Black-crowned night-heron foraging at Fisherman's Park below Conowingo Dam during sunrise (2010)



Photo 22: A two-year old black-crowned night-heron foraging at Fisherman's Park below Conowingo Dam during late morning (2011)



Photo 23: Adult black-crowned night-heron in a regular foraging area below Conowingo Dam



5 CONCLUSIONS

Habitat is present in the Pennsylvania portion of the project area that is generally consistent with the habitat preferences of the black-crowned night-heron (e.g. forested islands, wetlands). However, no black-crowned night herons nests were observed during surveys conducted in 2010 and 2011 during the survey period.

A few black-crowned night-herons were observed in the Maryland portion of the project area in 2010 and 2011, although no black-crowned night heron nests were found and nesting activity was not confirmed. The primary location within the project area where occurrences were observed lies below the Conowingo Dam in the spillway and tailrace and on the south end of Rowland Island where this species has been historically documented to forage and nest. Due to the presence of herons in the breeding season in this area, there is potential for this species to breed and nest in the area.

6 REFERENCES

- Blom, R. 1999. Conowingo Dam Annotated Checklist. Last update August 12, 1999. URL: <http://www.harfordbirdclub.org/conolist.html>
- Brauning, D.W. 1992. Atlas of Breeding Birds in Pennsylvania. Pittsburgh: University of Pittsburgh Press.
- Cohen, M. 2004. Phase I Conservation Plan. Pennsylvania Important Bird Area #57 – Lower Susquehanna River Gorge. May 2004. 11p. URL: <http://pa.audubon.org/Sites/Site57.pdf>.
- Conowingo Hydroelectric Project on the Susquehanna River, FERC No. 405. June 5, 2008.
- 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/074doi:10.2173/bna.74>
- Maryland Department of Natural Resources (MDNR). 2006. Letter to URS Corporation, RE: Environmental Review for Lower Susquehanna River Basin Site, Associated with Relicensing of Conowingo Dam Facility, Harford and Cecil County, Maryland. July 21, 2006.
- McConaughy, M.A., 1997. Central Pennsylvania Birdline. State Museum of Pennsylvania and Patriot-News. May 1, 1997. URL: <http://listserv.arizona.edu/cgi-bin/wa?A2=ind9705a&L=birdeast&P=67>.
- McWilliams, G.M. and D.W. Brauning. 2000. The Birds of Pennsylvania. Ithaca: Cornell University Press. 479 pp.
- Pennsylvania Game Commission (PGC). 2009a. Letter to FERC, RE: Conowingo Hydroelectric Dam, FERC Project No. 405-087 Comments on: Exelon's filing of Proposed Study Plan. November 20, 2009.
- PGC. 2009b. Black-crowned night-heron. URL: <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=621014&mode=2>
- PGC, 2008. Letter to Exelon, RE: Federal Energy Regulatory Commission Re-licensing of the
- Wildlife Habitat Council. 2011. Registry of Certified Programs. URL: <http://www.wildlifehc.org/registry/exelon-corporation-5/>

TABLE 3.2.1-1: 2010 SURVEY LOG

Date	Survey Area	Time	Personnel	Weather Conditions	Equipment	Leaf Conditions¹	Type of Survey	BCNH Present? (Y or N)	BCNH Nests? (Y or N)
4/19/10	A	7:30 am to 12:00 pm	Sharon Farris, Katherine Eberhart, Byran Strawn, Jason Rager	44-66 °F; mostly sunny; wind NNW 8-14 mph	Spotting scope; binoculars	Leaf out moderate; advanced for the time of year	Boat-based Nest Survey	N	N
4/30/10	A	7:30 am to 1:58 pm	Sharon Farris, Katherine Eberhart, Bryan Strawn	Average 73°F; sunny; windy SW 2-8 mph	Spotting scope; binoculars	Leaf out advanced	Boat-based Nest Survey	N	N
6/18/10	B	5:30 am to 10:30 am	Sharon Farris	Average 70°F; sunny ; wind NE 2-6 mph	Spotting scope; binoculars	Leaf out advanced	Land-based Nest and Presence/Absence Survey	Y, six occurrences of adults flying back and forth between Rowland Island and Fisherman's Park. Since only three were visible at the same time the count ranges from three to six adults	N
6/23/10	B	5:30 am to 6:45 am	Sharon Farris	68°F, clear; wind W 4-15 mph	Binoculars	Leaf out advanced	Supplemental	Y, three adults and one juvenile foraging on west shoreline at Fisherman's Park	N

¹ Leaf out conditions are included since observer ability to see nests is reduced under heavy foliage conditions. Leaf out occurred early in 2010 relative to other years.

TABLE 3.2.1-2: 2011 SURVEY LOG

Date	Survey Area	Time	Personnel	Weather Conditions	Equipment	Leaf Conditions¹	Type of Survey	BCNH Present? (Y or N)	BCNH Nests? (Y or N)
4/6/11 & 4/7/11	A, B	6:13 pm - 8:09 pm & 6:00 am - 2:00 pm	Sharon Farris, Cheryl Marks	clear; 47° F average, winds 6-10 mph NE	binoculars, spotting scope	Prior to leaf out	Land-based reconnaissance survey	Y, five adults on Rowland Island	N
4/21/11	A, B	6:30 am - 1:00 pm	Sharon Farris, Cheryl Marks	clear; 52° F average; winds 15 to 30 mph	binoculars, spotting scope	Buds on trees; young leaflets present on some tree species	Land-based survey	Y, three adults on Rowland Island	N
4/27/11	A, B	6:30 - 1:00 pm	Sharon Farris, Jason Rager, Bryan Strawn	clear, 50° F average, winds 10 -25 mph S	binoculars, spotting scope	Buds on trees; young leaflets present on some tree species	Land-based survey	Y, two adults on Rowland Island	N

¹ Leaf out conditions are included since observer ability to see nests is reduced under heavy foliage conditions.

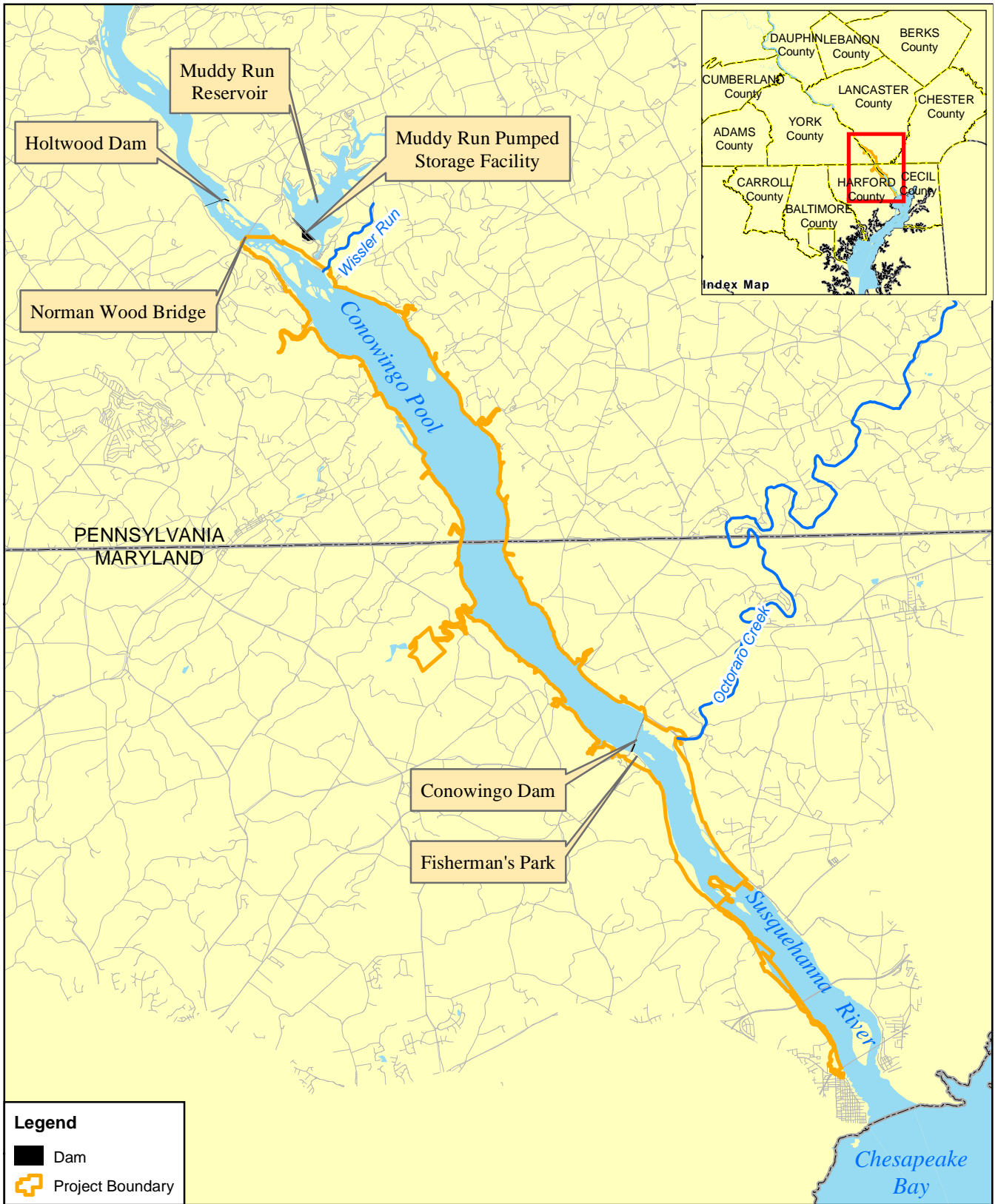
TABLE 3.2-3: OBSERVATION POINT LOCATIONS

Obs Pt	Observation Point Name:	Habitat:	Area:	BCNH Activity? (Y or N)	BCNH Nests? (Y or N)
1	McCall's Ferry Road	Riverine shoreline, rocky outcrops	Shoreline between Holtwood Dam and Norman Wood Bridge	N	N
2	Lock 12	Riverine shoreline, rocky outcrops	Shoreline under Norman Wood Bridge	N	N
3	Lock 15	Riverine, islands, lock remnant	Shoreline visible from Lock 15 including portions of the southwest side of Upper Bear Island, west side of Lower Bear Island and lock remnant (wetland)	N	N
4	Muddy Creek Boat Launch	Riverine, islands, wetland	Shoreline visible from the launch including west shoreline, south end of Lower Bear Island, west side of islands (Little Chestnut, Big Chestnut, Hennery, Sicily), wetland on west shoreline of Conowingo Pond	N	N
5	Wissler's Run	Riverine islands, shoreline	Shoreline visible from Wissler's Run including Turkey Island and adjacent unnamed island (southeast side), portions of west shoreline, east shoreline, tributary, portions of islands (Big Chestnut, Little Chestnut, Wolf, Lower Bear)	N	N
6	Susquehannock State Park	Islands (indicated in Area description)	Shoreline of east side of islands (Big Chestnut, Little Chestnut, Hennery, Wolf, Sicily)	N	N
7	Fishing Creek	Stream (Fishing Creek)	Creek mouth and portions of east shoreline	N	N
8	Peach Bottom/Peters Creek	Creek mouth, wetland near boat launch	Creek mouth and portions of east shoreline	N	N
9	Cold Cabin Road	Riverine	Shoreline of Conowingo Pond	N	N
10	Broad Creek	Riverine	Broad Creek in proximity to confluence of Broad Creek and Conowingo Pond	N	N
11	Conowingo Creek	Tributary (Conowingo Creek), fringe wetland	Confluence of Conowingo Creek and Conowingo Pond, upstream on shoreline of Conowingo Creek	N	N
12	Glen Cove	Cove	Confluence of Conowingo Pond with Glen Cove	N	N
13	Fisherman's Park	Riverine shoreline, island (Rowland Island)	Shoreline visible from Fisherman's Park including east shoreline, west side of Rowland Island and upstream/downstream in Susquehanna River	Y	N
14	Octoraro Creek	Riverine shoreline, floodplain (Octoraro Creek), island (Rowland Island)	Shoreline visible from point adjacent to the south side of Octoraro Creek, east side of Rowland Island, downstream and upstream	N	N

TABLE 4.1-1: AVIAN SPECIES SEEN OR HEARD DURING 2010 & 2011 SURVEYS

Common Name	Scientific Name
American crow	<i>Corvus brachyrhynchos</i>
American goldfinch	<i>Spinus tristis</i>
American robin	<i>Turdus migratorius</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Barn swallow	<i>Hirundo rustica</i>
Belted kingfisher	<i>Ceryle alcyon</i>
Black vulture	<i>Coragyps atratus</i>
Black-capped chickadee	<i>Poecile atricapillus</i>
Black-crowned night-heron	<i>Nycticorax Nycticorax</i>
Blue jay	<i>Cyanocitta cristata</i>
Bonaparte's gull	<i>Chroicocephalus philadelphia</i>
Canada goose	<i>Branta canadensis</i>
Caspian tern	<i>Hydroprogne caspia</i>
Common grackle	<i>Quiscalus quiscula</i>
Common Merganser	<i>Mergus merganser</i>
Cooper's hawk	<i>Accipter cooperii</i>
Double-crested cormorant	<i>Phalacrocorax auritus</i>
Downy woodpecker	<i>Picoides pubescens</i>
Eastern bluebird	<i>Sialis sialis</i>
Eastern kingbird	<i>Tyrannus tyrannus</i>
Eastern phoebe	<i>Sayornis phoebe</i>
European starling	<i>Sturnus vulgaris</i>
Gray catbird	<i>Dumetella carolinensis</i>
Great blue heron	<i>Ardea herodias</i>
Green heron	<i>Butorides virescens</i>
Herring gull	<i>Larus argentatus</i>
Indigo bunting	<i>Passerina cyanea</i>
Killdeer	<i>Charadrius vociferus</i>
Mallard	<i>Anas platyrhynchos</i>
Northern cardinal	<i>Cardinalis cardinalis</i>
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>
Osprey	<i>Pandion haliaetus</i>
Palm warbler	<i>Dendroica palmarum</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Red-bellied woodpecker	<i>Melanerpes carolinus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Rock dove	<i>Columba livia</i>
Royal tern	<i>Thalasseus maximus</i>
Snow goose	<i>Chen caerulescens</i>

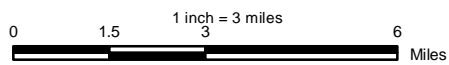
Common Name	Scientific Name
Spotted sandpiper	<i>Actitis macularia</i>
Tern sp.	<i>NA</i>
Tree swallow	<i>Tachycineta bicolor</i>
Tufted titmouse	<i>Baeolophus bicolor</i>
Turkey vulture	<i>Cathartes aura</i>
White-crowned sparrow	<i>Zonotrichia leucophrys</i>
Willow flycatcher	<i>Empidonax traillii</i>
Wood duck	<i>Aix sponsa</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>



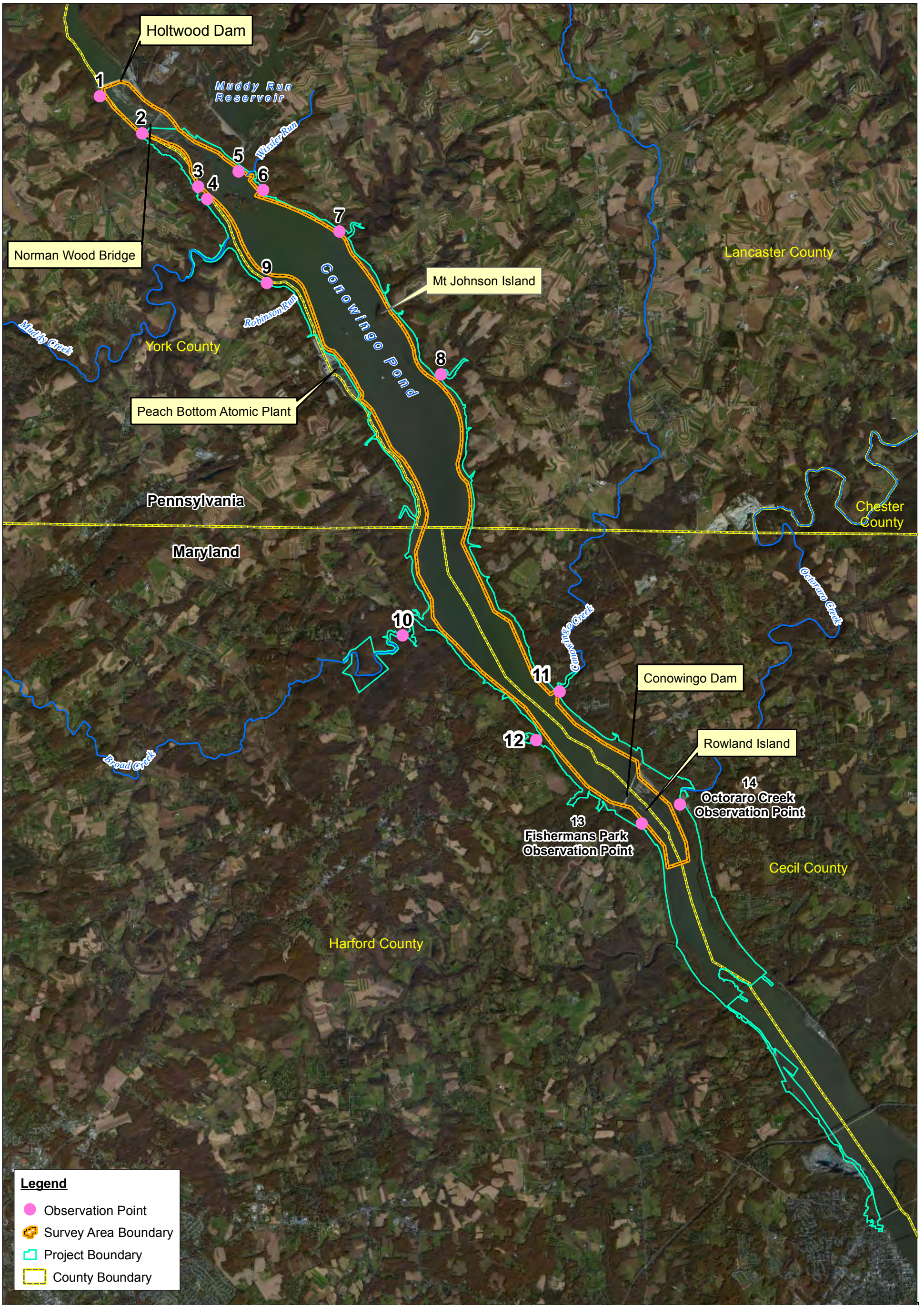
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**Figure 2.11-1:
Location Map**



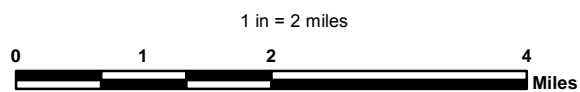
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Legend

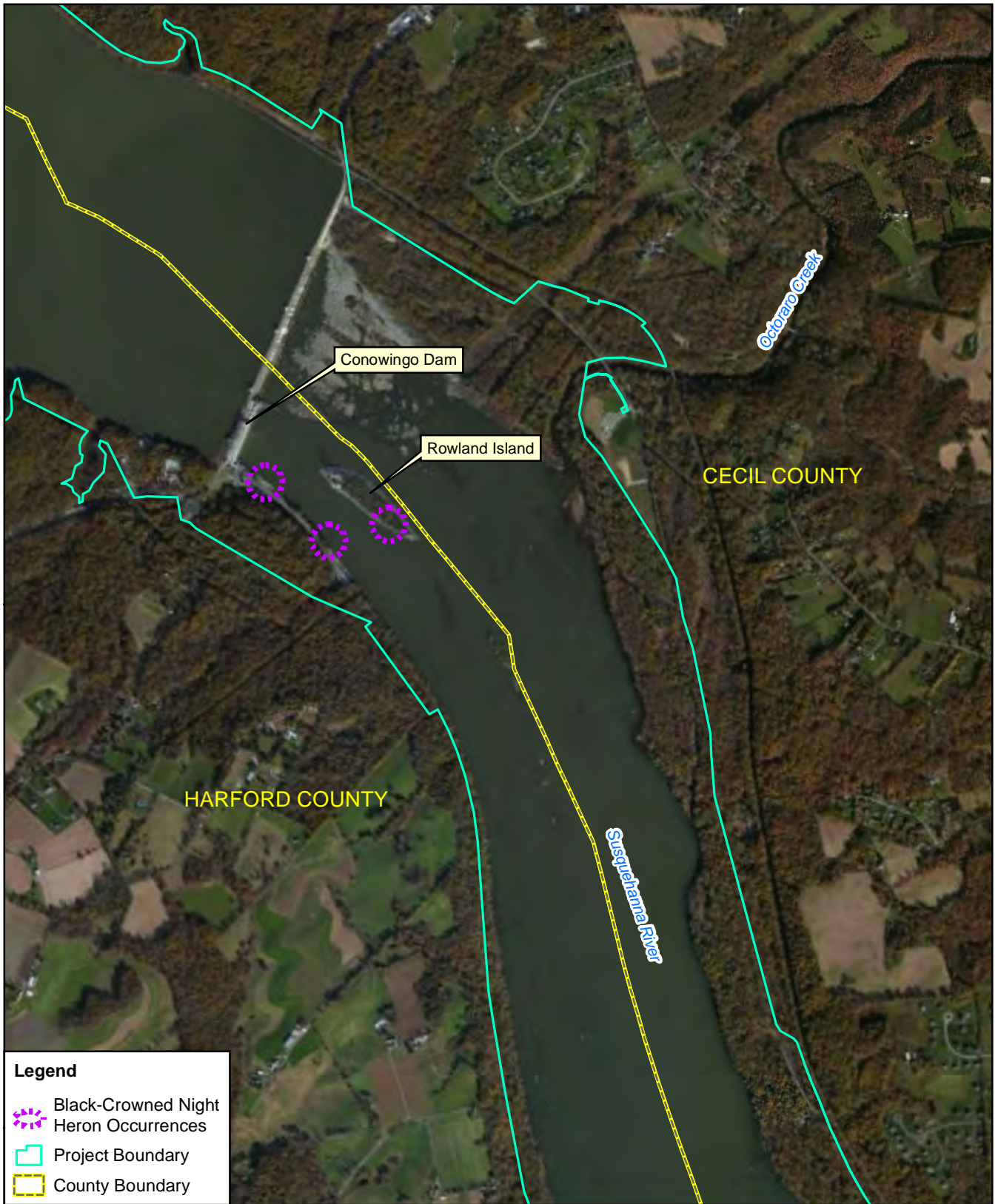
- Observation Point
- ▭ Survey Area Boundary
- ▭ Project Boundary
- ▭ County Boundary

EXELON GENERATION COMPANY, LLC
 BLACK CROWNED NIGHT HERON SURVEY
 CONOWINGO HYDROELECTRIC PROJECT
 PROJECT NO. 405






**Figure 3.2-1
 Survey Area Map**

Source: Imagery provided by Bing Maps™
 Lancaster and York (2008)
 WDC Baltimore 2008
 URS Custom Data



Legend

-  Black-Crowned Night Heron Occurrences
-  Project Boundary
-  County Boundary



EXELON GENERATION COMPANY, LLC
BLACK-CROWNED NIGHT-HERON NESTING SURVEY
CONOWINGO HYDROELECTRIC PROJECT
PROJECT NO. 405

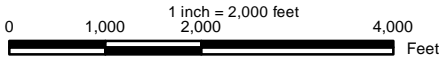


Figure 4.1-1
Black Crowned
Night Heron Occurrences

Source: Imagery provided by Bing Maps™
 WDC_Baltimore

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