

**Petty's Island  
State of the Birds Report:  
2020-2021 Biodiversity Monitoring Results**



**NEW JERSEY  
AUDUBON**  
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## HIGHLIGHTS

- Over 2,500 individuals of 131 species were observed during survey visits between August 2020 and July 2021.
- The cumulative bird list from all survey years (2014-2021) contains 151 species, with eleven species added this year: American Coot, Broad-winged Hawk, Cape May Warbler, Chestnut-sided Warbler, Chipping Sparrow, Horned Lark, Peregrine Falcon, Purple Finch, Savannah Sparrow, Yellow-breasted Chat, and Yellow-throated Vireo.
- A wide variety of migrant warblers and other songbirds continue to use the forested habitats on the island during spring and fall migration. Migratory and resident waterfowl, as well as other waterbird and shorebird species continue to use the Delaware River interior wetland habitats.
- During the 2018-2019 surveys, we observed three state-Endangered species (Bald Eagle, Peregrine Falcon, and Red-shouldered Hawk), three state-Threatened species (American Kestrel, Horned Lark, and Osprey), and sixteen species that are of Special Concern.
- In 2021, we documented a pair of Bald Eagles (state-listed Endangered) nesting on the island for the first time in recent years, with one young successfully fledged.
- Red-shouldered Hawk (state-listed Endangered) also continues to be regularly observed at the site, including sightings during fall 2020, spring 2021, and breeding season 2021 surveys.
- American Kestrels continued to be observed along the north end of the island throughout 2020 and 2021 survey periods, as well as the restored grassland. Although our surveys are not designed to confirm breeding, the presence of individuals throughout the season suggests possible breeding on the island. This species could potentially benefit from the installation of nesting boxes.
- In 2020, two new transects and points were surveyed in the former shipping container storage area that has now been restored to grassland habitat. Notable observations in this area include Wild Turkey, Killdeer throughout 2020 spring migration and early breeding season surveys, American Kestrel late in the breeding season of 2020 and 2021, and a diversity of sparrow species, including Savannah Sparrow along the grassland edge during migration periods. As grassland restoration progresses it is possible that they could be attracted to open habitats on the island, given availability of cavities for nesting.
- Birding checklists for Petty's Island eBird.org continue to increase, facilitated by guided bird walks led by New Jersey Audubon staff. These should be monitored moving forward to provide supplemental information about bird species usage of the site.

## GOALS AND OBJECTIVES

Petty's Island is a 304-acre island in the Delaware River between Camden, New Jersey and Philadelphia, Pennsylvania with a long history of industrial use. In 2009, the property was donated by Citgo to the New Jersey Natural Lands Trust (NJNLT) for the purposes of environmental conservation and education. The gift included a \$3 million fund in support of these goals. A container shipping facility continued to operate on the northern portion of the island until its lease ran out in 2017, after which work began to remove shipping containers and restore areas of asphalt to grassland habitat. New Jersey Audubon (NJA) has partnered with the NJNLT to provide educational programming, stewardship guidance, and wildlife monitoring at the site. Currently, the primary area of focus is the 76 forested acres at the southwestern end of the island. For the purposes of this report, NJA's goal is 1) to collect and evaluate information on wildlife populations on the island and surrounding habitat, 2) use this information to guide future management and aid in designing educational programming, and 3) assess the effects of stewardship activities at the site. NJA commenced regular surveys in the 76-acre woodland at the southern tip of the island in July 2014. In the winter of 2019/2020, we added two new survey points and transects in the former container shipping storage area that has now been restored to grassland. The focus has been on birds, but we also recorded information on any amphibians, reptiles, mammals, or unusual plant species encountered during site visits. July 2021 marked the completion of the seventh full year of year-round baseline monitoring surveys at the site. This report summarizes results of surveys conducted between August 2020 and July 2021; results from previous years are available elsewhere (Allen and Tsipoura 2015, 2016, 2017, Mylecraine and Allen 2019, 2020, Mylecraine 2021).

## INTRODUCTION

New Jersey Audubon (NJA) is a privately supported, not-for profit, statewide membership organization that aims to foster environmental awareness and a conservation ethic among citizens; protect New Jersey's birds and other wildlife, especially endangered and threatened species; and promote the preservation of natural habitats. These objectives are realized through Education and Programming, Research and Wildlife Monitoring, Conservation, Stewardship, and Environmental Advocacy. The New Jersey Natural Lands Trust (NJNLT) is an independent agency created in 1968 and affiliated with the state Department of Environmental Protection. Its primary purpose is the acquisition of open space for environmental conservation and public enjoyment. NJNLT acquired Petty's Island through a donated conservation easement from Citgo in 2009, to be fully restored and transferred to the trust by 2020. Citgo committed \$2 million to NJNLT for stewardship and restoration of the island, and \$1 million for an environmental center near the site. NJNLT has contracted with NJA to provide educational programming, as well as stewardship and wildlife monitoring guidance at the site.

Due to its size, isolation, and location within the Delaware River on the Atlantic Flyway, Petty's Island supports an impressive diversity of birds and other wildlife. Contributing to this is a diverse array of habitats including grasslands, forests, wetlands, several large ponds, and a 140-acre fringe of tidal flats that host migratory shorebirds and several rare plant species (NJNLT 2015). Its location within a large, urbanized landscape increases its value to migrating birds which may have few other options for stopover and refueling sites (Pennington et al. 2008, Seewagen et al. 2010). Bald Eagles nested on Petty's Island in 2021 and continue to use the island for roosting and foraging (McCort et al. 2010, Allen and Tsipoura 2015, 2016, 2017; Mylecraine and Allen 2018).

Petty's urban surroundings and industrial history make its current ecological importance both surprising and encouraging. Its proximity to the large urban centers of Camden, New Jersey and Philadelphia, Pennsylvania also makes this a unique opportunity to connect large numbers of people with nature who may not have otherwise had the chance. In recent years, NJA has led numerous public tours and litter clean-ups on the island, partnered with local community groups, and assessed the site for its restoration potential.

In July 2014, NJA began conducting bird surveys on the site throughout the year within the 76 acres of forest and wetlands at the southwestern end of the island. Other animal and plant sightings were also recorded. Surveys were initiated to obtain baseline data on the existing natural resources at the site, similar to a monitoring program NJA has been conducting at another urban reserve (Linden's Hawk Rise Sanctuary) since 2010 (Munafò and Tsipoura 2011, Allen and Mylecraine 2017) as well as at other urban sites (Mizrahi et al. 2007, Tsipoura and Mylecraine 2010). As NJNLT continues to move forward with the restoration of Petty's Island, robust and repeatable baseline survey data will be valuable for comparisons with post-management data to determine the impact of stewardship activities on wildlife populations. Surveys could also aid in identifying areas in need of additional restoration and will provide guidance for educational and interpretive activities on the site. In 2020, we added two new survey points and transects in the former shipping container storage area that has now been



restored to grassland habitat. Here we present results from the seventh full year of the survey, covering the period August 2020 to July 2021.

## **METHODOLOGY**

### **Bird Survey Methods**

Surveys were conducted using a combination of standardized point count and line transect surveys. Following standardized and scientifically rigorous protocols allows for repeatability of surveys through time and detailed analyses. In addition, all surveys include methods that will allow for future distance analyses, occupancy modeling and/or time removal sampling to account and adjust data for imperfect detectability. Spring migration and breeding season bird surveys were conducted following standard point count methodology (Ralph et al. 1995). During these time periods, birds are vocalizing and are therefore likely to be more detectable on point counts than other time periods. Winter and fall migration surveys were conducted using 200-meter line transect surveys (Buckland et al. 2006). Line transect surveys may be more effective for migration surveys (Wilson et al. 2000), and are particularly useful during fall and winter surveys when birds are less vocal. Detailed survey methodologies for point count and transect surveys are presented below. All surveys were performed by one New Jersey Audubon staff observer (K. Mylecraine).

### **Point and transect locations**

From 2014 through fall migration 2019, surveys were restricted to the 76-acre wooded area at the southwestern end of the island. Spring and breeding season point count locations were established based on standard protocols for avian surveys (Ralph et al. 1995). We initially created a 300 m x 300 m grid of points, rotated to allow a maximum number of points to fall within the 76-acre wooded area. Points were then moved as needed to avoid edges or inaccessible flooded areas while maintaining a spacing of at least 200 m to avoid duplicate counting of individuals (Ralph et al. 1995; Table 1 and Figures 1 and 2). A total of 7 survey points were mapped covering a variety of upland and wetland forested habitats. Fall and winter transects were established based on the existing point count locations where possible. Some transects were then moved slightly to maximize coverage area and avoid flooded areas. A total of six transects were established, each 200 m long (Table 1 and Figures 1 and 2). All initial survey locations have remained in the same locations throughout the study.

Beginning in the winter of 2019-2020, we added two new survey points within the former shipping container storage area that has now been restored to grassland habitat. These points and transects we mapped using the same methodology described above, and are shown in Figure 1b and Figure 2.

### **Survey methodology**

Point count and transect surveys were conducted following standard protocols (Ralph et al. 1995, Buckland 2006). All surveys were conducted between one half hour before sunrise and four hours after sunrise, on days with no precipitation and wind speeds less than 12 mph (Beaufort 3).

During spring migration and breeding season surveys, observers conducted 10-minute point counts at each location, recording all birds heard or seen. We conducted four surveys during spring migration 2021 between 1 April and 15 May, and three surveys during the 2021 breeding season between 16 May and 31 July (see Table 2 for list of survey dates). To account for biases in population measures resulting from imperfect detectability, data collection methods were designed to allow future distance sampling (Buckland et al. 2001) and time-depletion (removal) analyses (Farnsworth et al. 2002). Repeated surveys will also allow the use of occupancy modeling (MacKenzie et al. 2006) in future analyses. Observers recorded all birds heard or seen in ten one-minute intervals, and measured exact distance, when possible, using a laser rangefinder.

Transect surveys were conducted four times during 2020 fall migration between 15 August and 15 November, and four times during winter 2020-2021 between 15 December and 31 March (see Table 2 for list of survey dates). Data collection methods were designed to allow future distance analyses (Buckland et al. 2001, Buckland 2006). Observers walked along the transect line, and recorded exact distance, when possible, and direction to each bird. During both point count and transect surveys, observers also recorded observation type (heard, seen, heard and seen, or over-flight) for each detection, as well as basic weather information (wind speed, temperature, sky condition) and time of day.

## **Data Analysis**

Results presented here are a simple tabulation and summary of observations, but the data collection methods used will also allow more detailed analyses that take into account detection probabilities, such as occupancy modeling (MacKenzie et al. 2006), distance (Buckland et al. 2001) and removal analyses (Farnsworth et al. 2002).

At the site level, we created a list of all bird species observed during 2020-2021 fall migration, winter, spring migration, and breeding season surveys. We calculated species richness, including the total number of species observed, and total number of state Endangered, Threatened, and Special Concern species observed during each season. For each species and season, we also calculated frequency of occurrence by point, total number of individuals observed per point, and relative abundance. Frequency of occurrence by point was calculated as the number of points at which a species was observed divided by the total number of points surveyed. Relative abundance was calculated as the total number of observations of the species of interest divided by the total number of observations for all species combined. The total number of observations represents the sum of all individuals counted at each point/transect, across all surveys and locations. We also tabulated the number of birds observed during each survey, and calculated the maximum number of individuals recorded, across all points/transects, on any one survey.

## RESULTS AND DISCUSSION

### 2020-2021 Bird Survey Results

A total of 131 bird species were observed by New Jersey Audubon research staff at Petty's Island between August 2020 and July 2021. We counted 2,575 individuals of 108 species on point count and transect surveys, and observed an additional 22 species incidentally, outside of official surveys (Tables 2 and 3). Survey data for each season in 2020-2021, by point/transect and survey, are presented in Tables 4-15. Year seven of the survey brings our total 2014-2021 list of bird species to 151, with the following eleven species added this year: American Coot, Broad-winged Hawk, Cape May Warbler, Chestnut-sided Warbler, Chipping Sparrow, Horned Lark, Peregrine Falcon, Purple Finch, Savannah Sparrow, Yellow-breasted Chat, and Yellow-throated Vireo (Table 16). Five of these species (Chestnut-sided Warbler, Chipping Sparrow, Peregrine Falcon, Savannah Sparrow, and Yellow-throated Vireo) were previously reported on the island by McCort et al. (2010), and the remaining species are new records for the site.

Two other sources exist to supplement our knowledge of the island's recent birdlife: a report by Herpetological Associates, Inc. (McCort et al. 2010), and data from a relatively recent 'hotspot' created in eBird.org ('Petty Island') where birdwatchers can submit checklists of species seen (Sullivan et al. 2014). The eBird hotspot contains 33 complete checklists in the period 2014-August 2021, as well as a partial checklist from a reliable source that reported American Bittern on May 2, 2018. While these are not standardized data, the observations are included in Table 16 to fill in gaps, labeled 'e' so they can be easily distinguished from survey data. Twelve species (American Bittern, American Pipit, Bobolink, House Sparrow, Lesser Yellowlegs, Little Blue Heron, Marsh Wren, Northern Harrier, Northern Pintail, Ruddy Duck, White-winged Scoter, and Worm-eating Warbler) have been reported to eBird that have not been recorded during our survey visits. Four of these (Bobolink, House Sparrow, Lesser Yellowlegs, and Ruddy Duck) were reported by McCort et al. (2010), but the remaining species are new records for the site. The Herpetological Associates, Inc. survey encompassed the entire island (and surrounding wetlands/water) and took place over eight full days in March-June 2010. The result was a list of 141 avian species, and included 15 species not found on our list, primarily spring migrants and species typical of non-forested habitats (i.e., the river and the northern two-thirds of the island; see Table 17; McCort et al. 2010). Thus, the grand total of bird species from all three sources (our surveys, eBird, and the 2010 report) from spring 2010 to summer 2021 is 179 species (Tables 16 and 17).

### **State-listed Species**

During the 2020-2021 surveys, we observed three state-Endangered species (Bald Eagle, Peregrine Falcon, and Red-shouldered Hawk), and three state-Threatened species (American Kestrel, Horned Lark, and Osprey; Table 3). We observed sixteen species that are of Special Concern during the breeding season: Black-throated Blue Warbler, Black-throated Green Warbler, Blue-headed Vireo, Broad-winged Hawk, Brown Thrasher, Caspian Tern, Cooper's Hawk, Great Blue Heron, Least Flycatcher, Northern Parula, Sharp-shinned Hawk, Veery, Winter Wren, Wood Thrush, and Yellow-breasted Chat (Table 3). Of these, Great Blue Heron and Spotted Sandpiper have a history of breeding on the island (McCort et al 2010). In previous years we also observed Canada Warbler (SC), Nashville Warbler (SC), Pied-billed Grebe

(Endangered), Semipalmated Sandpiper (Special Concern during non-breeding periods), and Spotted Sandpiper (SC, Table 16). eBird users have also reported American Bittern (Spring 2018) and Northern Harrier (Spring 2019), both listed as endangered during the breeding season and species of special concern during non-breeding period, as well as Bobolink (Threatened during the breeding season and species of special concern during non-breeding periods).

Bald Eagles are considered state-Endangered during the breeding season and Threatened during the non-breeding season. In 2021, we documented the first successful nesting of a Bald Eagle pair on the island in recent years, with one young successfully fledged. Historical records indicate that this species has previously nested on the island (McCort et al. 2010), but in recent years, this species has nested on the New Jersey shore of the Delaware River directly across from Petty's Island. We have encountered Bald Eagles on the island during 19 of the 29 consecutive seasons we have surveyed (Table 16). The relatively low frequency of sightings in some years (Table 16) despite a known nest in the vicinity is likely due to their large home range and the fact that our surveys take place in the forest with few clear views of the river from the transect lines and points. In 2020-2021, we recorded sightings of Bald Eagles during all four seasonal periods, and documented successful breeding. During this time period, Bald Eagles were observed on point/transect surveys during Fall 2020 and Spring 2021, and as incidental encounters during Winter and Breeding Season visits. Nesting was first observed during a survey on March 22, 2021, and one young was successfully fledged.

Peregrine Falcons are listed as state-Endangered during the breeding season and of Special Concern during non-breeding periods. This species was previously observed on the island by McCort et al. (2010), but was not recorded during our survey visits until Spring 2021. A single individual was observed flying over the restored grassland and Delaware River on May 12. This species is known to nest on bridges spanning the Delaware River between NJ and PA, including the Betsy Ross, Walt Whitman, and Burlington-Bristol bridges (Clark and Wurst 2020).

Red-shouldered Hawks are considered state-Endangered during the breeding season and of Special Concern during the non-breeding seasons. We have encountered them on the island during 19 of the 29 consecutive seasons we have surveyed (Table 16), including multiple observations of calling and territorial adults (e.g., chasing a Red-tailed Hawk) and possible begging calls by juveniles (Allen and Tsipoura 2015, 2016). In the current survey period, we observed Red-shouldered Hawks during 2020 fall migration, 2021 spring migration, and 2021 breeding season surveys. One individual was observed flying and circling high over the island on September 15, 2021, one individual was heard calling over the wooded area on May 12, 2021, and over the road on 19 September, 2019 (Table 6), and a single individual was heard calling from the wooded area north of the restored grassland during a point count survey at Pett\_09 on July 21, 2021 (Tables 13 and 14). Though we have not found a nest during the six-year survey period, the territorial behavior observed in previous years, coupled with repeated observations during the summer months is strong evidence of potential breeding on the island or on the nearby mainland where they have also been heard calling (Allen and Tsipoura 2015, 2016). McCort et al. (2010) did not find Red-shouldered Hawk during their 2010 survey, but cited an observation on the island sometime during 2004-2006.

Pied-billed Grebe, an endangered species in New Jersey during the breeding season and of special concern in the non-breeding season, and has been recorded periodically during our seven-year survey. One was recorded in spring 2016 (18 March), though no evidence of nesting was found (Allen and Tsipoura 2016). In 2018, we observed another individual on 8 April, but again did not find evidence of nesting or presence later in the season. However, this and other secretive and/or nocturnal marsh species cannot be ruled out as nesters, especially as the large interior pond complex (e.g., between transects 02 and 03) represents potentially suitable nesting habitat (e.g., see NJDEP habitat description: <http://www.state.nj.us/dep/fgw/ensp/pdf/end-thrtened/pbgrebe.pdf>). During 2020-2021, Pied-billed Grebe was reported by eBird observers on October 4 (NJ Audubon Young Birders field trip) and November 15, 2020 (NJ Audubon field trip).

American Bittern and Northern Harrier are both endangered during the breeding season and special concern during non-breeding periods, and have been recorded by eBird observers, but not on survey visits. Northern Harrier is a species that prefers open habitats such as marshes, grasslands and agricultural fields. As a breeding species in New Jersey, it occupies open marsh habitats, and is more widely distributed during migration (<https://www.nj.gov/dep/fgw/ensp/pdf/end-thrtened/harrier.pdf>). This species was recorded by eBird observers during 2019 spring migration. American Bittern is a secretive species that inhabits emergent marsh habitats (<https://www.nj.gov/dep/fgw/ensp/pdf/end-thrtened/ambittern.pdf>). Because of their secretive nature, American Bittern and other secretive marsh birds may be overlooked during passive point count surveys, and are often surveyed using a playback protocol designed specifically for marsh birds. American Bittern was observed by eBird users during 2018 spring migration.

American Kestrel is a threatened species in New Jersey throughout the year. This species was first recorded as an incidental encounter during the winter of 2016/2017, and the number of sightings have increased through 2020 and 2021. In 2018, a female was observed on the north end of the island on 18 June, perched on the wires along the road. In 2019, one to three individuals were repeatedly observed in the same location – along wires near along the road just after crossing the bridge onto the island – during spring migration, breeding, and early fall migration surveys. We continued to observe individuals in this area during fall 2019 and spring 2020, and breeding season 2020, with three individuals (including one possible juvenile) together. In 2020, we also began to observe American Kestrels using the restored grassland habitat in the former shipping container storage area, including three individuals on 14 July, 2020, and sightings of multiple individuals continued during fall 2020, winter 2020/2021 (north end only), spring migration 2021 (grassland and north end), and breeding season 2021 (grassland and north end). American Kestrels are cavity nesters and prefers large open areas with short vegetation (<https://www.nj.gov/dep/fgw/ensp/pdf/end-thrtened/kestrel.pdf>). Although our surveys are not designed to confirm breeding, the presence of a pair throughout the season suggests possible breeding on site. They were not recorded during McCort's survey (McCort et al. 2010); however, it is possible that they could be attracted to open habitats on the island, particularly areas restored to grassland habitat, given availability of nest boxes or other cavities for nesting.

Osprey is a threatened species in New Jersey during the breeding season, and inhabits coastal and inland rivers and other bodies of water that support adequate fish populations

(<https://www.nj.gov/dep/fgw/ensp/pdf/end-thrtened/osprey.pdf>). This species was previously recorded by McCort et al. (2010), and as incidental encounters during our spring 2015, fall 2017, breeding season and fall migration 2018, and breeding season 2021 surveys along the river. In the current 2020-2021 period, Osprey was recorded by eBird observers during fall 2020, as an incidental encounter during spring 2021 surveys, and was recorded on a breeding season point count survey at Pett\_08 on July 8<sup>th</sup>.

Bobolink and Horned Lark are both state-Threatened species during the breeding season and species of special concern during non-breeding periods. Both species were recorded in 2020/2021 for the first time during the seven-year survey period. Bobolink was reported by eBird observers as a flyover in fall 2020. This species was previously recorded by McCort et al. (2010). Horned Lark had not been previously reported on this island. Eight individuals were observed on a spring 2021 point count survey at Pett\_08.

Of the wide variety of state species of concern recorded during the 2014-2021 surveys, the majority are likely to be transients due to the season they were observed in and the ranges and habitat requirements of the species (Walsh et al. 1999, Boyle 2011). Only three of these special concern species have a history of breeding on the island. Great-blue Heron, a state species of special concern during the breeding season with a history of breeding at the site, was previously sighted in low numbers (one or two) in all four survey seasons in 2015-2016 (Allen and Tsipoura 2016), during fall, winter and spring of 2016-2017, fall, spring and breeding seasons in 2017-2018, fall migration and breeding seasons in 2018-2019 surveys, and fall, winter and breeding seasons in 2019-2020. In 2020-2021, we recorded Great Blue Heron all four survey seasons. Historically, Great Blue Heron was confirmed nesting in trees within the ponds on the site in 2004 (5 nests) and 2010 (2 nests; McCort et al. 2010). We observed no evidence of nesting on the site in 2014-2021 despite active searches. Spotted Sandpiper, another species of special concern during the breeding season, was previous observed foraging at an interior pond during fall migration surveys in 2014, and along the river during spring migration surveys in 2018 and 2019. In none of these instances were we able to confirm breeding status. McCort et al. (2010) confirmed a nest along an access road in the oil tank field. We have also found no direct evidence for nesting by Cooper's Hawks in 2014-2021, despite presumed nesting on the site in 2010 (McCort et al. 2010). During 2020-2021, we observed Cooper's Hawks on fall and winter surveys, and there was an additional eBird report during spring migration. Previously, this species was recorded during winter 2014/ 2015, fall 2015, and spring 2019 surveys, and by an eBird observer during 2017 fall migration. In 2019, we observed a singing male Black-throated Blue Warbler – a Special Concern species with no previous evidence of breeding on site - during the breeding season, on 20 June. Breeding status was not determined, but this was likely an unpaired male.

### **Fall Migration**

During four 2020 fall migration visits, we recorded a total of 685 individual birds of 67 different species on transect surveys (Tables 4 and 5) and observed 19 additional species at the site outside of the surveys (Table 6). Notable observations include a variety of migrant warblers and other songbirds, waterfowl and state-listed raptors, including American Kestrel, Bald Eagle, and Red-shouldered Hawk.

Northern Flicker was observed at the greatest frequency during fall migration, occurring at all eight of the surveyed transects. Four species (American Robin, Carolina Chickadee, Carolina Wren, and White-throated Sparrow) were recorded at 7 of the 8 transects, one species (Red-bellied Woodpecker) was observed at 6 transects, and six species (Bald Eagle, Downy Woodpecker, Gray Catbird, Northern Cardinal, Song Sparrow, and Yellow-rumped Warbler) were recorded at 5 transects (Table 4). The remaining species were recorded at 4 (50%) or fewer transects. The most abundant species recorded was again White-throated Sparrow (196 individuals recorded, accounting for 29% of all individuals counted). Other abundant species included Pine Siskin (61), Green-winged Teal (44), American Robin (33) and Yellow-rumped Warbler (28). Species richness, calculated as the total number of species observed per transect, ranged from 12 at PETT\_T08 in the restored grassland to 27 at PETT\_T02 in the forested area (Table 4, Figure 3).

### **Winter**

During the four winter 2020-2021 visits, we recorded 914 individual birds of 44 different species on transect surveys (Tables 7 and 8). We observed six additional species during site visits between transect surveys (Table 9). Notable sightings included a pair of Bald Eagles confirmed nesting on the island for the first time in recent years, Great Blue Heron and Winter Wren (species of concern during the breeding season), and several species of waterfowl both in the Delaware River and the interior ponds: American Black Duck, Bufflehead, Canada Goose, Common Merganser, Gadwall, Green-winged Teal, Lesser Scaup, Mallard, Ring-necked Duck, and Wood Duck (Tables 7-9).

Canada Goose was observed at the greatest transect frequency, occurring at seven of the eight transects (88% frequency). Four additional species were observed at 6 of the 7 survey transects (Carolina Wren, Northern Cardinal, Red-bellied Woodpecker, and White-throated Sparrow; Table 7); and two species observed at 5 of the 8 survey transects (American Robin and Song Sparrow; Table 7). All other species were recorded at 50% or fewer transects. White-throated Sparrow accounted for the greatest number of individuals observed (308, accounting for 34% of all individuals counted) and was followed by Red-winged Blackbird (248), Ring-billed Gull (104), Canada Goose (38) and Mallard (35; Table 8). The number of species observed per transect (across the four surveys) ranged from three, recorded at PETT\_T07 in the restored grassland area, to 20 species, recorded at PETT\_T01 and PETT\_T02 (Table 7 and Figure 4).

### **Spring Migration**

During four site visits in spring 2021, we recorded 606 individual birds of 71 different species on point count surveys (Tables 10 and 11). We did not survey PETT\_07 during spring migration due to the close proximity to the active Bald Eagle nest. An additional 28 species were observed at the site, but not recorded during point count surveys (Table 12), for a total of 99 species. Notable sightings included eighteen species of warblers, several other neotropical migrants including Wood Thrush, Least Flycatcher and Savannah Sparrow (all Special Concern species during breeding periods), Horned Lark (Threatened during the breeding season, Special Concern during non-breeding periods), and a variety of state-listed raptors including Bald Eagle, American Kestrel, Osprey, and Red-shouldered Hawk (see 'State-listed Species' above).

American Goldfinch and Canada Goose were observed at the greatest point frequency, occurring at all eight of the points surveyed (100% frequency); followed by Red-winged Blackbird and Yellow Warbler, recorded at seven of eight survey points; Baltimore Oriole, Blue-gray Gnatcatcher, Brown-headed Cowbird, Carolina Wren, Gray Catbird, Northern Cardinal, Northern Parula, Tufted Titmouse, and White-throated Sparrow, observed at six of eight transects; and American Robin, Black-and-White Warbler, House Wren, Laughing Gull, Northern Flicker, and Warbling Vireo, recorded at five transects. All other species were recorded at fewer than 50% of points surveyed. The most abundant species recorded were Canada Goose (108 individuals counted), Laughing Gull (79), White-throated Sparrow (42), Yellow Warbler (22), and American Goldfinch (22). The number of species observed per point ranged from 12 at PETT\_09 in the restored grassland area to 32 at PETT\_02 (Table 10 and Figure 5).

### **Breeding Season**

A total of 370 individual birds of 50 species were counted on the three point count survey visits in the summer breeding season in 2021 (Tables 13 and 14). PETT\_07 was not visited during the first three survey visits due to the close proximity to the active Bald Eagle nest. This point was surveyed only once during late July, after the Bald Eagle young fledged. Fourteen additional species were observed at the site, but not recorded on point count surveys (Table 15). Notable sightings included confirmed fledging of one state-Endangered Bald Eagle young, as well as observations of state-listed American Kestrel, Great Blue Heron, Osprey, and Red-shouldered Hawk (as discussed above). Of particular interest were the American Kestrels observed using in the restored grassland habitat of the former shipping container area on July 21st (Table 13 and 14), the Indigo Buntings recorded along the edge of the grassland throughout the season, and Yellow-billed Cuckoo observed in the forested area during two of four breeding season surveys (Table 14). Yellow-billed Cuckoo was also heard during the breeding 2014, 2017, 2018, 2019, and 2020 surveys, and possibly seen carrying nesting material in 2018, and could potentially breed at the site.

American Goldfinch and American Robin were found at the greatest frequency, each occurring at eight of the nine survey points (89%). Canada Goose and Warbling Vireo were recorded at seven of the nine survey points; Cedar Waxwing, Indigo Bunting, and Northern Cardinal at six points; and Baltimore Oriole, Blue-gray Gnatcatcher, Gray Catbird, House Wren, Yellow Warbler, and Yellow-billed Cuckoo at five points (Table 13). The most abundant species recorded were American Robin (34 observations, accounting for 9% of the total individual count), Cedar Waxwing (33), Wood Duck (32), Canada Goose (28), Yellow Warbler (18) and American Goldfinch (18). The number of species observed per point ranged from 2 at PETT\_07 (surveyed only once on July 21<sup>st</sup>) to 32 at PETT\_01 (Table 13 and Figure 6). We did not attempt to confirm breeding status of any species, though we have found direct evidence of breeding by the following species during the survey visits (2014-2021): American Robin, Canada Goose, Gray Catbird, House Finch, Indigo Bunting (seen carrying food in 2021), Northern Cardinal, and Yellow Warbler. In 2018, we also recorded Yellow-billed Cuckoo possibly carrying nesting material.



## **Other wildlife observations**

Throughout the 2014-2021 survey visits, NJA staff kept records of other wildlife species observed on site; however, systematic surveys were not conducted, and this is not a full representation of wildlife using the site. In the current year, we found evidence for five of the six species of mammal that we had previously documented at the site (Allen and Tsipoura 2015, 2016, 2017, Mylecraine and Allen 2019, Mylecraine 2020): Red Fox (*Vulpes Vulpes*), Groundhog (*Marmota monax*), Eastern Gray Squirrel (*Sciurus carolinensis*), Raccoon (*Procyon lotor*; tracks only), and White-tailed Deer (*Odocoileus virginianus*; many sightings). American Beaver (*Castor canadensis*; evidence: chewed trees), has also been documented in previous years. Reptile and amphibian observations in 2020/2021 include: Bullfrog (*Lithobates catesbeiana*), Common Snapping Turtle (*Chelydra serpentina*), Green Frog (*Lithobates clamitans*), Northern Gray Tree Frog (*Hyla versicolor*), Painted Turtle (*Chrysemys picta*), Spring Peeper (*Pseudacris crucifer*), and Eastern Box Turtle (*Terrapene carolina*). Eastern Box Turtle had not been previously observed during our surveys, and was observed on May 4<sup>th</sup>, 2021, along the road at the edge of the restored grassland. This species and Fowler's Toad (recorded in previous years) are listed as state species of special concern. Previous observations also include American Toad (*Anaxyrus americanus*), Fowler's Toad (*Anaxyrus fowleri*), and Redbelly Turtle (*Pseudemys rubriventris*). McCort et al. (2010) surveyed intensively for reptile and amphibian species and present a more inclusive list, although they did not observe Northern Gray Tree Frog or Spring Peeper. The newly-discovered Atlantic Coast Leopard Frog (*Rana kauffeldi*) should be searched for in future visits as Petty's Island is within its currently known range (Feinberg et al. 2014).

Two native plants of note that have been encountered in the interior wetlands of the survey site include Rosy Meadowsweet (*Spirea tomentosa*) and an unidentified species of Lady's Tresses Orchid (*Spiranthes* sp.; Allen and Tsipoura 2015). The orchid was only seen by us in September 2014. Seven flowering individuals of *Spiranthes vernalis* were found growing in a ditch on the northern part of the island by McCort et al. (2010), and this could be the same species.

## CONCLUSIONS

Petty's Island contains multiple habitat types, from extensive forested wetlands to dry grasslands, within its approximately 300-acre boundaries plus an additional 140+ acres of ecologically important tidal mudflats and marshes surrounding it. Its potential importance for connecting the urban population centers of Camden and Philadelphia to nature is also highly significant. This report summarizes the sixth year of standardized bird surveys at the site. As NJNLT and partners move forward with habitat restoration at the site, these data collected over the past seven years, will serve as a valuable baseline and allow us to document changes in species use through time. Continued post-management surveys, performed in a consistent and similarly rigorous manner, will be useful to detect any long-term changes in bird use. Ultimately, the use of analyses that correct for observer biases (e.g., occupancy modeling, distance analysis) will enhance the ability to identify any changes through time.

Our primary survey area, the 76-acre forested southwestern end, contains significant areas of wetlands and is home to a diverse bird community typical of riparian forest and wetlands. During the breeding season, songbirds such as Yellow Warbler and Warbling Vireo are common, while in migration the island is host to an array of warblers and other neotropical migrants, wetland-dependent migrants such as Rusty Blackbird and Northern Waterthrush, and other forest generalists. In 2021, we documented the first successful nesting of a Bald Eagle (state-Endangered) on the island in recent years, with one young fledged. Red-shouldered Hawk (state-Endangered) is regularly recorded on the island, including multiple observations during the nesting season that suggest possible breeding on site or nearby. The Great Blue Heron (a species of special concern) formerly bred at the site and has been observed multiple times during the late spring and summer months. Numerous waterfowl, including Pied-billed Grebe, American Wigeon, Blue-winged Teal, Green-winged Teal, Hooded Merganser, American Black Duck, Wood Duck, and Gadwall, frequent the central ponds during migration, while other, deeper-water species such as Bufflehead, Common Loon, Scaup, and Common Merganser occur along the shorelines. Spotted Sandpipers (a state species of special concern) forage in the mud of the ponds and have bred at the site (McCort et al. 2010). The state of these forested wetlands is remarkable given the location within a large urbanized landscape, and even more so considering that historical aerial photos show the area was heavily disturbed and partially non-existent (a yet-to-be filled area of the river) as recently as the 1930s (Figure 1).

The recovery of the forested area since the 1930s speaks to the great potential for forest and grassland restoration efforts on the remaining two-thirds of the island. With the completion of grassland restoration in the former shipping container storage area, we added two new survey transects and points beginning in the winter of 2019-2020. We have documented a number of species using the open area, including Killdeer – a ground-nesting bird of open habitats – during 2020 spring and breeding season surveys, American Kestrel – a state-Threatened species – during 2020 and 2021 survey periods, a variety of sparrow species, including Savannah Sparrow, along the edge during migration. Continuing surveys in 2022 and beyond will allow NJNLT and partners to document species use as the restoration progresses. While northern areas of the island have not been surveyed during the seven years of the study, we observed numerous species of wildlife using the area while travelling across the island. The state-listed American Kestrel (threatened) has been observed during multiple years on the northern end of the island, and may

possibly be breeding in open areas. Red-tailed Hawks and Red Foxes have also frequently been observed hunting grassy areas. Wild Turkey, Eastern Kingbird, Orchard Oriole, and large mixed flocks of blackbirds were also seen in this habitat, and McCort et al. (2010) even found obligate-grassland species during migration, including Grasshopper Sparrow and Bobolink (Table 17). Overall, we believe there is great potential for ongoing grassland and restoration efforts planned in these areas (NJNLT 2015).

## LITERATURE CITED

- Allen, M. and K. Mylecraine. 2017. Hawk Rise Sanctuary & Linden Landfill State of the Birds Report: 2016 Biodiversity Inventory Results. New Jersey Audubon, Bernardsville, New Jersey.
- Allen, M. and N. Tsipoura. 2015. Biodiversity Inventory of Petty's Island: 2014 - 2015 Survey Results. New Jersey Audubon, Bernardsville, New Jersey.
- Allen, M. and N. Tsipoura. 2016. Biodiversity Inventory of Petty's Island: 2015 - 2016 Survey Results. New Jersey Audubon, Bernardsville, New Jersey.
- Allen, M. and N. Tsipoura. 2017. Biodiversity Inventory of Petty's Island: 2016-2017 Survey Results. New Jersey Audubon, Bernardsville, New Jersey.
- Boyle, W.J. 2011. The Birds of New Jersey: Status and Distribution. Princeton University Press, Princeton, New Jersey.
- Buckland, S. T., D. R. Anderson, K. P. Burnham, J. L. Laake, D. L. Borchers, and L. Thomas. 2001. Introduction to distance sampling: estimating abundance of biological populations. Oxford University Press Inc., New York.
- Buckland, S. T. 2006. Point-transect surveys for songbirds: robust methodologies. *Auk* 123:345-357.
- Clark, K. and B. Wurst. 2020. Peregrine Falcon Research and Management Program in New Jersey, 2020. New Jersey Endangered and Nongame Species Program. [https://www.njfishandwildlife.com/ensp/pdf/pefa20\\_report.pdf](https://www.njfishandwildlife.com/ensp/pdf/pefa20_report.pdf). Accessed October 20, 2021.
- Farnsworth, G. L., K. H. Pollock, J. D. Nichols, T. R. Simons, J. E. Hines, and J. R. Sauer. 2002. A removal model for estimating detection probabilities from point-count surveys. *Auk* 119:414-425.
- Feinberg, J. A., C. Newman, G. J. Watkins-Colwell, M. D. Schlesinger, B. Zarate, B. R. Curry, H. B. Shaffer, and J. Burger. 2014. Cryptic Diversity in Metropolis: Confirmation of a New Leopard Frog Species (Anura: Ranidae) from New York City and Surrounding Atlantic Coast Regions". *PLOS ONE* (Public Library of Science) 9 (10). doi:10.1371/journal.pone.0108213.
- MacKenzie, D. I., J. D. Nichols, J. A. Royle, K. Pollock, L. Bailey, and J. E. Hines. 2006. Occupancy estimation and modeling – Inferring patterns and dynamics of species occurrence. Elsevier, Amsterdam.
- McCort, M. P., T. Gordon, J. Dowdell, and R. T. Zappalorti. 2010. Spring 2010 Plant and Wildlife Inventory on Petty's Island, Pennsauken Township, Camden County, NJ.

- Herpetological Associates, Inc., Jackson, NJ; report submitted to Conserve Wildlife Foundation of New Jersey, Trenton, NJ.
- Mizrahi, D. N., Tsipoura, K., Witkowski, and M. Bisignano 2007. Avian Abundance and Distribution in the New Jersey Meadowlands District: The Importance of Habitat, Landscape and Disturbance. MDOC 2007-026. Report to NJ Meadowlands Commission.
- Munafa, K. and N. Tsipoura. 2011. Biodiversity Inventory, Hawk Rise Sanctuary and Linden Landfill: 2011 Survey Results. New Jersey Audubon, Bernardsville, NJ.
- Mylecraine, K. and M. Allen. 2019. Petty's Island State of the Birds Report: 2017-2018 Biodiversity Monitoring Results. New Jersey Audubon, Bernardsville, NJ.
- Mylecraine, K. and M. Allen. 2020. Petty's Island State of the Birds Report: 2018-2019 Biodiversity Monitoring Results. New Jersey Audubon, Bernardsville, NJ.
- NJNLT [New Jersey Natural Lands Trust]. 2015. Petty's Island Preserve. Online: <http://nj.gov/dep/njnltpettysisland.htm> Accessed: October 2015
- Pennington, D. N., J. Hansel, and R. B Blair. 2008. The conservation value of urban riparian areas for landbirds during spring migration: Land cover, scale and vegetation effects. *Biological Conservation* 141: 1235-1248.
- Ralph, C. J., J. R. Sauer, and S. Droege. 1995. Monitoring bird populations by point counts. U.S. Department of Agriculture, Forest Service General Technical Report PSW-GTR-149.
- Seewagen, C. L., E. J. Slayton, and C. G. Guglielmo. 2010. Passerine migrant stopover duration and spatial behaviour at an urban stopover site. *Acta Oecologica* 36 :484-492.
- Sullivan, B.L., J.L. Aycrigg, J.H. Barry, R.E. Bonney, N. Bruns, et al. 2014. The eBird enterprise: An integrated approach to development and application of citizen science. *Biological Conservation* 169:31-40.
- Tsipoura, N. and K. Mylecraine. 2009. Breeding Bird Abundance and Distribution in the Lower Raritan – 2009. Final Report Submitted to Edison Wetlands Association, 24 May 2010
- Walsh, J., V. Elia, R. Kane, and T. Halliwell. 1999. *Birds of New Jersey*. New Jersey Audubon Society, Bernardsville, NJ.
- Wilson, R. R., D. J. Twedt, and A. B. Elliott. 2000. Comparisons of line transects and point counts for monitoring spring migration in forested wetlands. *Journal of Field Ornithology* 71:345-355.

**TABLE 1.** Survey point (a) and transect (b) coordinates, and number of surveys conducted between August 2020 and July 2021 at the south end of Petty’s Island, Pennsauken, NJ. \*Note: PETT\_07 was not surveyed during spring migration and the first three breeding season surveys in 2021 due to the close proximity to the active Bald Eagle nest. See also Figure 2.

a. Point Count Locations (Spring Migration and Breeding Surveys)

Point ID	Latitude	Longitude	# of Surveys	
			Spring	Breeding
PETT_01	39.96141	-75.10546	4	4
PETT_02	39.96191	-75.10934	4	4
PETT_03	39.96338	-75.11151	4	4
PETT_04	39.96525	-75.11117	4	4
PETT_05	39.96432	-75.11401	4	4
PETT_06	39.96267	-75.11664	4	4
PETT_07	39.96214	-75.11367	0	1
PETT_08	39.96540	-75.10823	4	4
PETT_09	39.96333	-75.10698	4	4

b. Transect Locations (Winter and Fall Migration Surveys)

Transect ID	'A' End		'B' End		# of Surveys	
	Latitude	Longitude	Latitude	Longitude	Fall	Winter
PETT_T01	39.96178	-75.10471	39.96103	-75.10621	4	4
PETT_T02	39.96122	-75.10933	39.96260	-75.10934	4	4
PETT_T03	39.96453	-75.11083	39.96324	-75.11149	4	4
PETT_T04	39.96458	-75.11272	39.96383	-75.11424	4	4
PETT_T05	39.96268	-75.11621	39.96235	-75.11447	4	4
PETT_T06	39.96222	-75.11273	39.96185	-75.11100	4	4
PETT_T07	39.96366	-75.10583	39.96282	-75.10791	4	4
PETT_T08	39.96570	-75.10724	39.96485	-75.10930	4	4

**TABLE 2.** Summary of surveys conducted at Petty’s Island, Pennsauken, NJ, August 2020 through July 2021, including a) a tabulation of winter, spring and fall migration and breeding bird surveys, and b) a list of survey dates. PETT\_07 was not surveyed during spring migration and the first three breeding season surveys due to close proximity to the active Bald Eagle nest.

a.

	<b>Fall 2019</b>	<b>Winter 2019 - 2020</b>	<b>Spring 2020</b>	<b>Breeding 2020</b>	<b>Total 2019-2020</b>
Points/transects surveyed	0/8	0/8	8/0	9/0	9/8
# of survey visits	4	4	4	4	16
Species recorded on point/transect counts	67	44	71	50	108
Total species observed	86	50	99	64	131
T&E species	3	2	5	4	6
Special Concern species	12	3	8	1	15
Total individuals counted	685	914	606	370	2,575

b.

	<b>Fall 2019</b>	<b>Winter 2019- 2020</b>	<b>Spring 2020</b>	<b>Breeding 2020</b>
	9/3/2020	12/23/2020	4/6/2021	5/27/2021
Survey Dates	9/15/2020	1/21/2021	4/20/2021	6/15/2021
	10/6/2020	2/17/2021	5/4/2021	7/8/2021
	10/28/2020	3/22/2021	5/12/2021	7/21/2021

**TABLE 3.** Full list of bird species observed at Petty’s Island, Pennsauken, NJ between August 2020 and July 2021, during winter, spring and fall migration, and breeding season surveys. “Obs” refers to species only observed during travel between survey points/transects. State-listed species are in red (Endangered), blue (Threatened), or green (Special Concern).

	Fall 2020		Winter 2020/2021		Spring 2021		Breeding 2021	
	Survey	Obs	Survey	Obs	Survey	Obs	Survey	Obs
American Black Duck				X				
American Coot						X		
American Crow	X		X		X		X	
American Goldfinch	X		X		X		X	
<b>American Kestrel</b>	<b>X</b>			<b>X</b>	<b>X</b>		<b>X</b>	
American Redstart	X				X			
American Robin	X		X		X		X	
American Woodcock	X							
<b>Bald Eagle<sup>Br, T(NB)</sup></b>	<b>X</b>			<b>X</b>	<b>X</b>			<b>X</b>
Baltimore Oriole	X				X		X	
Barn Swallow					X		X	
Belted Kingfisher	X		X		X			
Black Vulture		X				X		
Black-and-White Warbler	X				X			
Blackburnian Warbler						X		
Blackpoll Warbler					X			X
<b>Black-throated Blue Warbler<sup>Br</sup></b>	<b>X</b>				<b>X</b>			
<b>Black-throated Green Warbler<sup>Br</sup></b>					<b>X</b>			
Blue Jay			X		X		X	
Blue-gray Gnatcatcher	X				X		X	
<b>Blue-headed Vireo<sup>Br</sup></b>		<b>X</b>						
<b>Broad-winged Hawk<sup>Br</sup></b>	<b>X</b>							
Brown Creeper	X		X			X		
<b>Brown Thrasher<sup>Br</sup></b>	<b>X</b>							
Brown-headed Cowbird			X		X		X	
Bufflehead			X					
Canada Goose	X		X		X		X	
Cape May Warbler						X		
Carolina Chickadee	X		X		X		X	
Carolina Wren	X		X		X		X	
<b>Caspian Tern<sup>Br</sup></b>		<b>X</b>						
Cedar Waxwing	X						X	
Chestnut-sided Warbler	X				X			X
Chimney Swift					X		X	
Chipping Sparrow						X		
Common Grackle	X		X		X		X	
Common Merganser				X				
Common Raven			X		X			
Common Yellowthroat	X				X			X
<b>Cooper's Hawk<sup>Br</sup></b>	<b>X</b>		<b>X</b>					
Dark-eyed Junco	X			X		X		
Double-crested Cormorant	X		X		X		X	
Downy Woodpecker	X		X		X		X	
Eastern Kingbird					X		X	
Eastern Phoebe	X							
Eastern Towhee	X					X		
Eastern Wood-Pewee	X							X
European Starling	X		X		X			X
Field Sparrow		X	X		X		X	
Fish Crow			X		X		X	
Forster's Tern		X						



TABLE 3. (cont'd)

	Fall 2020		Winter 2020/2021		Spring 2021		Breeding 2021	
	Survey	Obs	Survey	Obs	Survey	Obs	Survey	Obs
Gadwall				X		X		
Golden-crowned Kinglet	x							
Gray Catbird	x				x		x	
<b>Great Blue Heron<sup>Br</sup></b>		<b>x</b>	<b>x</b>			<b>x</b>	<b>x</b>	
Great Crested Flycatcher	x				x		x	
Great Egret		x					x	
Great Horned Owl	x							
Green Heron		x				x		
Green-winged Teal	x		x			x		
Hairy Woodpecker	x		x		x		x	
Hermit Thrush	x				x			
Herring Gull			x		x			
<b>Horned Lark<sup>Br, SC(NB)</sup></b>					<b>x</b>			
House Finch	x				x		x	
House Wren	x				x		x	
Indigo Bunting		x				x	x	
Killeer		x						
Laughing Gull					x		x	
<b>Least Flycatcher<sup>Br</sup></b>					<b>x</b>			
Least Sandpiper		x						
Lesser Scaup			x					
Magnolia Warbler					x			
Mallard		x	x		x			x
Mourning Dove	x						x	
Northern Cardinal	x		x		x		x	
Northern Flicker	x		x		x			
Northern Mockingbird			x					x
<b>Northern Parula<sup>Br</sup></b>	<b>x</b>				<b>x</b>			
Northern Rough-winged Swallow							x	
Northern Waterthrush	x				x			
Orchard Oriole						x		x
<b>Osprey<sup>Br</sup></b>						<b>x</b>	<b>x</b>	
Ovenbird	x				x			
Palm Warbler	x				x			
<b>Peregrine Falcon<sup>Br, SC(NB)</sup></b>					<b>x</b>			
Pine Siskin	x							
Pine Warbler						x		
Prairie Warbler					x			
Purple Finch						x		
Red-bellied Woodpecker	x		x		x		x	
Red-breasted Nuthatch	x				x			
Red-eyed Vireo	x				x		x	
<b>Red-shouldered Hawk<sup>Br, SC(NB)</sup></b>		<b>x</b>				<b>x</b>	<b>x</b>	
Red-tailed Hawk		x	x			x	x	
Red-winged Blackbird	x		x		x		x	
Ring-billed Gull		x	x			x	x	
Ring-necked Duck			x			x		
Rock Pigeon	x		x			x	x	
Rose-breasted Grosbeak		x			x			
Ruby-crowned Kinglet	x				x			
Ruby-throated Hummingbird					x		x	
Rusty Blackbird						x		
<b>Savannah Sparrow<sup>Br</sup></b>	<b>x</b>				<b>x</b>			
Scarlet Tanager					x			

TABLE 3. (cont'd)

	Fall 2020		Winter 2020/2021		Spring 2021		Breeding 2021	
	Survey	Obs	Survey	Obs	Survey	Obs	Survey	Obs
<b>Sharp-shinned Hawk<sup>Br</sup></b>	x							
Song Sparrow	x		x		x			x
Swainson's Thrush	x						x	
Swamp Sparrow	x		x					
Tennessee Warbler						x		
Tree Swallow			x		x		x	
Tufted Titmouse	x		x		x		x	
Turkey Vulture		x	x			x		x
<b>Veery<sup>Br</sup></b>	x							
Warbling Vireo		x			x		x	
White-breasted Nuthatch	x		x		x		x	
White-throated Sparrow	x		x		x			
Wild Turkey	x		x		x		x	
Willow Flycatcher								x
Wilson's Warbler						x		
<b>Winter Wren<sup>Br</sup></b>	x		x					
Wood Duck	x		x		x		x	
<b>Wood Thrush<sup>Br</sup></b>					x			
Yellow Warbler					x		x	
Yellow-bellied Sapsucker	x							
Yellow-billed Cuckoo							x	
<b>Yellow-breasted Chat<sup>Br</sup></b>						x		
Yellow-rumped Warbler	x		x		x			
Yellow-throated Vireo						x		

<sup>Br</sup> = Breeding status only; <sup>SC(NB)</sup> = Special Concern status in non-breeding season; <sup>T(NB)</sup> = Threatened status in non-breeding season

TABLE 4. Total species list and number of individuals observed during 2020 fall migration transect surveys at Petty’s Island, Pennsauken, NJ, by transect. Frequency (freq.) is the proportion of transects at which a species was observed. Relative abundance is the number of individuals of that species divided by the total number of individuals of all species. State-listed species are in red (E), blue (T), or green (SC).

	# of		Transect ID								Total	Relative Abundance
	Transects	Freq	01	02	03	04	05	06	07	08		
American Crow	1	0.13		2							2	0.003
American Goldfinch	4	0.50	2	4		2				1	9	0.013
<b>American Kestrel</b>	<b>2</b>	<b>0.25</b>							<b>2</b>	<b>1</b>	<b>3</b>	<b>0.004</b>
American Redstart	4	0.50		1	3		1	1			6	0.009
American Robin	7	0.88	4	1	1	1	4	2	20		33	0.048
American Woodcock	2	0.25	1				1				2	0.003
<b>Bald Eagle<sup>Br, T(NB)</sup></b>	<b>5</b>	<b>0.63</b>	<b>1</b>		<b>1</b>	<b>1</b>			<b>1</b>	<b>2</b>	<b>6</b>	<b>0.009</b>
Baltimore Oriole	1	0.13					2				2	0.003
Belted Kingfisher	1	0.13					1				1	0.001
Black-and-White Warbler	4	0.50	1	1	1			1			4	0.006
<b>Black-throated Blue Warbler<sup>Br</sup></b>	<b>2</b>	<b>0.25</b>				<b>1</b>	<b>1</b>				<b>2</b>	<b>0.003</b>
Blue-gray Gnatcatcher	1	0.13		1							1	0.001
<b>Broad-winged Hawk<sup>Br</sup></b>	<b>1</b>	<b>0.13</b>								<b>1</b>	<b>1</b>	<b>0.001</b>
Brown Creeper	1	0.13	1								1	0.001
<b>Brown Thrasher<sup>Br</sup></b>	<b>1</b>	<b>0.13</b>		<b>1</b>							<b>1</b>	<b>0.001</b>
Canada Goose	3	0.38	2			1		2			5	0.007
Carolina Chickadee	7	0.88	1	2	2	2	1	1	1		10	0.015
Carolina Wren	7	0.88	5	4	2	6	3	3	1		24	0.035
Cedar Waxwing	1	0.13	1								1	0.001
Chestnut-sided Warbler	1	0.13						1			1	0.001
Common Grackle	1	0.13				15					15	0.022
Common Yellowthroat	1	0.13		1							1	0.001
<b>Cooper's Hawk<sup>Br</sup></b>	<b>1</b>	<b>0.13</b>							<b>1</b>		<b>1</b>	<b>0.001</b>
Dark-eyed Junco	2	0.25	2			2					4	0.006
Double-crested Cormorant	1	0.13							1		1	0.001
Downy Woodpecker	5	0.63	2	2	2	2	2				10	0.015
Eastern Phoebe	1	0.13			1						1	0.001
Eastern Towhee	3	0.38		1				1	1		3	0.004
Eastern Wood-Pewee	3	0.38			1		1	1			3	0.004
European Starling	2	0.25			1					7	8	0.012
Golden-crowned Kinglet	4	0.50	4	1			1	1			7	0.010
Gray Catbird	5	0.63	2	4	3		3	2			14	0.020
Great Crested Flycatcher	1	0.13	1								1	0.001
Great Horned Owl	1	0.13			1						1	0.001
Green-winged Teal	1	0.13			44						44	0.064
Hairy Woodpecker	3	0.38	2	1				3			6	0.009
Hermit Thrush	4	0.50	1			2	3	1			7	0.010
House Finch	1	0.13			1						1	0.001
House Wren	2	0.25		1				2			3	0.004
Mourning Dove	2	0.25					1			4	5	0.007
Northern Cardinal	5	0.63	4	4		1	3	2			14	0.020
Northern Flicker	8	1.00	2	1	2	1	2	2	1	1	12	0.018
<b>Northern Parula<sup>Br</sup></b>	<b>2</b>	<b>0.25</b>	<b>1</b>					<b>1</b>			<b>2</b>	<b>0.003</b>
Northern Waterthrush	1	0.13				1					1	0.001
Ovenbird	1	0.13					1				1	0.001
Palm Warbler	1	0.13								2	2	0.003
Pine Siskin	3	0.38				1			20	40	61	0.089
Red-bellied Woodpecker	6	0.75	1	3	2	3	4	3			16	0.023
Red-breasted Nuthatch	1	0.13					1				1	0.001
Red-eyed Vireo	2	0.25	1	1							2	0.003

TABLE 4. (cont'd)

	# of		Transect ID								Total	Relative Abundance	
	Transects	Freq	01	02	03	04	05	06	07	08			
Red-winged Blackbird	1	0.13		15								15	0.022
Rock Pigeon	1	0.13								1		1	0.001
Ruby-crowned Kinglet	3	0.38		1		1	2					4	0.006
Savannah Sparrow <sup>Br</sup>	2	0.25							3	12		15	0.022
Sharp-shinned Hawk <sup>Br</sup>	1	0.13		2								2	0.003
Song Sparrow	5	0.63		1	2		2		1	1		7	0.010
Swainson's Thrush	1	0.13	1									1	0.001
Swamp Sparrow	1	0.13					3					3	0.004
Tufted Titmouse	4	0.50		2	2	1	4					9	0.013
Veery <sup>Br</sup>	1	0.13		1								1	0.001
White-breasted Nuthatch	2	0.25			1			1				2	0.003
White-throated Sparrow	7	0.88	11	37	5	15	88	20		20		196	0.286
Wild Turkey	1	0.13							11			11	0.016
Winter Wren <sup>Br</sup>	2	0.25			1		1					2	0.003
Wood Duck	1	0.13			20							20	0.029
Yellow-bellied Sapsucker	2	0.25			1	1						2	0.003
Yellow-rumped Warbler	5	0.63	6	5		10	5	2				28	0.041
Unknown Sparrow	1	0.13							3			3	0.004
<b>Total Individuals</b>			<b>60</b>	<b>101</b>	<b>100</b>	<b>70</b>	<b>141</b>	<b>53</b>	<b>67</b>	<b>93</b>		<b>685</b>	
<b>Total Species</b>			<b>25</b>	<b>28</b>	<b>23</b>	<b>21</b>	<b>26</b>	<b>21</b>	<b>13</b>	<b>13</b>		<b>67</b>	

<sup>Br</sup> = breeding season status only

<sup>SC(NB)</sup> = Special Concern status in non-breeding season

TABLE 5. Total species list and number of individuals observed during 2020 Fall Migration transect surveys at Petty’s Island, Pennsauken, NJ, by survey. Maximum represents the maximum number of individuals observed on any one survey (across all points). State-listed species are in red (E), blue (T), or green (SC).

	Survey #1 9/3/2020	Survey #2 9/15/2020	Survey #3 10/6/2020	Survey #4 10/28/2020	Total	Max per Survey
American Crow				2	2	2
American Goldfinch		2.00	2	5	9	5
<b>American Kestrel</b>	<b>1</b>		<b>2</b>		<b>3</b>	<b>2</b>
American Redstart	1	5.00			6	5
American Robin		2.00	4	27	33	27
American Woodcock				2	2	2
<b>Bald Eagle<sup>Br, T(NB)</sup></b>	<b>1</b>	<b>2.00</b>	<b>2</b>	<b>1</b>	<b>6</b>	<b>2</b>
Baltimore Oriole	2				2	2
Belted Kingfisher				1	1	1
Black-and-White Warbler		2.00	2		4	2
<b>Black-throated Blue Warbler<sup>Br</sup></b>			<b>2</b>		<b>2</b>	<b>2</b>
Blue-gray Gnatcatcher	1				1	1
<b>Broad-winged Hawk<sup>Br</sup></b>		<b>1.00</b>			<b>1</b>	<b>1</b>
Brown Creeper				1	1	1
<b>Brown Thrasher<sup>Br</sup></b>		<b>1.00</b>			<b>1</b>	<b>1</b>
Canada Goose	2		1	2	5	2
Carolina Chickadee	2	2.00	2	4	10	4
Carolina Wren	3	6.00	7	8	24	8
Cedar Waxwing		1.00			1	1
Chestnut-sided Warbler		1.00			1	1
Common Grackle	15				15	15
Common Yellowthroat			1		1	1
<b>Cooper's Hawk<sup>Br</sup></b>			<b>1</b>		<b>1</b>	<b>1</b>
Dark-eyed Junco				4	4	4
Double-crested Cormorant		1.00			1	1
Downy Woodpecker		1.00	5	4	10	5
Eastern Phoebe				1	1	1
Eastern Towhee			1	2	3	2
Eastern Wood-Pewee		3.00			3	3
European Starling		4.00	1	3	8	4
Golden-crowned Kinglet			1	6	7	6
Gray Catbird		5.00	8	1	14	8
Great Crested Flycatcher		1.00			1	1
Great Horned Owl				1	1	1
Green-winged Teal			24	20	44	24
Hairy Woodpecker		2.00	3	1	6	3
Hermit Thrush				7	7	7
House Finch				1	1	1
House Wren	2	1.00			3	2
Mourning Dove	3	2.00			5	3
Northern Cardinal	1	8.00	2	3	14	8
Northern Flicker		1.00	7	4	12	7
<b>Northern Parula<sup>Br</sup></b>		<b>2.00</b>			<b>2</b>	<b>2</b>
Northern Waterthrush		1.00			1	1
Ovenbird	1				1	1
Palm Warbler			2		2	2
Pine Siskin				61	61	61
Red-bellied Woodpecker	3	2.00	6	5	16	6
Red-breasted Nuthatch			1		1	1
Red-eyed Vireo		2.00			2	2
Red-winged Blackbird				15	15	15

TABLE 5. (cont'd)

	Survey #1 9/3/2020	Survey #2 9/15/2020	Survey #3 10/6/2020	Survey #4 10/28/2020	Total	Max per Survey
Rock Pigeon	1				1	1
Ruby-crowned Kinglet			1	3	4	3
Savannah Sparrow <sup>Br</sup>			10	5	15	10
Sharp-shinned Hawk <sup>Br</sup>			1	1	2	1
Song Sparrow				7	7	7
Swainson's Thrush			1		1	1
Swamp Sparrow				3	3	3
Tufted Titmouse	2	1.00	5	1	9	5
Veery <sup>Br</sup>		1.00			1	1
White-breasted Nuthatch			2		2	2
White-throated Sparrow			10	186	196	186
Wild Turkey		11.00			11	11
Winter Wren <sup>Br</sup>				2	2	2
Wood Duck	8	12.00			20	12
Yellow-bellied Sapsucker				2	2	2
Yellow-rumped Warbler			4	24	28	24
Unknown Sparrow				3	3	3
<b>Total Individuals</b>	<b>49</b>	<b>86</b>	<b>121</b>	<b>429</b>	<b>685</b>	
<b>Total Species</b>	<b>17</b>	<b>30</b>	<b>31</b>	<b>37</b>	<b>67</b>	

<sup>Br</sup> = Breeding season status only

<sup>SC(NB)</sup> = Special Concern status in non-breeding season

**TABLE 6.** Additional species observed at Petty’s Island, Pennsauken, NJ (a) during 2020 Fall Migration surveys, but not recorded on transect surveys, and (b) recorded by eBird observers. State-listed species are in red (E), blue (T), or green (SC).

**a. New Jersey Audubon Incidental Encounters**

<b>Species</b>	<b>Notes</b>
Black Vulture	Observed on 9/15
<b>Blue-headed Vireo<sup>Br</sup></b>	<b>Along trail on 10/6</b>
<b>Caspian Tern<sup>Br</sup></b>	<b>Seen on mudflats in river on 9/3 and 9/15</b>
Field Sparrow	Observed along edge of restored grassland on 10/6
Forster's Tern	Seen on mudflats in river on 9/3 and 9/15
<b>Great Blue Heron<sup>Br</sup></b>	<b>Observed along river on 9/3 and 9/15</b>
Great Egret	Observed along river on 9/3 and 10/6
Green Heron	Observed in small pond on 9/3
Herring Gull	Observed along river on 9/15
Indigo Bunting	Observed along edge of restored grassland on 10/6
Killeer	Along river on 10/6
Least Sandpiper	Along river on 9/15
Mallard	Observed on 9/3
<b>Red-shouldered Hawk<sup>Br, SC(NB)</sup></b>	<b>Observed circling high on 9/15</b>
Red-tailed Hawk	Seen on 9/15
Ring-billed Gull	Observed along river on 9/15, 10/6, and 10/28
Rose-breasted Grosbeak	Observed in woods between PETT_03 and PETT_04 on 9/15
Turkey Vulture	Seen on 9/15 and 10/6
Warbling Vireo	Observed along trail on 9/15

<sup>Br</sup> = breeding season status only

TABLE 6. (cont'd)

## b. Recorded by eBird Observers

Species	Notes
American Black Duck	NJ Audubon Young Birders Club 10/4/2020 and field trip 11/15/2020
American Coot	Observed by NJ Audubon Young Birders Club 10/4/2020
American Pipit	Observed by NJ Audubon Young Birders Club 10/4/2020
American Wigeon	Observed by NJ Audubon Young Birders Club 10/4/2020
Barn Swallow	Observed on NJ Audubon field trip 9/12/2020
Blackpoll Warbler	Observed by NJ Audubon Young Birders Club 10/4/2020
Blue-winged Teal	Observed by NJ Audubon Young Birders Club 10/4/2020
Blue Jay	NJ Audubon Young Birders Club 10/4/2020 and field trip 11/15/2020
<b>Bobolink<sup>Br, SC(NB)</sup></b>	<b>Observed flying over on NJ Audubon field trip 9/12/2020</b>
Brown-headed Cowbird	Observed by NJ Audubon Young Birders Club 10/4/2020
Bufflehead	Observed on NJ Audubon field trip 11/15/2020
<b>Canada Warbler<sup>Br</sup></b>	<b>Observed on NJ Audubon field trip 9/12/2020</b>
Cape May Warbler	Observed on NJ Audubon field trip 9/12/2020
Chimney Swift	NJ Audubon field trip 9/12/2020 and Young Birders Club 10/4/2020
Chipping Sparrow	NJ Audubon Young Birders Club 10/4/2020 and field trip 11/15/2020
Gadwall	Observed on NJ Audubon field trip 11/15/2020
Great Black-backed Gull	Observed by NJ Audubon Young Birders Club 10/4/2020
House Sparrow	Observed by NJ Audubon Young Birders Club 10/4/2020
Laughing Gull	NJ Audubon field trip 9/12/2020 and Young Birders Club 10/4/2020
Lesser Scaup	Observed on NJ Audubon field trip 11/15/2020
Lesser Yellowlegs	Observed on NJ Audubon field trip 9/12/2020
Magnolia Warbler	Observed by NJ Audubon Young Birders Club 10/4/2020
Marsh Wren	Observed by NJ Audubon Young Birders Club 10/4/2020
Merlin	Observed on NJ Audubon field trip 11/15/2020
Northern Mockingbird	NJ Audubon field trips 9/12/2020 and 11/15/2020; Young Birders Club 10/4/2020
Northern Pintail	Observed by NJ Audubon Young Birders Club 10/4/2020
Northern Rough-winged Swallow	NJ Audubon field trip 9/12/2020 and Young Birders Club 10/4/2020
<b>Osprey<sup>Br</sup></b>	<b>NJ Audubon field trip 9/12/2020 and Young Birders Club 10/4/2020</b>
<b>Peregrine Falcon<sup>Br, SC(NB)</sup></b>	<b>Observed by NJ Audubon Young Birders Club 10/4/2020</b>
<b>Pied-billed Grebe<sup>Br, SC(NB)</sup></b>	<b>NJ Audubon Young Birders Club 10/4/2020 and field trip 11/15/2020</b>
Pine Warbler	Observed on NJ Audubon field trip 9/12/2020
Purple Finch	Observed by NJ Audubon Young Birders Club 10/4/2020
Ring-necked Duck	Observed on NJ Audubon field trip 11/15/2020
Ruddy Duck	Observed on NJ Audubon field trip 11/15/2020
Scarlet Tanager	NJ Audubon field trip 9/12/2020 and Young Birders Club 10/4/2020
Tree Swallow	Observed on NJ Audubon field trip 9/12/2020
<b>Wood Thrush<sup>BR</sup></b>	<b>Observed on NJ Audubon field trip 9/12/2020</b>
<b>Worm-eating Warbler<sup>Br</sup></b>	<b>Observed on NJ Audubon field trip 9/12/2020</b>
Yellow-billed Cuckoo	Observed on NJ Audubon field trip 9/12/2020

<sup>Br</sup> = breeding season status only



**TABLE 7.** Total species list and number of individuals observed during Winter 2020-2021 surveys at Petty’s Island, Pennsauken, NJ, by transect. Frequency (freq.) refers to the number of points at which a species was observed divided by the total number of points. Relative abundance was calculated as the number of individuals of that species divided by the total number of individuals of all species. State-listed species are in red (E), blue (T), or green (SC).

	# of		Transect ID								Total	Relative Abundance
	Points	Freq	01	02	03	04	05	06	07	08		
American Black Duck	1	0.125		3							3	0.003
American Crow	3	0.375	1		2					7	10	0.011
American Goldfinch	2	0.25	2	1							3	0.003
American Robin	5	0.625	4	2	1		1	2			10	0.011
Belted Kingfisher	1	0.125		1							1	0.001
Blue Jay	1	0.125	1								1	0.001
Brown Creeper	2	0.25	1					1			2	0.002
Brown-headed Cowbird	1	0.125	1								1	0.001
Bufflehead	1	0.125	7								7	0.008
Canada Goose	7	0.875	2	11	1	2		6	14	2	38	0.042
Carolina Chickadee	4	0.5	3		4	1	2				10	0.011
Carolina Wren	6	0.75	4	5	4	1	3	5			22	0.024
Common Grackle	1	0.125	1								1	0.001
Common Raven	1	0.125			1						1	0.001
Cooper's Hawk <sup>Br</sup>	1	0.125		1							1	0.001
Double-crested Cormorant	1	0.125		1							1	0.001
Downy Woodpecker	4	0.5	1	2			2	4			9	0.010
European Starling	1	0.125			1						1	0.001
Fish Crow	1	0.125								1	1	0.001
Great Blue Heron <sup>Br</sup>	1	0.125			1						1	0.001
Green-winged Teal	2	0.25			4			1			5	0.005
Hairy Woodpecker	3	0.375	1	1				1			3	0.003
Herring Gull	1	0.125		4							4	0.004
Lesser Scaup	1	0.125	4								4	0.004
Mallard	2	0.25		6	29						35	0.038
Northern Cardinal	6	0.75	1	2	1	1	3	2			10	0.011
Northern Flicker	3	0.375		2	1	1					4	0.004
Northern Mockingbird	1	0.125		1							1	0.001
Red-bellied Woodpecker	6	0.75	2	2	2	1	2	2			11	0.012
Red-tailed Hawk	1	0.125		1							1	0.001
Red-winged Blackbird	4	0.5	10	2			235	1			248	0.271
Ring-billed Gull	3	0.375	2					100		2	104	0.114
Ring-necked Duck	1	0.125			11						11	0.012
Rock Pigeon	1	0.125								1	1	0.001
Song Sparrow	5	0.625	2	7	4		3	1			17	0.019
Swamp Sparrow	1	0.125				2					2	0.002
Tree Swallow	4	0.5			1	2		1		1	5	0.005
Tufted Titmouse	4	0.5	1	1	1			1			4	0.004
Turkey Vulture	1	0.125							3		3	0.003
White-breasted Nuthatch	1	0.125	1								1	0.001
White-throated Sparrow	6	0.75	19	71	10	30	90	88			308	0.337
Wild Turkey	2	0.25			1			1			2	0.002
Winter Wren <sup>Br</sup>	1	0.125			1						1	0.001
Wood Duck	1	0.125			2						2	0.002
Yellow-rumped Warbler	1	0.125				1					1	0.001
Unidentified Gull	1	0.125								1	1	0.001
Unidentified Sparrow	1	0.125								1	1	0.001
<b>Total Individuals</b>			<b>71</b>	<b>127</b>	<b>83</b>	<b>42</b>	<b>341</b>	<b>217</b>	<b>24</b>	<b>9</b>	<b>914</b>	
<b>Total Species</b>			<b>22</b>	<b>20</b>	<b>21</b>	<b>10</b>	<b>9</b>	<b>16</b>	<b>3</b>	<b>5</b>	<b>44</b>	

<sup>Br</sup> = Breeding season status only, <sup>SC(NB)</sup> = Special Concern status in non-breeding season

**TABLE 8.** Total species list and number of individuals observed during winter 2020-2021 transect surveys at Petty’s Island, Pennsauken, NJ, by survey. Maximum represents the maximum number of individuals observed on any one survey (across all points). State-listed species are in red (E), blue (T), or green (SC).

	Survey #1 12/23/2020	Survey #2 1/21/2021	Survey #3 2/17/2021	Survey #4 3/22/2021	Total	Max per Survey
American Black Duck				3	3	3
American Crow	2			8	10	8
American Goldfinch	2			1	3	2
American Robin	1	1	2	6	10	6
Belted Kingfisher	1				1	1
Blue Jay	1				1	1
Brown Creeper	2				2	2
Brown-headed Cowbird				1	1	1
Bufflehead				7	7	7
Canada Goose	22	2		14	38	22
Carolina Chickadee	4	2	1	3	10	4
Carolina Wren	10	5	2	5	22	10
Common Grackle				1	1	1
Common Raven	1				1	1
Cooper's Hawk <sup>Br</sup>	1				1	1
Double-crested Cormorant				1	1	1
Downy Woodpecker	4	1		4	9	4
European Starling				1	1	1
Fish Crow	1				1	1
Great Blue Heron <sup>Br</sup>			1		1	1
Green-winged Teal				5	5	5
Hairy Woodpecker			1	2	3	2
Herring Gull				4	4	4
Lesser Scaup				4	4	4
Mallard	25		2	8	35	25
Northern Cardinal	1	3		6	10	6
Northern Flicker	1	1		2	4	2
Northern Mockingbird				1	1	1
Red-bellied Woodpecker	4	3	2	2	11	4
Red-tailed Hawk		1			1	1
Red-winged Blackbird	70	150		28	248	150
Ring-billed Gull	102	1	1		104	102
Ring-necked Duck				11	11	11
Rock Pigeon				1	1	1
Song Sparrow	4	6	3	4	17	6
Swamp Sparrow				2	2	2
Tree Swallow				5	5	5
Tufted Titmouse				4	4	4
Turkey Vulture				3	3	3
White-breasted Nuthatch	1				1	1
White-throated Sparrow	122	74	52	60	308	122
Wild Turkey		1		1	2	1
Winter Wren <sup>Br</sup>	1				1	1
Wood Duck			2		2	2
Yellow-rumped Warbler				1	1	1
Unidentified Gull		1			1	1
Unidentified Sparrow				1	1	1
<b>Total Individuals</b>	<b>383</b>	<b>252</b>	<b>69</b>	<b>210</b>	<b>914</b>	
<b>Total Species</b>	<b>23</b>	<b>14</b>	<b>11</b>	<b>32</b>	<b>44</b>	

<sup>Br</sup> = Breeding season status only

<sup>SC(NB)</sup> = Special Concern status in non-breeding season

**TABLE 9.** Additional species (a) observed at Petty’s Island, Pennsauken, NJ during winter 2020 - 2021, but not encountered on transect surveys. State-listed species are in red (E), blue (T), or green (SC).

Species	Notes
American Kestrel	Observed on north end of island during 3 of 4 surveys (12/23/21, 2/7/21, and 3/22/21)
Bald Eagle <sup>Br, T(NB)</sup>	Flying over grassland on 1/21/21; perched on north end and nesting on island on 3/22/21
Common Merganser	Seen in river on 12/23/20
Dark-eyed Junco	Observed along edge between restored grassland and woods on 3/22/21
Field Sparrow	Heard singing along access road on 3/22/21
Gadwall	Seen in interior wetlands on 3/22/21

TABLE 10. Total species list and number of individuals observed during 2021 Spring Migration surveys at Petty’s Island, Pennsauken, NJ, by transect. Frequency (freq.) was calculated as the number of transects at which a species was observed divided by the total number of transects surveyed. Relative abundance was calculated as the number of individuals of that species divided by the total number of individuals of all species. State-listed species are in red (E), blue (T), or green (SC).

	# of Points	Freq	Transect ID									Total	Relative Abundance
			01	02	03	04	05	06	08	09			
American Crow	1	0.125					1					1	0.002
American Goldfinch	8	1	4	2	3	2	5	1	2	3		22	0.036
<b>American Kestrel</b>	<b>2</b>	<b>0.25</b>							<b>1</b>	<b>2</b>		<b>3</b>	<b>0.005</b>
American Redstart	2	0.25		1	1							2	0.003
American Robin	5	0.625		3	5	1	3	2				14	0.023
<b>Bald Eagle<sup>Br, T(NB)</sup></b>	<b>3</b>	<b>0.375</b>		<b>1</b>			<b>1</b>		<b>2</b>			<b>4</b>	<b>0.007</b>
Baltimore Oriole	6	0.75	2	2	1	2	1	1				9	0.015
Barn Swallow	2	0.25							7	3		10	0.017
Belted Kingfisher	1	0.125			1							1	0.002
Black-and-White Warbler	5	0.625	1	1	1	1	1					5	0.008
Blackpoll Warbler	1	0.125	1									1	0.002
<b>Black-throated Blue Warbler<sup>Br</sup></b>	<b>2</b>	<b>0.25</b>				<b>2</b>		<b>2</b>				<b>4</b>	<b>0.007</b>
<b>Black-throated Green Warbler<sup>Br</sup></b>	<b>1</b>	<b>0.125</b>		<b>1</b>								<b>1</b>	<b>0.002</b>
Blue Jay	4	0.5	1			2	1	2				6	0.010
Blue-gray Gnatcatcher	6	0.75	2	4	2	2	2	3				15	0.025
Brown-headed Cowbird	6	0.75	1	4	1		5	4		1		16	0.026
Canada Goose	8	1	2	10	49	2	3	2	34	6		108	0.178
Carolina Chickadee	4	0.5		1	4		1	1				7	0.012
Carolina Wren	6	0.75	4	1	1	4	1	3				14	0.023
Chestnut-sided Warbler	1	0.125				1						1	0.002
Chimney Swift	1	0.125								2		2	0.003
Common Grackle	1	0.125								3		3	0.005
Common Raven	1	0.125							2			2	0.003
Common Yellowthroat	2	0.25					1	1				2	0.003
Double-crested Cormorant	2	0.25							2	1		3	0.005
Downy Woodpecker	4	0.5	1		1	3		1				6	0.010
Eastern Kingbird	3	0.375				1			1	1		3	0.005
European Starling	3	0.375			3	1			1			5	0.008
Field Sparrow	2	0.25		1					1			2	0.003
Fish Crow	2	0.25	1							1		2	0.003
Gray Catbird	6	0.75	3	2	1	1	1	4				12	0.020
Great Crested Flycatcher	2	0.25	2	1								3	0.005
Hairy Woodpecker	1	0.125						1				1	0.002
Hermit Thrush	1	0.125					1					1	0.002
Herring Gull	1	0.125		1								1	0.002
<b>Horned Lark<sup>Br, SC(NB)</sup></b>	<b>1</b>	<b>0.125</b>							<b>8</b>			<b>8</b>	<b>0.013</b>
House Finch	1	0.125	1									1	0.002
House Wren	5	0.625	1	1	2		2	3				9	0.015
Laughing Gull	5	0.625		3			1	2	40	33		79	0.130
<b>Least Flycatcher<sup>Br</sup></b>	<b>1</b>	<b>0.125</b>	<b>1</b>									<b>1</b>	<b>0.002</b>
Magnolia Warbler	1	0.125					1					1	0.002
Mallard	2	0.25		2	2							4	0.007
Northern Cardinal	6	0.75	2	4	3	1	3	3				16	0.026
Northern Flicker	5	0.625		2	1	2	1	1				7	0.012
<b>Northern Parula<sup>Br</sup></b>	<b>6</b>	<b>0.75</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>3</b>				<b>13</b>	<b>0.021</b>
Northern Rough-winged Swallow	2	0.25			1				2			3	0.005
Northern Waterthrush	3	0.375		1	3		2					6	0.010
Ovenbird	4	0.5	1			2	1	1				5	0.008

TABLE 10. (continued)

	# of Points	Freq	Transect ID							Total	Relative Abundance	
			01	02	03	04	05	06	08			09
Palm Warbler	1	0.125				1					1	0.002
<b>Peregrine Falcon<sup>Br, SC(NB)</sup></b>	<b>1</b>	<b>0.125</b>							<b>1</b>		<b>1</b>	<b>0.002</b>
Prairie Warbler	1	0.125	1								1	0.002
Red-bellied Woodpecker	4	0.5	1			2	1	1			5	0.008
Red-breasted Nuthatch	1	0.125	1								1	0.002
Red-eyed Vireo	3	0.375			1	2	1				4	0.007
Red-winged Blackbird	7	0.875	1	7	4	2	4		1	1	20	0.033
Rose-breasted Grosbeak	1	0.125				1					1	0.002
Ruby-crowned Kinglet	1	0.125		1							1	0.002
Ruby-throated Hummingbird	1	0.125	1								1	0.002
<b>Savannah Sparrow<sup>Br</sup></b>	<b>1</b>	<b>0.125</b>							<b>1</b>		<b>1</b>	<b>0.002</b>
Scarlet Tanager	1	0.125							1		1	0.002
Song Sparrow	2	0.25		1		1					2	0.003
Tree Swallow	4	0.5		5	9		1		2		17	0.028
Tufted Titmouse	6	0.75	2	1	3	1	3	3			13	0.021
Warbling Vireo	5	0.625	1	2	1		2	2			8	0.013
White-breasted Nuthatch	1	0.125				1					1	0.002
White-throated Sparrow	6	0.75	2	9	2	9	3	17			42	0.069
Wild Turkey	1	0.125				1					1	0.002
Wood Duck	1	0.125			2						2	0.003
<b>Wood Thrush<sup>Br</sup></b>	<b>3</b>	<b>0.375</b>	<b>1</b>	<b>2</b>				<b>1</b>			<b>4</b>	<b>0.007</b>
Yellow Warbler	7	0.875	4	6	4	2	1	4	1		22	0.036
Yellow-rumped Warbler	3	0.375	5			4		2			11	0.018
<b>Total Individuals</b>			<b>52</b>	<b>86</b>	<b>114</b>	<b>60</b>	<b>56</b>	<b>72</b>	<b>109</b>	<b>57</b>	<b>606</b>	
<b>Total Species</b>			<b>30</b>	<b>32</b>	<b>29</b>	<b>30</b>	<b>31</b>	<b>28</b>	<b>18</b>	<b>12</b>	<b>71</b>	

<sup>Br</sup> = breeding season status only

TABLE 11. Total species list and number of individuals observed during 2021 Spring Migration point count surveys at Petty’s Island, Pennsauken, NJ, by survey. Maximum represents the maximum number of individuals observed on any one survey (across all transects). State-listed species are in red (E), blue (T), or green (SC).

	Survey #1 4/6/2021	Survey #2 4/20/2021	Survey #3 5/4/2021	Survey #4 5/12/2021	Total	Max per Survey
American Crow			1		1	1
American Goldfinch	5	9	5	3	22	9
<b>American Kestrel</b>			<b>1</b>	<b>2</b>	<b>3</b>	<b>2</b>
American Redstart				2	2	2
American Robin	3	5	3	3	14	5
<b>Bald Eagle<sup>Br, T(NB)</sup></b>	<b>1</b>	<b>1</b>		<b>2</b>	<b>4</b>	<b>2</b>
Baltimore Oriole			5	4	9	5
Barn Swallow		1	7	2	10	7
Belted Kingfisher				1	1	1
Black-and-White Warbler			5		5	5
Blackpoll Warbler			1		1	1
<b>Black-throated Blue Warbler<sup>Br</sup></b>			<b>1</b>	<b>3</b>	<b>4</b>	<b>3</b>
<b>Black-throated Green Warbler<sup>Br</sup></b>				<b>1</b>	<b>1</b>	<b>1</b>
Blue Jay		1		5	6	5
Blue-gray Gnatcatcher		7	4	4	15	7
Brown-headed Cowbird	5	5	4	2	16	5
Canada Goose	22	26	39	21	108	39
Carolina Chickadee	5	2			7	5
Carolina Wren	4	4	3	3	14	4
Chestnut-sided Warbler			1		1	1
Chimney Swift		2			2	2
Common Grackle	3				3	3
Common Raven				2	2	2
Common Yellowthroat			1	1	2	1
Double-crested Cormorant		3			3	3
Downy Woodpecker	2	2	1	1	6	2
Eastern Kingbird			2	1	3	2
European Starling	1	4			5	4
Field Sparrow	2				2	2
Fish Crow	1	1			2	1
Gray Catbird			6	6	12	6
Great Crested Flycatcher			2	1	3	2
Hairy Woodpecker			1		1	1
Hermit Thrush			1		1	1
Herring Gull			1		1	1
<b>Horned Lark<sup>Br, SC(NB)</sup></b>			<b>8</b>		<b>8</b>	<b>8</b>
House Finch				1	1	1
House Wren		2	3	4	9	4
Laughing Gull		1	45	33	79	45
<b>Least Flycatcher<sup>Br</sup></b>			<b>1</b>		<b>1</b>	<b>1</b>
Magnolia Warbler			1		1	1
Mallard	4				4	4
Northern Cardinal	5	3	4	4	16	5
Northern Flicker	2	4		1	7	4
<b>Northern Parula<sup>Br</sup></b>			<b>7</b>	<b>6</b>	<b>13</b>	<b>7</b>
Northern Rough-winged Swallow		2	1		3	2
Northern Waterthrush			5	1	6	5
Ovenbird			4	1	5	4
Palm Warbler		1			1	1
<b>Peregrine Falcon<sup>Br, SC(NB)</sup></b>				<b>1</b>	<b>1</b>	<b>1</b>
Prairie Warbler			1		1	1

TABLE 11. (continued)

	Survey #1 4/6/2021	Survey #2 4/20/2021	Survey #3 5/4/2021	Survey #4 5/12/2021	Total	Max per Survey
Red-bellied Woodpecker		1		4	5	4
Red-breasted Nuthatch				1	1	1
Red-eyed Vireo			1	3	4	3
Red-winged Blackbird	6	5	4	5	20	6
Rose-breasted Grosbeak			1		1	1
Ruby-crowned Kinglet		1			1	1
Ruby-throated Hummingbird			1		1	1
<b>Savannah Sparrow<sup>Br</sup></b>		<b>1</b>			<b>1</b>	<b>1</b>
Scarlet Tanager				1	1	1
Song Sparrow	2				2	2
Tree Swallow	4	8	3	2	17	8
Tufted Titmouse	4	4	3	2	13	4
Warbling Vireo			4	4	8	4
White-breasted Nuthatch	1				1	1
White-throated Sparrow	17	18	1	6	42	18
Wild Turkey			1		1	1
Wood Duck	2				2	2
<b>Wood Thrush<sup>Br</sup></b>			<b>2</b>	<b>2</b>	<b>4</b>	<b>2</b>
Yellow Warbler		3	12	7	22	12
Yellow-rumped Warbler		5	3	3	11	5
<b>Total Individuals</b>	<b>101</b>	<b>132</b>	<b>211</b>	<b>162</b>	<b>606</b>	
<b>Total Species</b>	<b>22</b>	<b>30</b>	<b>45</b>	<b>42</b>	<b>71</b>	

<sup>Br</sup> = breeding season status only

TABLE 12. Additional species observed at Petty’s Island, Pennsauken, NJ (a) during NJ Audubon 2021 spring migration surveys, but not encountered on point count surveys, and (b) recorded by eBird observers. State-listed species are in red (E), blue (T), or green (SC).

**a. New Jersey Audubon Incidental Encounters**

Species	Notes
American Coot	Seen on interior wetland pond on 4/6/21
Blackburnian Warbler	Seen in woods on 5/12/21
Black Vulture	Observed on 4/20/21 flying over north end of island
Brown Creeper	Seen in woods on 4/20/21
Cape May Warbler	Seen in woods on 5/12/21
Chipping Sparrow	Observed along trail on 4/6/21
Dark-eyed Junco	Observed along trail on 4/6/21
Eastern Towhee	Heard along woods edge on 4/20/21
Gadwall	Seen in interior ponds on 4/6/21
<b>Great Blue Heron<sup>Br</sup></b>	<b>Observed near p3, along interior wetland pond edge on 4/6/21</b>
Green Heron	Seen along small interior pond on 5/12/21
Green-winged Teal	Seen in interior ponds on 4/6/21
Indigo Bunting	Observed along trail on 5/12/21
Orchard Oriole	Heard along entrance road on 5/12/21
<b>Osprey<sup>Br</sup></b>	<b>Three individuals observed along river on 5/4/21; single individuals seen on 4/20/21</b>
<b>Peregrine Falcon<sup>Br, SC(NB)</sup></b>	<b>Seen over restored grassland on near river on 5/12/21</b>
Pine Warbler	Observed in woods on 4/6/21 and 4/20/21
Purple Finch	Observed along trail on 5/4/21
<b>Red-shouldered Hawk<sup>Br, SC(NB)</sup></b>	<b>Heard calling over woods on 5/12/21</b>
Red-tailed Hawk	Observed on 4/20/21 and 5/12/21
Ring-billed Gull	Observed along river on multiple survey visits
Ring-necked Duck	Seen in river on 4/6/21
Rock Pigeon	Seen on former shipping dock structure along river on 5/4/21
Rusty Blackbird	Four individuals seen in small interior wetland on 5/4/21
Tennessee Warbler	Seen in woods on 5/4/21
Turkey Vulture	Observed on 4/20/21 flying over north end of island
Wilson's Warbler	Observed along trail on 5/12/21
<b>Yellow-breasted Chat<sup>Br</sup></b>	<b>Observed along trail on 5/4/21</b>
Yellow-throated Vireo	Observed along trail on 5/4/21

<sup>Br</sup> = breeding season status only

**b. Recorded by eBird Observers**

Species	Notes
<b>Cooper's Hawk<sup>Br</sup></b>	<b>Observed on NJ Audubon field trip 4/24/21</b>
Mourning Dove	Observed on NJ Audubon field trip 4/24/21
Northern Mockingbird	Observed on NJ Audubon field trip 4/24/21
Turkey Vulture	Observed on NJ Audubon field trip 4/24/21

<sup>Br</sup> = breeding season status only



TABLE 13. Total species list and number of individuals observed during 2021 Breeding Season surveys at Petty’s Island, Pennsauken, NJ, by transect. Frequency (freq.) was calculated as the number of transects at which a species was observed divided by the total number of transects surveyed. Relative abundance was calculated as the number of individuals of that species divided by the total number of individuals of all species. State-listed species are in red (E), blue (T), or green (SC).

	# of Points	Freq	Point ID									Total	Relative Abundance
			01	02	03	04	05	06	07	08	09		
American Crow	2	0.22			1			1				2	0.005
American Goldfinch	8	0.89	3	3	1	1	2	1		3	4	18	0.049
<b>American Kestrel</b>	<b>1</b>	<b>0.11</b>									<b>1</b>	<b>1</b>	<b>0.003</b>
American Robin	8	0.89	2	1	16	2	2	2		8	1	34	0.092
Baltimore Oriole	5	0.56	1	2	3	1		1				8	0.022
Barn Swallow	2	0.22								7	1	8	0.022
Blue Jay	1	0.11										1	0.003
Blue-gray Gnatcatcher	5	0.56		1	1	1	2	3				8	0.022
Brown-headed Cowbird	3	0.33		1	1			1				3	0.008
Canada Goose	7	0.78	1	6	3		3	13	1	1		28	0.076
Carolina Chickadee	4	0.44	1	1	1			1				4	0.011
Carolina Wren	3	0.33	4			2		1				7	0.019
Cedar Waxwing	6	0.67	1	25	3	1	1	2				33	0.089
Chimney Swift	3	0.33		2				1		1		4	0.011
Common Grackle	2	0.22		4							3	7	0.019
Double-crested Cormorant	1	0.11								3		3	0.008
Downy Woodpecker	3	0.33	2		1			2				5	0.014
Eastern Kingbird	4	0.44	1		2		1			1		5	0.014
Field Sparrow	1	0.11								1		1	0.003
Fish Crow	1	0.11								3		3	0.008
Gray Catbird	5	0.56	5	1	2		2	2				12	0.032
<b>Great Blue Heron<sup>Br</sup></b>	<b>2</b>	<b>0.22</b>		<b>1</b>	<b>1</b>							<b>2</b>	<b>0.005</b>
Great Crested Flycatcher	3	0.33		2	1	1						4	0.011
Great Egret	1	0.11			1							1	0.003
Hairy Woodpecker	2	0.22	1					1				2	0.005
House Finch	1	0.11		1								1	0.003
House Wren	5	0.56	1	2	6		2	2				13	0.035
Indigo Bunting	6	0.67	1	3		1		1		3	7	16	0.043
Laughing Gull	1	0.11							1			1	0.003
Mourning Dove	1	0.11		1								1	0.003
Northern Cardinal	6	0.67	1	4	3	1	3	3				15	0.041
Northern Rough-winged Swallow	1	0.11								2		2	0.005
<b>Osprey<sup>Br</sup></b>	<b>1</b>	<b>0.11</b>								<b>1</b>		<b>1</b>	<b>0.003</b>
Red-bellied Woodpecker	2	0.22	3	1								4	0.011
Red-eyed Vireo	4	0.44	3		5	2	1					11	0.030
<b>Red-shouldered Hawk<sup>Br, SC(NB)</sup></b>	<b>1</b>	<b>0.11</b>									<b>1</b>	<b>1</b>	<b>0.003</b>
Red-tailed Hawk	2	0.22		1						1		2	0.005
Red-winged Blackbird	3	0.33		4	2					2		8	0.022
Ring-billed Gull	1	0.11								1		1	0.003
Rock Pigeon	1	0.11								2		2	0.005
Ruby-throated Hummingbird	1	0.11	1									1	0.003
Swainson's Thrush	1	0.11	1									1	0.003
Tree Swallow	1	0.11			1							1	0.003
Tufted Titmouse	4	0.44	1	1	2	2						6	0.016
Warbling Vireo	7	0.78	3	3	2	1	4	3		1		17	0.046
White-breasted Nuthatch	1	0.11					1					1	0.003
Wild Turkey	1	0.11									3	3	0.008

TABLE 13. (cont'd)

	# of Points	Freq	Point ID									Total	Relative Abundance
			01	02	03	04	05	06	07	08	09		
Wood Duck	1	0.11			32							32	0.086
Yellow Warbler	5	0.56	5	7	2	1		3				18	0.049
Yellow-billed Cuckoo	5	0.56	1	2	1	1		2				7	0.019
<b>Total Individuals</b>			<b>43</b>	<b>80</b>	<b>94</b>	<b>18</b>	<b>24</b>	<b>47</b>	<b>2</b>	<b>41</b>	<b>21</b>	<b>370</b>	
<b>Total Species</b>			<b>22</b>	<b>25</b>	<b>25</b>	<b>14</b>	<b>12</b>	<b>21</b>	<b>2</b>	<b>17</b>	<b>8</b>	<b>50</b>	

<sup>Br</sup> = breeding season status only

**TABLE 14.** Total species list and number of individuals observed during 2021 Breeding Season point count surveys at Petty’s Island, Pennsauken, NJ, by survey. Maximum represents the maximum number of individuals observed on any one survey (across all transects). State-listed species are in red (E), blue (T), or green (SC).

	Survey #1 5/27/2021	Survey #2 6/15/2021	Survey #3 7/8/2021	Survey #4 7/21/2021	Total	Max per Survey
American Crow			2		2	2
American Goldfinch	3	5	7		18	7
<b>American Kestrel</b>				<b>1</b>	<b>1</b>	<b>1</b>
American Robin	2	1	26	5	34	26
Baltimore Oriole	3	4	1		8	4
Barn Swallow	1	4	3		8	4
Blue Jay				1	1	1
Blue-gray Gnatcatcher	1	6	1		8	6
Brown-headed Cowbird	2	1			3	2
Canada Goose	9	8	9	2	28	9
Carolina Chickadee	1	3			4	3
Carolina Wren	2	2	2	1	7	2
Cedar Waxwing	28	4	1		33	28
Chimney Swift	1	1		2	4	2
Common Grackle	3			4	7	4
Double-crested Cormorant			3		3	3
Downy Woodpecker	1	1	2	1	5	2
Eastern Kingbird	4	1			5	4
Field Sparrow		1			1	1
Fish Crow		2	1		3	2
Gray Catbird	4	5	2	1	12	5
<b>Great Blue Heron<sup>Br</sup></b>		1		1	2	1
Great Crested Flycatcher	2	1	1		4	2
Great Egret			1		1	1
Hairy Woodpecker	1			1	2	1
House Finch			1		1	1
House Wren	5	4	2	2	13	5
Indigo Bunting	5	3	6	2	16	6
Laughing Gull				1	1	1
Mourning Dove			1		1	1
Northern Cardinal	4	4	4	3	15	4
Northern Rough-winged Swallow			2		2	2
<b>Osprey<sup>Br</sup></b>			<b>1</b>		<b>1</b>	<b>1</b>
Red-bellied Woodpecker	1	1	1	1	4	1
Red-eyed Vireo	3	3	4	1	11	4
<b>Red-shouldered Hawk<sup>Br, SC(NB)</sup></b>				1	1	1
Red-tailed Hawk	1	1			2	1
Red-winged Blackbird	2	5	1		8	5
Ring-billed Gull			1		1	1
Rock Pigeon	1	1			2	1
Ruby-throated Hummingbird		1			1	1
Swainson's Thrush	1				1	1
Tree Swallow	1				1	1
Tufted Titmouse	2	3	1		6	3
Warbling Vireo	6	9	2		17	9
White-breasted Nuthatch			1		1	1
Wild Turkey		3			3	3
Wood Duck	16	8	8		32	16
Yellow Warbler	9	7	2		18	9
Yellow-billed Cuckoo		2	5		7	5
<b>Total Individuals</b>	<b>125</b>	<b>106</b>	<b>105</b>	<b>34</b>	<b>370</b>	
<b>Total Species</b>	<b>31</b>	<b>33</b>	<b>32</b>	<b>19</b>	<b>50</b>	

<sup>Br</sup> = breeding season status only

**TABLE 15.** Additional species observed at Petty’s Island, Pennsauken, NJ (a) during 2021 breeding season surveys, but not encountered on point count surveys, and (b) recorded by eBird observers. State-listed species are in red (E), blue (T), or green (SC).

**a. New Jersey Audubon Incidental Encounters**

Species	Notes
<b>Bald Eagle</b> <sup>Br, T(NB)</sup>	<b>Pair observed nesting throughout the season, one young fledged!</b>
Blackpoll Warbler	Observed in woods on 5/27/21 (migrant)
Chestnut-sided Warbler	Observed along trail on 5/27/21 (possible late migrant)
Common Yellowthroat	Along entrance road on 7/21/21
Eastern Wood-Pewee	Observed on multiple dates in woods (5/27/21, 6/15/21, and 7/8/21)
European Starling	Observed on 6/15/21
Laughing Gull	Observed throughout season along river (5/27/21, 7/8/21, 7/21/21)
Mallard	Along river on 6/15/21 and 7/21/21
Northern Mockingbird	Observed along entrance road on 7/8/21
Orchard Oriole	Along entrance road on 6/15/21 and 7/21/21
Song Sparrow	Along entrance road on 7/21/21
Turkey Vulture	Observed on 6/15/21
Unidentified Sandpiper	Group of unidentified small sandpipers along river on 7/21/21
Willow Flycatcher	Observed along entrance road on 6/15/21

<sup>Br</sup> = breeding season status only

**b. Recorded by eBird Observers**

Species	Notes
<b>Broad-winged Hawk</b> <sup>Br</sup>	<b>Observed on NJ Audubon field trip 05/21/21</b>
Eastern Phoebe	Observed on NJ Audubon field trip 05/21/21
Green Heron	Observed by Robin Irizarry on 08/11/21
<b>Little Blue Heron</b>	<b>Observed by Robin Irizarry on 08/11/21</b>
<b>Northern Parula</b> <sup>Br</sup>	<b>Observed on NJ Audubon field trip 05/21/21 (likely migrant)</b>
Northern Waterthrush	Observed on NJ Audubon field trip 05/21/21 (likely migrant)
Scarlet Tanager	Observed on NJ Audubon field trip 05/21/21
Solitary Sandpiper	Observed by Robin Irizarry on 08/11/21

<sup>Br</sup> = breeding season status only

**TABLE 16.** Full list of bird species observed at Petty’s Island, Pennsauken, NJ during seven years of standardized surveys (2014-2021). State-listed species are in red (E), blue (T), or green (SC) text. ‘x’ indicates detection during a point count or transect survey, “\*” denotes incidental detections between surveys, and “e” denotes a report from the Petty Island eBird hotspot<sup>1</sup> (two checklists from late April 2016 and 2017; five checklists between fall 2017 and breeding 2018; five checklists from April 2019; four checklists between fall 2019 and breeding 2020; and 18 checklists between fall 2020 and breeding 2021).

Species	Breeding 14	Fall 14	Winter 14/15	Spring 15	Breeding 15	Fall 15	Winter 15/16	Spring 16	Breeding 16	Fall 16	Winter 16/17	Spring 17	Breeding 17	Fall 17	Winter 17/18	Spring 18	Breeding 18	Fall 18	Winter 18/19	Spring 19	Breeding 19	Fall 19	Winter 19/20	Spring 20	Breeding 20	Fall 20	Winter 20/21	Spring 21	Breeding 21	
Acadian Flycatcher																									*					
American Black Duck		x	*	*			x	*	*		x	*		*		e		*						*			e	x		
American Bittern <sup>Br, SC(NB)</sup>																e														
American Coot																										e			*	
American Crow		x	*			*					x				x	e	*	x	x	e	*	x	x	x	x	x	x	x	x	x
American Goldfinch	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
American Kestrel											*										*	*	*		*	x	x	*	x	x
American Pipit																											e			
American Redstart		x		*	x	x		x	x			x	x	x		x	x	x		x	*	x			x	x	x		x	
American Robin	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
American Wigeon											*								x					x		e				
American Woodcock			*																x				*				x			
Bald Eagle <sup>Br, T(NB)</sup>		*	*			*			*	*	*	*	*	x	x	e			*		e	*	*	*	*	*	x	*	x	*
Baltimore Oriole		x		x	x	x		x	x	x		x	x	x		x	x	x		x	x				x	x	x		x	x
Barn Swallow						x						x				e					e				x	x	e		x	x
Belted Kingfisher		x		x										x		*		x	*	*	*	*			*	x	x	x	x	x
Black Vulture																e						*			*	*	*	*	*	*
Black-and-White Warbler		x		x				x				*		x		x		x		x		*		*			x		x	
Blackburnian Warbler												*		x		x		x		x				*				*		
Blackpoll Warbler				x												x					x					x	e		x	*
Black-throated Blue Warbler <sup>Br</sup>				*		*		x				x				x		x		x	x	x				x	x	x		
Black-throated Green Warbler <sup>Br</sup>																x		x		x	x	x				x		x		
Blue Jay		x		*		x	x	x				x	x	x		x		x	*	x	x				x	*	e	x	x	x
Blue-gray Gnatcatcher	x	*		x	x			x	x	*		x	x	x		x	x				x	x			x	x	x		x	x
Blue-headed Vireo <sup>Br</sup>																							x			*				
Blue-winged Teal				*				*																			e			
Blue-winged Warbler																				*		x								
Bobolink <sup>Br, SC(NB)</sup>																											c			
Broad-winged Hawk <sup>Br</sup>																											x			e

TABLE 16. (continued)

Species	Breeding 14	Fall 14	Winter 14/15	Spring 15	Breeding 15	Fall 15	Winter 15/16	Spring 16	Breeding 16	Fall 16	Winter 16/17	Spring 17	Breeding 17	Fall 17	Winter 17/18	Spring 18	Breeding 18	Fall 18	Winter 18/19	Spring 19	Breeding 19	Fall 19	Winter 19/20	Spring 20	Breeding 20	Fall 20	Winter 20/21	Spring 21	Breeding 21		
Brown Creeper		x												x	x	e		x	x			*	x	*		x	x	*			
Brown Thrasher <sup>Br</sup>																					*					x	x	*			
Brown-headed Cowbird	x	x	x	x	x	x	x	x	x		x	x	x		x	x	x		x	x			x	x	x	e	x	x	x		
Bufflehead			*				*				*				*	*			*							e	x				
Canada Goose	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Canada Warbler <sup>Br</sup>														x							*					e					
Canvasback															x																
Cape May Warbler																											e		*		
Carolina Chickadee	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Carolina Wren	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	*	x	x	x	x	x	x	x	
Caspian Tern <sup>Br</sup>														e									*			*					
Cedar Waxwing		x		x	x		x	x	x		*	x	x	x			x				x	x	e		*	x	x			x	
Chestnut-sided Warbler																										x		x	*		
Chimney Swift					*	x				x		x	x				*				e	x			x	x	e		x	x	
Chipping Sparrow																										e		*			
Chuck-wills-widow																*															
Common Grackle	*				x	x		*	x	x		x	x	*			x				e	x			x	x	x	x	x	x	
Common Loon			*																												
Common Merganser			*	*			*				*									*	*							*			
Common Raven		x		x	x	*								x														x	x		
Common Tern		*																													
Common Yellowthroat		x		x	*	*		x	x			x	x	x		x	x	x			x	e		x	x	x	x	x	*		
Cooper's Hawk <sup>Br</sup>			x			x								e							x					x	x	x	e		
Dark-eyed Junco		x	x	*		x	x	*		x	x			x	x	x		x	x			x	x	x		x	x	*	*		
Double-crested Cormorant	*	x	x	*	*	*				*		x	*	x		e		x			*	*	*	x	x	e	x	x	x	x	
Downy Woodpecker	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Eastern Kingbird	x			x	x			*	x			*	x			*	x				e	*			*	x			x	x	
Eastern Phoebe		x	*				x	x	x		x			x		x		x	x		*		x	x			x			e	
Eastern Towhee		x						x		x				x		e		x			x	x	x	x	x	x	x	*			
Eastern Wood-Pewee		x			x	x		x					x	x			x				x	x		x	x	x	x			*	
European Starling	*	*		*		*	x	x		*	x	*	*		x	x	x	x	x	x		x			x	x	x	x	x	*	
Field Sparrow							*									e	x				e					e	*	x	x	x	
Fish Crow				x	x								x		*	x				*	x		*		x	*		x	x	x	
Forster's Tern												e	*									*				*	*				
Gadwall			*								x				x			x	x					x			e	*	*		

TABLE 16. (continued)

Species	Breeding 14	Fall 14	Winter 14/15	Spring 15	Breeding 15	Fall 15	Winter 15/16	Spring 16	Breeding 16	Fall 16	Winter 16/17	Spring 17	Breeding 17	Fall 17	Winter 17/18	Spring 18	Breeding 18	Fall 18	Winter 18/19	Spring 19	Breeding 19	Fall 20	Winter 19/20	Spring 20	Breeding 20	Fall 20	Winter 20/21	Spring 21	Breeding 21		
Golden-crowned Kinglet		x	x			x	x			x	x			x	x	x		x	x			*				x					
Gray Catbird	x	x		x	x	x		x	x	x		x	x	x		x	x	x		x	x	x		x	x	x			x		
Gray-cheeked Thrush																*		x		x											
Great Black-backed Gull			x			*	*		*		*			*	*	e				*				*			e				
Great Blue Heron <sup>Br</sup>	*	x	x	*		x	x	*	*	x	x	*		x		x	x	x		e	*	*	x		x	*	x	*	x		
Great Crested Flycatcher	x	x		x	x	x		x	x			x	x			x	x	x		x	x	x		x	x	x	x		x		
Great Egret		*				x				*				*			*	x				*			x	*			x		
Great Horned Owl															x		x			*						x					
Greater Yellowlegs																x				e		*									
Green Heron		*			*	x				*				x		*		*		x	x	x		x			*		*	e	
Green-winged Teal		x	*	*		x	x	*		x	x			x	x	*		x	*		x	x		x			x	x	*		
Hairy Woodpecker		x	x	x		x	x		*	x	x	x	x	x	x	x	x	x	x	x	*	x	x	x	x	*	x	x	x	x	
Hermit Thrush		x	x	*		x		x		x				x		e		x	x	*	*	x		*			x		x		
Herring Gull	*	x	x	*		*	*		*	*	x			x	x		x		x	e	*	*		x				x	x		
Hooded Merganser		x																						x							
Horned Lark <sup>Br, SC(NB)</sup>																													x		
House Finch	*	x	x	x		x	x	x	x	x	x	x	x	x	x	*	x		x	x				x	x	x	x		x	x	
House Sparrow																				e							e				
House Wren	x	x		x	x	x		x	x	x		x	x	x		x	x	x		x	x	x		x	x	x	x		x	x	
Indigo Bunting	x																				x	x			x	x	*		*	x	
Killdeer	*	x						*	*					e		*				e	*	e		x	x	x	*		*	x	
Laughing Gull		x		x	x			x		*		x		e		e		x		x	*	*		x			e		x	x	
Least Flycatcher <sup>Br</sup>																x													x		
Least Sandpiper						x								e													*				
Lesser Scaup											*				x												e		x		
Lesser Yellowlegs																				e							e				
Little Blue Heron																														e	
Magnolia Warbler		x		x												x						*					e		*		
Mallard		x	x	*	*	x	x	x		x	x	*	*	e	x	x	*	x	x	x	x	*	*	x		e	*	x	x	x	
Marsh Wren																											e				
Merlin																			x								e				
Mourning Dove	*	x			*	*			*	x	x		x		x		*	x				*				e	x		e	x	
Nashville Warbler <sup>Br</sup>																*															
Northern Cardinal	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Northern Harrier <sup>Br, SC non-Br</sup>																					e										

TABLE 16. (continued)

Species	Breeding 14	Fall 14	Winter 14/15	Spring 15	Breeding 15	Fall 15	Winter 15/16	Spring 16	Breeding 16	Fall 16	Winter 16/17	Spring 17	Breeding 17	Fall 17	Winter 17/18	Spring 18	Breeding 18	Fall 18	Winter 18/19	Spring 19	Breeding 19	Fall 19	Winter 19/20	Spring 20	Breeding 20	Fall 20	Winter 20/21	Spring 21	Breeding 21		
Northern Flicker	*	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	*	x	x	x	x	*	x	x	x	x	
Northern Mockingbird		*		*				*		x			*		x	e	x			x				*	*	e	x	c	*		
Northern Parula <sup>Br</sup>				*				*				x		x		x				x					x		x	x	e		
Northern Pintail																										e					
N. Rough-winged Swallow					*					x						e				*				x	x	*	e		x	x	
Northern Shoveler															*					x											
Northern Waterthrush				*				x				*				x					x					x		x	e		
Orchard Oriole	*			x				x	*			x	x			x				*	x				*	*		*	*	*	
Osprey <sup>Br</sup>				*										*		e	*	*			e				*	e		*	x		
Ovenbird		x						x				x		x		x		x			x				x		x	x			
Palm Warbler				*										x		x					e		x	x	x		x	x			
Peregrine Falcon <sup>Br, SC(NB)</sup>																										e		x			
Pied-billed Grebe <sup>Br, SC(NB)</sup>							*									*										e					
Pine Siskin		x																								x					
Pine Warbler																e								x		e		*			
Prairie Warbler												*																	x		
Purple Finch																										e		*			
Red-bellied Woodpecker	x	x	x	x	x	x	*	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Red-breasted Merganser							x																								
Red-breasted Nuthatch										x									x		*						x		x		
Red-eyed Vireo		x		x								x	x	e		*	x				x	x			x	x	x	x	x	x	
Red-shouldered Hawk <sup>Br, SC(NB)</sup>	x	x		x		x	*		x		x	x	x		x	x	*	x	x	x			*		x	x	*	*	x	x	
Red-tailed Hawk		x	x						x		x		x			*	*	*			x	x	x		x	x	*	x	*	x	
Red-winged Blackbird	x	x	x	x	x		x	x	x		x	x	*	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Ring-billed Gull		*	x	*		x	x		x	*	x	x		x	x	x		*	x	*			x	x	*	x	*	x	*	x	
Ring-necked Duck			*												*											e	x	*			
Rock Pigeon																e								x		x	x	*	x		
Rose-breasted Grosbeak		x						x				x		e		x					*				x		*		x		
Royal Tern		*																													
Ruby-crowned Kinglet		x					x	x		x	x			x	x	*			x		x		x		x		x		x		
Ruby-throated Hummingbird													x							e	x		*		*	*			x	x	
Ruddy Duck																										e					
Rusty Blackbird				x				x													x							*			
Savannah Sparrow <sup>Br</sup>																										x		x			
Scarlet Tanager																x					*					e		x	e		



TABLE 16. (continued)

Species	Breeding 14	Fall 14	Winter 14/15	Spring 15	Breeding 15	Fall 15	Winter 15/16	Spring 16	Breeding 16	Fall 16	Winter 16/17	Spring 17	Breeding 17	Fall 17	Winter 17/18	Spring 18	Breeding 18	Fall 18	Winter 18/19	Spring 19	Breeding 19	Fall 19	Winter 19/20	Spring 20	Breeding 20	Fall 20	Winter 20/21	Spring 21	Breeding 20/21	
Semipalmated Sandpiper <sup>Br</sup>		*																				*								
Sharp-shinned Hawk					*								X									*					*			
Solitary Sandpiper		X				X								X															e	
Song Sparrow	X	X	X	X	X	*	X	X	X	X	X	*	X	X	X	X		X	X	e		X	X		X	X	X	X	*	
Sora		X																												
Spotted Sandpiper <sup>Br</sup>		*														*				*					*					
Swainson's Thrush				X								*		X		X											X		X	
Swamp Sparrow		X		X		*										*			X			X	X				X	X		
Tree Swallow		*		X	X		X	X				X	X			X			X	X	*	e	*	X	e	e	X	X	X	
Tufted Titmouse		X	X		X	X	X	X		X	X	X	X	X	X	e	X	X		X	X	X	X	X	X	X	X	X	X	X
Turkey Vulture																*					e			X	*	*	*	X	*	
Veery <sup>Br</sup>						X		*		X						*		X			e					X			*	
Warbling Vireo	X	X		X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	*		X	X
White-breasted Nuthatch		X	*		*					X	X							X	X							X	X	X	X	
White-eyed Vireo								X											X							X	X	X	X	
White-throated Sparrow		X	X	*		X	X	X	X	X	X	X		X	X	X		X	X	X		X	X	X	X	X	X	X	X	
White-winged Scoter																					e									
Wild Turkey	*	X	X			X	X	X	*	X	X	*	*	X	X	*	*	X	X	*	*	X	X		X	X	X	X	X	X
Willow Flycatcher					X				X				X	e			*					X				*			*	
Wilson's Warbler																						*						*		
Winter Wren <sup>Br</sup>		X				X	X				*					X						X				X	X	X	X	
Wood Duck	X	X	X	X	*		*	X	X	X	X	X	*	X	X	*	X	*	*	X	X	X	X	X	X	X	X	X	X	X
Wood Thrush <sup>Br</sup>		X										*									X				*		X	X	X	
Worm-eating Warbler <sup>Br</sup>																											e			
Yellow Warbler	X			X	X			X	X			X	X			X	X			X	X				X	X		X	X	
Yellow-bellied Sapsucker														X					X					X	X		X			
Yellow-billed Cuckoo	X	X		X				*				X	*	e		*	X					X	e		X				X	
Yellow-breasted Chat <sup>Br</sup>																													*	
Yellow-rumped Warbler		X	X	X		X	X	X		X	X	X		X	X	X			X	X	X	X	X	X	X	X				
Yellow-throated Vireo																													*	

<sup>1</sup> eBird checklists: 2016-2017 - Fred Lambert; 2017-2018 - Kyle Gallagher, David Weber, Shayna Marchese, Beth Freiday, and Doryce Wheeler; 2018-2019 - Barb Bassett, Etan Zeller MacLean, Ann Marie Morrison, Kelly Wenzel (NJA staff), and Emily Wilmoth; 2019-2020 - Chris Daly, Tykee James, and Emily Wilmoth; 2020-2021 – Scott Barnes (NJA staff), Gene Muller, Alex Bernzweig, Konstantin Mironov, John Vassallo, Dave Atkinson, Steve Mattan, Parry Rehn, Candice Burke, E. Cesarini, and Robin Irizarry

<sup>4</sup> The breeding season of 2014 was a partial season with only one survey visit in mid-July

<sup>Br</sup> = breeding season status only; <sup>T(NB)</sup> = Threatened status in non-breeding season; <sup>SC(NB)</sup> = Special Concern status in non-breeding season

**TABLE 17.** Additional bird species observed by McCort et al. (2010) during eight surveys in March-June 2010, but not recorded on our surveys or eBird checklists during the 2014-2021 time period.

<b>Species</b>	
Alder Flycatcher	Mourning Warbler
Bank Swallow	Northern Bobwhite
Bay-breasted Warbler	Purple Martin
Cliff Swallow <sup>Br</sup>	Snow Goose
Grasshopper Sparrow <sup>Br, SC(NB)</sup>	Tennessee Warbler
Great Cormorant	Wilson's Snipe
Iceland Gull	Yellow-bellied Flycatcher
Lincoln's Sparrow	

**FIGURE 1.** Aerial photos of Petty’s Island, Pennsauken, NJ showing the (a) industrial history of the island (top: 1930s; bottom: 2013) with original bird survey locations are shown for reference; and (b) restoration following removal of oil tanks and restoration of former container shipping area (May 2019, Google Earth Image) with the original survey locations and two new points/transects added during Winter 2019/2020.

(a)

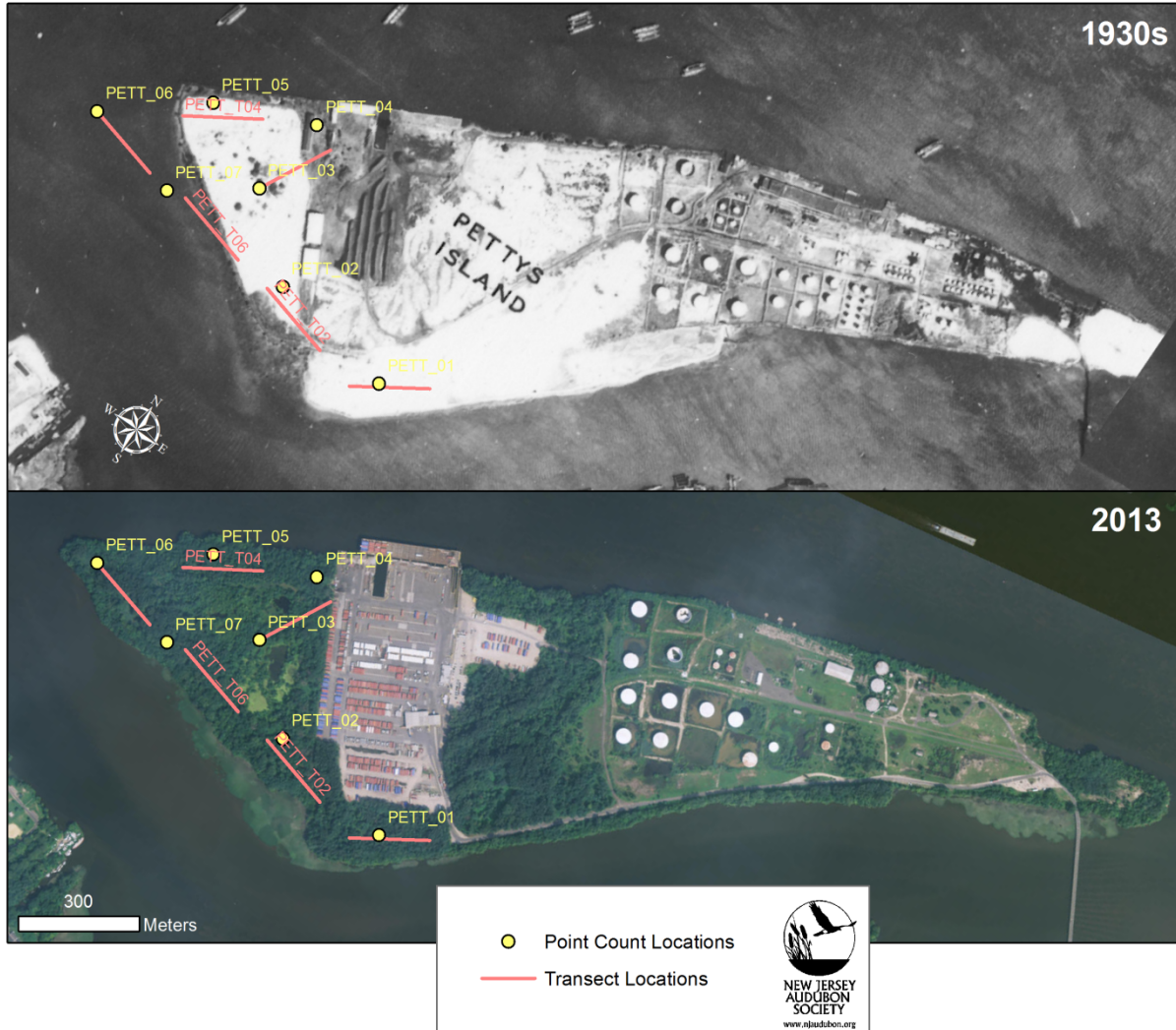
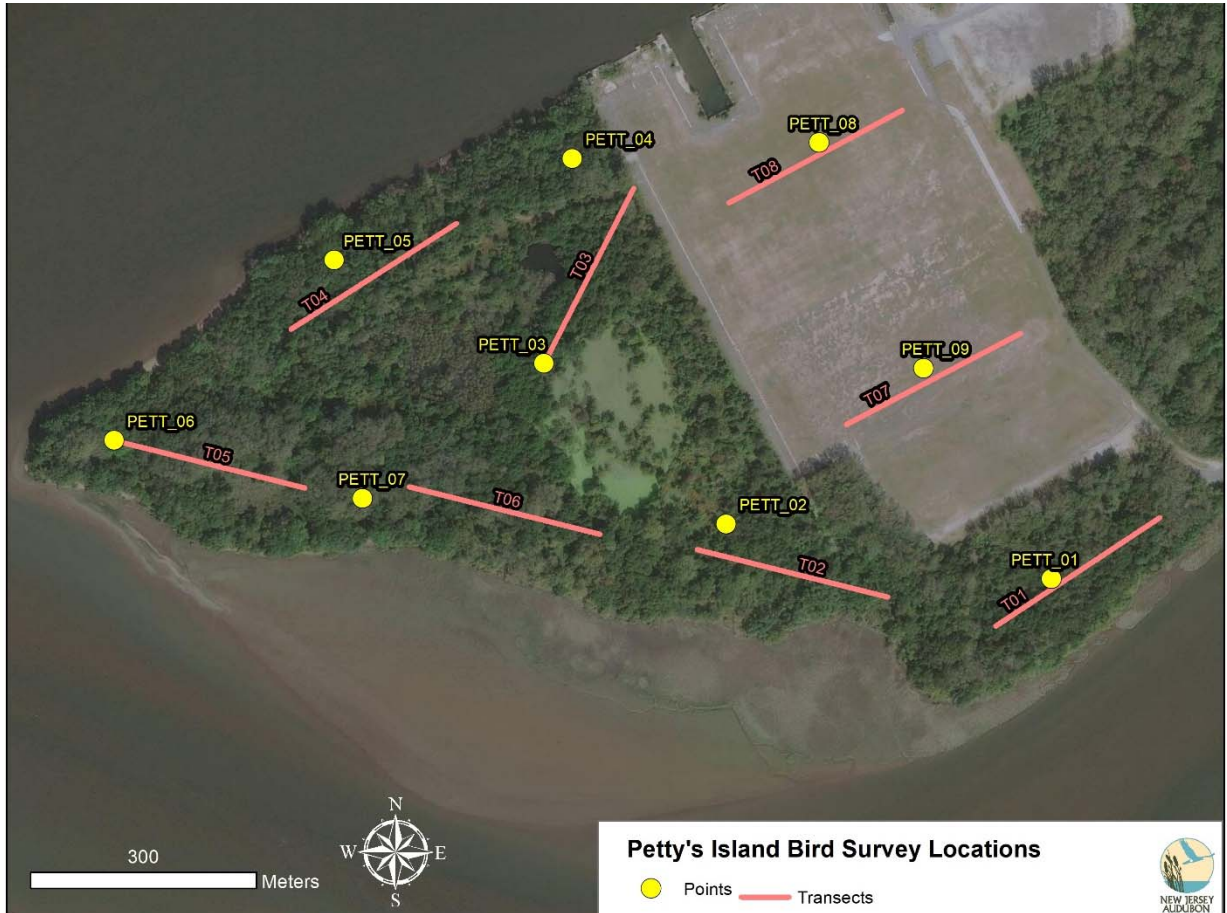


Figure 1 (cont'd).

(b)



**FIGURE 2.** Bird survey point and transect locations at Petty's Island, Pennsauken, NJ. Transects (red lines) are surveyed during fall migration and winter surveys. Points (yellow circles) are surveyed during spring migration and breeding season surveys. Two new transects (T07 and T08) were added to the survey beginning in Winter 2019/2020, and two new points (PETT\_08 and PETT\_09) were added in spring 2020.





**FIGURE 3.** Bird species richness (total number of species observed), by transect, during fall 2020 bird surveys at Petty's Island, Pennsauken, NJ.



**FIGURE 4.** Bird species richness (total number of species observed), by transect, during 2020-2021 winter bird surveys at Petty's Island, Pennsauken, NJ.



**FIGURE 5.** Total bird species richness (total number of species observed), by point, during 2021 spring migration bird surveys at Petty's Island, Pennsauken, NJ. PETT\_07 was not surveyed due to the close proximity to the active Bald Eagle nest.





**FIGURE 6.** Bird species richness (total number of species observed), by point, during 2021 breeding season bird surveys at Petty's Island, Pennsauken, NJ. PETT\_07 was surveyed only once, after the Bald Eagle young had successfully fledged.

