Horseshoe Island
2022 Report

Photo: Teri Bowers

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CONSERVE WILDLIFE
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NEW JERSEY DEP
Fish and Wildlife

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

EXECUTIVE SUMMARY

Horseshoe Island is an offshore island that has formed just southeast of the Little Egg Inlet. It was first observed as habitat for migrant and roosting birds in 2018 but nesting was not confirmed until 2021. It was immediately apparent that this island was critical to migratory, roosting, and nesting coastal avian species but that human disturbance could threaten to undermine its full potential. In winter 2022, the NJ DEP Fish and Wildlife petitioned the Tidelands Resource Council, whose jurisdiction the island falls under, for management rights. These were granted in March 2022 for a period of five years and included a seasonal closure to human use from March 1 - September 30 of each year.

NJ DEP Fish and Wildlife and Conserve Wildlife Foundation of New Jersey (working on behalf of Edwin B. Forsythe NWR) jointly collected avian biological data, human use data, and conducted outreach for the public. Monitoring commenced on April 15 and concluded on September 28. Biological monitoring objectives were to visit the site at least 3x/week (including both weekend days), conduct American Oystercatcher surveys at least 2x/week, and a migratory shorebird survey and breeding colonial species survey at least 1x/week. Staff posted informational signs around the perimeter of the island, focusing their efforts at the southwest and northwest landing areas. Public outreach was conducted on-site with boaters and off-site through stakeholder mailings, information on websites, and an informational video.

Over 25 avian species were documented using the island (including three federally listed and seven state listed species) for migratory, breeding, or roosting purposes. Five species were documented breeding, including Black Skimmer (largest and most productive skimmer colony in the state), Least Tern (largest Least Tern colony in the state), American Oystercatchers (posted above average productivity for the state), Royal Tern (northernmost colony in the world), and Common Tern (most successful beach strand colony in the state). Of note among the migratory species utilizing the island was Red Knot (a federally and state listed species) whose numbers peaked at 700, which represents a significant migratory flock for this highly imperiled species.

Signage and staff presence at the site educating the public about the closure reduced human disturbance as compared to 2021. Notably, breeding and migratory species were observed using the western side of the island (where the majority of boat landings take place) to a higher degree this year, signaling that the closure had a positive impact on increasing the amount of habitat available to the birds. As this was the first year of the closure, compliance, as expected, was mixed. Many people respected the closure but there were several groups that repeatedly landed on the island, verbally harassed staff, and would not abide by the closure.

The first year of management under the agreement with the Tidelands Resource Council was deemed a success, as there were more birds overall utilizing more areas of the island and they fledged more chicks than in 2021. To build on 2022's success, in 2023 partnering agencies plan to continue to engage in outreach efforts (both on and off-island), increase presence on the site by law enforcement, increase the number of site visits each week, and work towards collecting site use data in the non-breeding season. Horseshoe Island is an incredibly unique feature on the NJ coastline and given its ephemeral nature, it is imperative that it is given the highest degree of protection for as long as it persists.

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INTRODUCTION

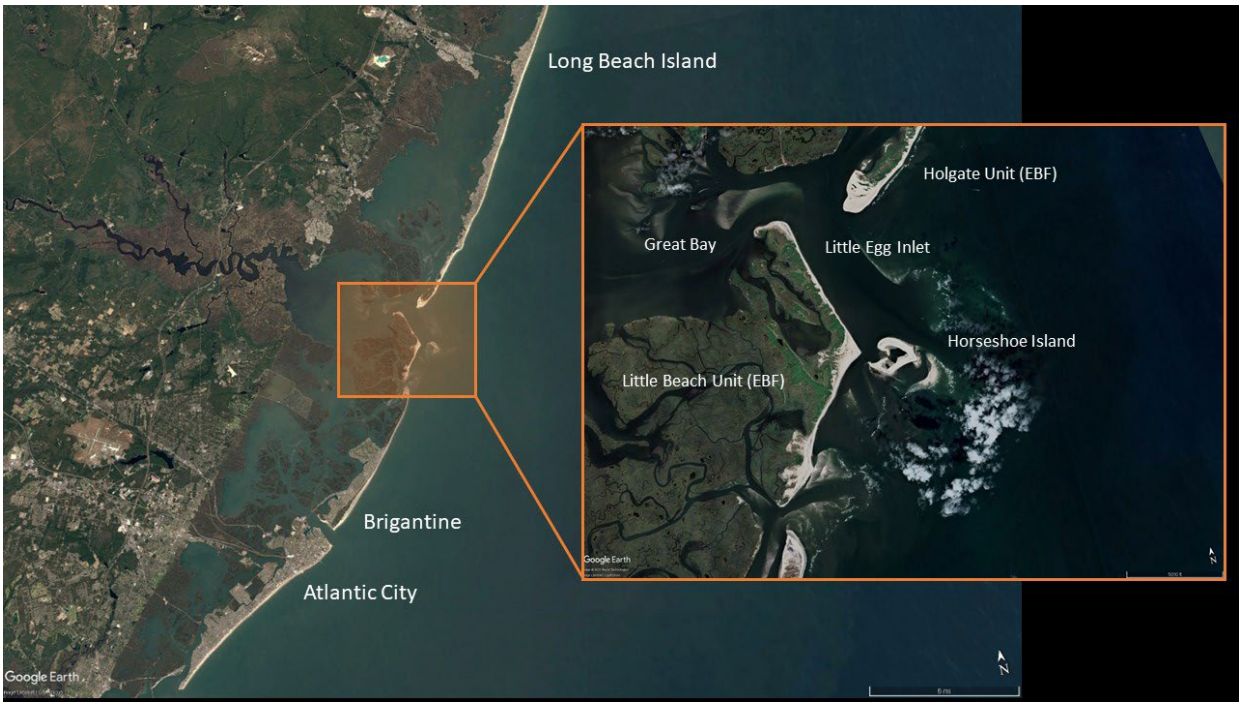

Figure 1. Location of Horseshoe Island

Horseshoe Island (HOIS) is located immediately south of and adjacent to the Little Egg Inlet just offshore of Little Beach Island, New Jersey (Figures 1). A shoal/bar that was tidally overwashed on a consistent basis was present in the same location for a number of years, however, more recently it has transitioned to an island that regularly remains above high tide (Figure 2).

Figure 2. Aerial view of Horseshoe Island, looking northeast

Shorebird nesting was first confirmed at HOIS in 2021, including by state endangered Black Skimmer and Least Tern, among other species. High numbers of migratory and staging shorebirds were also observed on HOIS that year, including the federally threatened/state endangered Red Knot. Many of the species using the island are identified as Focal Species of Greatest Conservation Need under the state's Wildlife Action Plan (NJSWAP, March 2018). The island is absent of mammalian predators, which is unprecedented in New Jersey, further increasing its importance.

At the same time, regular use of the island by the public for recreational purposes was also noted in 2021; many of those activities are not compatible with bird use, potentially limiting the reproductive success of nesting birds and disturbing other non-nesting species. Given the intersection of those factors, in the winter of 2022, New Jersey DEP Fish and Wildlife (NJFW) and the Edwin B. Forsythe National Wildlife Refuge (Refuge) petitioned the state's Tidelands Resource Council for management rights of the island to benefit its wildlife. The council approved a Management Rights Agreement (MRA) in March 2022 that included a provision to seasonally close the island and its adjacent tidal waters to all public uses from March 1 – September 30.

2022 was the first year that the MRA was in effect at HOIS. The perimeter of the island, especially those areas on the west side where boats typically land, were marked with signs indicating the public closure. Regular maintenance of signage was required due to periodic storms and tidal overwash of the site. Staff from NJFW and the Conserve Wildlife Foundation of New Jersey (CWF) (working on behalf of the Refuge) regularly visited HOIS from April-September to conduct biological monitoring. and help deter public usage. Several outreach strategies were implemented, as per the plan. When staff was on-site they attempted to educate the public regarding the closure, including through the distribution of an informational card (Appendix A). A video about HOIS and its importance for wildlife was produced by NJFW and included contributions from the Refuge and CWF (video can be viewed at https://youtu.be/7UTVuRU_aCQ). Email notifications about the importance of the island to wildlife and the closure were sent to various stakeholders and partners.

This report provides a detailed account of the nesting and other bird usage at the HOIS in 2022, as well as the monitoring and management effort conducted by NJFW, CWF, and the Refuge.

DESCRIPTION OF MONITORING

HOIS was co-monitored by NJFW and the Refuge, which were represented by staff from the Endangered and Nongame Species Program (ENSP) and CWF, respectively. CWF provided most of the on-the-ground monitoring, while ENSP took the lead on posting signage on the island and provided additional monitoring coverage. Both crews shared weekend monitoring and public outreach responsibilities. Both utilized NestStory, an internet-based data collection tool, to record and store all relevant monitoring data. This year, monitoring on HOIS began on April 15 and ended on September 28. Over the course of the season, the field staff provided monitoring coverage on a total of 72 site visits with 45 (62.5%) conducted by CWF, 20 conducted by ENSP (27.8%), and seven (9.7%) conducted by combined crews. In total, staff provided monitoring coverage on 29 weekend days and three federal holidays, representing 44% of the total site visits.

Compared to other beach-nesting bird sites in New Jersey, HOIS presented unique monitoring challenges due to its status as an offshore island that is only accessible by boat. As a result, monitoring efforts were particularly limited by tidal cycles and weather conditions. Crews were especially cognizant of high winds and swell, which

can make operating small watercraft through Little Egg Inlet unsafe. Taking these logistical restrictions into account, staff from each branch collaborated to achieve the following monitoring objectives each week:

1. Minimum of three site visits, including one weekday and both weekend days
2. Minimum of two American Oystercatcher nest/brood checks for each nesting/brooding pair
3. At least one comprehensive colonial species survey
4. At least one comprehensive shorebird/migrant survey

Monitoring Frequency

In the early stages of the season (mid-April - May), staff aimed to conduct one or two site visits a week on HOIS. Weekend coverage began on Memorial Day Weekend and continued for the remainder of the season in order to maintain staff presence during the most likely periods of high human activity. ENSP and CWF crews divided monitoring responsibilities on weekends, with each crew providing coverage on one weekend day. In addition to weekend coverage, staff aimed to conduct at least one weekday site visit, for a minimum total of three monitoring days each week.

Monitoring frequency changed throughout the season as nesting activity increased and management responsibilities intensified. In June, staff conducted surveys between two and three times a week. Monitoring efforts peaked in July and August when staff conducted between four and five site visits a week. After Labor Day, monitoring intensity decreased and staff provided coverage between two and three times a week. Site visit length varied depending on the scope and purpose of each mission. For example, short visits (between 30 minutes to an hour) could include checking a colony's status after suspected flood damage or sighting an American Oystercatcher brood on its fledge date. Longer visits (up to 5 hours) included thorough surveys, colony counts, nest/brood checks, and sign maintenance.

American Oystercatcher Monitoring

American Oystercatcher monitoring occurred from April 15 through August 30. Upon determining nesting territories for breeding oystercatcher pairs, staff searched for nests in microhabitats of interest (elevated hummocks and wracklines) within those territories using behavioral cues and tracking as aids. Once a nest was discovered, staff assigned an oystercatcher pair to the nest based on behavioral observations and band re-sights. Conditions permitting, staff aimed to perform at least two nest checks per nest each week with a visual confirmation of the egg count and status (e.g., laying, incubating, hatching, etc.). Estimated hatch dates were calculated by adding 28 days to the date staff determined the final egg was laid. Nests found at full clutch were given a "no later than" estimated hatch date, which was calculated by adding 28 days to the date of discovery. All egg and nest losses were recorded along with the suspected cause of loss (e.g., flooding, burial, depredation, etc.).

Once nests hatched, staff monitored the location and status of each brood. Similar to nest checks, staff aimed to conduct at least two brood checks each week with visual counts of the chicks and GPS coordinates marking the broods' locations on the island. Direct brood observations for oystercatchers can be difficult as adult oystercatchers are particularly sensitive to human disturbance and will hide their easily camouflaged chicks among piles of wrack. As a result, staff attempted to scope oystercatcher broods from a far distance whenever possible. If a brood could not be directly observed, staff used behavioral cues from the adults to help determine

if a pair was still brooding chicks. A brood's estimated fledge date was calculated by adding 35 days to the determined hatch date. Chicks were only considered fledged upon direct observation on their fledge date. To reduce uncertainty, broods were checked at least two additional times following their fledge date.

Colonial Species Monitoring

Staff monitored breeding colonies of Least Terns, Black Skimmers, Common Terns, and Royal Terns at Horseshoe Island. Populations of nesting birds were divided into two main colonies based on their location on HOIS. The "North" colony included birds nesting on the northern half of the island, while the "South" colony included nesting pairs located on the southern half.

Staff conducted colony counts at least once a week from late May through September, following survey protocols established by ENSP. Counts were performed for each species within the North and South colonies. Staff counted the total number of adults present within the colony as well as the total number of incubating adults, as indicated by sitting posture. The incubating adult count provided an estimate for the number of active nests, in lieu of a visual nest count that would require entering (and disturbing) the colony. Once hatching occurred, staff counted the number of downy chicks, feathered chicks, and fledglings present during each survey. Counts were generally conducted from the periphery of the colony to minimize disturbance, but staff did occasionally enter the colonies to confirm the presence of eggs or chicks. Depending on the size and complexity of the colony, multiple crew members would conduct independent counts and report an average to reduce outliers. Whenever possible, staff also re-sighted any banded adults present in the Black Skimmer and Royal Tern colonies. Any significant events impacting the status of the colonies, such as depredation, flooding, or human disturbance, were noted along with the date and general proximity to the colony. GPS coordinates were also recorded around the perimeter of each colony to record its general location.

Shorebird/Migrant Surveys

Staff conducted weekly shorebird and waterbird surveys at HOIS to assess how migrants and non-breeding species utilized the island. During these surveys, staff recorded the abundance of shorebirds and waterbirds foraging and/or roosting on the island and its adjacent sandbar. Birds were identified to the lowest taxonomic level possible based on expertise and sighting conditions. Migrant colonial species such as Royal Terns and Common Terns were distinguished from the breeding colonies already present on the island and were counted separately. The complete list of nonbreeding species observed on HOIS in 2022 can be found in the avian use section, below.

Additional Monitoring Responsibilities

In addition to the four primary monitoring objectives, staff performed tasks as needed including sign maintenance and public outreach. In an effort to provide education about the island's closure and help discourage unauthorized boat landings, staff installed the following signage on Horseshoe Island (Appendix C):

- Two large format "Area Closed" or "No Landing" signs in the most commonly used landing zones (the southwestern corner and the northwestern corner).

- One large QR code sign at the north end of the island, which provided a link to the NJFW webpage about HOIS (https://dep.nj.gov/njfw/conservation/horseshoe-island/) It was designed to be large enough to scan from a passing boat, without landing.
- Small format signage along the perimeter of the island with information regarding the island's closure.

Signage was originally posted around the perimeter of the island in mid-April, but staff regularly repaired and replaced signposts throughout the season in response to flooding events and suspected theft. All signage was removed from the island on September 28, which marked the conclusion of the monitoring period and was just in advance of the public closure period.

Public outreach was conducted primarily on weekend monitoring days and involved educating the public on the seasonal closure and distributing informational postcards (Appendix A). To record human activity on HOIS, staff documented all watercraft landings on HOIS and its surrounding areas by recording the number of people, boats, jet skis, and dogs present. Whenever possible, staff recorded watercraft registration numbers, descriptions of disturbance, and notes about boater interactions, which are all maintained in a database. To supplement human use surveys taken during HOIS site visits, CWF staff conducted 26 additional surveys during routine monitoring days at Little Beach Island when the west side of HOIS could be directly observed from Little Beach. Surveys from Little Beach were conducted during periods of low human activity (weekdays) and represented brief (approximately one hour) durations.

AVIAN USE

Breeding and migratory bird species were observed using the entirety of HOIS throughout the seasonal closure (March 1 – September 30). While breeding and migratory use of the island overlapped, the species groups varied. Breeding birds at HOIS were comprised of state-listed beach-nesting bird species: Black Skimmer (endangered), Least Tern (endangered), Common Tern (species of special concern), and American Oystercatcher (species of special concern). While not uncommon migrants in the state, Royal Terns (not listed) were an exceptional addition to the species suite breeding on HOIS. Royal Terns typically limit breeding south of the Delmarva peninsula so the colony at HOIS was the northernmost known colony on the east coast. They have been observed nesting before in New Jersey – Hereford Inlet (2008, 2009, 2015, 2016) and Horseshoe Island (2021). Piping Plovers (federally threatened, state endangered) were noted utilizing the habitat during the breeding season. Nesting Piping Plovers were not observed; however, marked breeding adults from nearby nesting sites were frequently observed foraging. Marked migrant Piping Plovers from other regions were also noted using the island. Notable sized flocks of Red Knots (federally threatened, state endangered) were observed using HOIS to roost and forage on both their south- and north-bound migrations.

Breeding Use

The first **American Oystercatcher** nest on the island was recorded April 15. By the end of the breeding season, a total of ten pairs nested on HOIS. This was a 67% increase in pair number over 2021 (six pairs). Pair distribution was widespread across the island utilizing the entire habitat for breeding. Because of limited management of public use in 2021, the western edge of HOIS became the landing area for many recreational boaters thereby limiting its functional use for birds. The seasonal closure deterred some human use of the western edge, and two Oystercatcher pairs utilized those areas to rear chicks. Pair-nest success (the percentage of pairs that successfully hatch at least one nest) was considerably high compared to the state-wide total (80%

pair-nest success on Horseshoe, 29% pair-nest success for the state). This is not surprising considering the lack of mammalian predators on the island. Sites elsewhere in the state were plagued with predation issues (accounting for 52% of nest loss statewide). There were 20 nest attempts on the island by American Oystercatchers: eight nests hatched, 11 failed, and one unknown outcome of whether the nest hatched or failed (Figure 3). Of the failed nests, ten were lost to flooding and one was lost to avian predation. A total of 13 chicks hatched from eight pairs. Ten chicks successfully fledged resulting in a fledge rate of 1.00 fledglings/pair, twice the rangewide recovery target of 0.50 fledglings/pair established by the American Oystercatcher Working Group. From a statewide perspective, this was one of the most successful sites considering the statewide fledgling rate was only 0.30 fledglings/pair. The success of American Oystercatchers at this site is largely due to low predator pressure and ample opportunities for foraging when disturbance is low.

Figure 3. Location and fate of 2022 American Oystercatcher nests

Colonial nesting waterbirds are comprised of interspecific species groups that prefer nesting in large numbers with nests as close as one to two yards from each other. Nest specific data is not collected in the same manner for colonial nesting waterbirds as compared to territorial nesting shorebirds (American Oystercatchers) due to lower levels of disturbance tolerance. Colonial nesters were first noted on the island on May 11 (Least and Common Terns). The colonial waterbird colony formed on the northern berm with a small, separate colony formed on the southern berm of the island. As the season progressed, failed breeders from other locations (particularly Black Skimmers) joined the Horseshoe colony, expanding the boundary to the western edge of the island.

Least Terns had a peak count of 371 total breeding adults with 245 incubating adults during the June 5 – June 11 census week. In terms of habitat utilization, Least Terns were noted foraging and roosting across the entire island. Breeding Least Terns were congregated on the northwestern berm, and hosted the largest colony counts in the state until a flood event occurred the second week of June. Recurring flooding events limited nest and fledgling success rendering low productivity (9 total fledglings). Compared to last year, breeding Least Tern use of HOIS declined 21% , possibly as a result of low success due to flooding in 2021. It should also be noted that with an increase of the other colonial nesting species in 2022, it is possible Least Terns were pushed into potentially less desirable and more flood-prone areas as their diminutive size makes it difficult for them to compete with the larger species for optimal habitat.

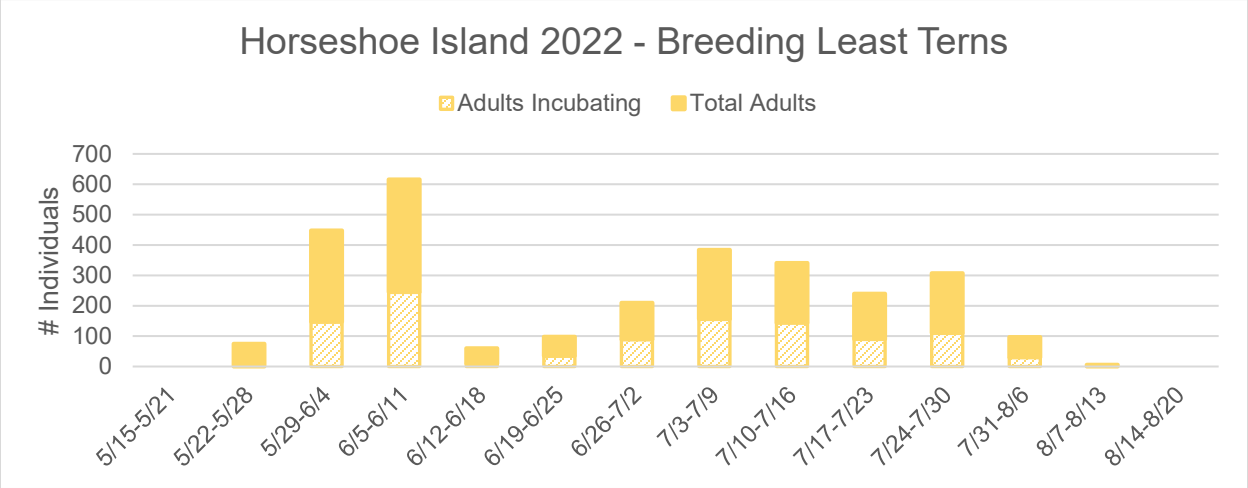

Figure 4. Total breeding Least Tern adults and proportion incubating, by week.

Common Terns had a high count of 158 total breeding adults with 85 incubating adults during the June 26 – July 2 census week. The birds were concentrated on the northern berm with a small colony expanding to the southern berm. Common Terns are not monitored statewide (they nest on beaches and in the marsh) so it is difficult to put into perspective the site's overall contribution to regional productivity and success. However, HOIS was the most productive of the state's colonies that were monitored in 2022. Flooding was the primary threat to Common Terns at HOIS although some success was achieved. Approximately 65 chicks fledged from the island. Considering the number of adults on the island, 65 fledglings was a moderate success for this species when comparing trends to more intensely monitored species such as Least Terns and Black Skimmers.

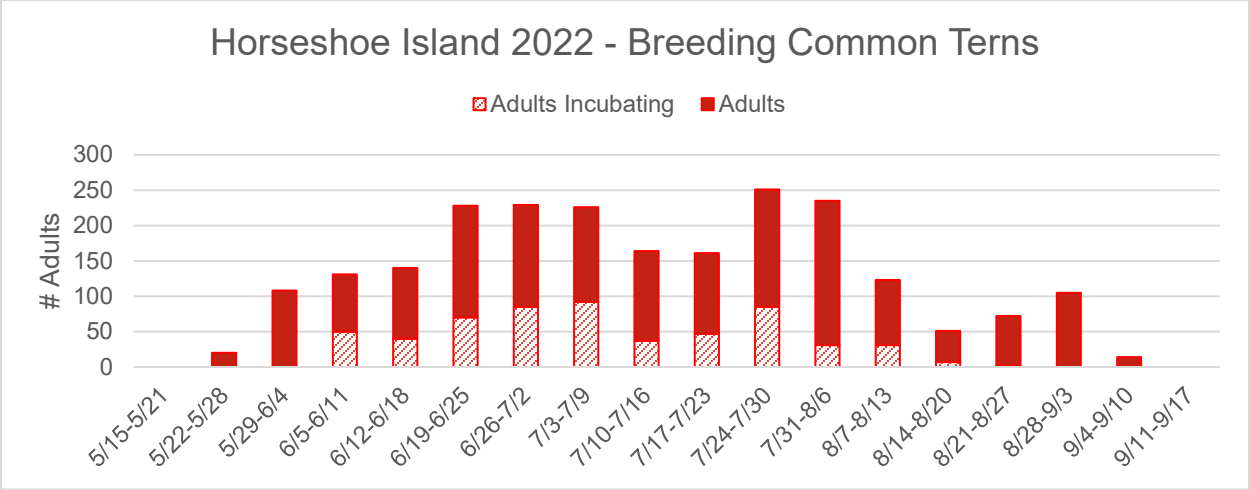

Figure 5. Total breeding Common Tern adults and proportion incubating, by week.

Royal Terns nested successfully on HOIS for the second consecutive breeding season. Northeastern Royal Terns breed along coastal Virginia south to Florida, with an irregular colony forming in southeastern Maryland (Buckley et al. 2021). Although they have been recorded previously nesting in New Jersey (2007, 2008, 2015, 2016, 2021), this unusual colony highlights the ecological importance of HOIS. Royal Tern habitat, as described in Birds of The World, "is barren sandy barrier beaches…typified by inaccessibility, high visibility, the absence of mammalian predators, and surrounded by shallow waters near the mouth of bays" (Buckley et al. 2021). The island offers all requirements of ideal Royal Tern habitat. The first occurrence of Royal Terns was noted on June 2. Two weeks later (June 15), the first nests were confirmed within the Black Skimmer and Common Tern colony. A peak count of 180 breeding adults were recorded on the island with 90 incubating nests during the July 17 – July 23 census week. Royal Terns utilized the northern berm habitat and were within the center of the waterbird colony. A total of 45 Royal Tern fledglings were produced. In addition to hosting a successful breeding colony, HOIS offered refuge to many migrant and staging flocks of Royal Terns from mid-July through September. A high count of 855 adult Royal Terns was recorded on August 22. Several migrant and breeding Royal Terns were marked adults that were banded in Virginia.

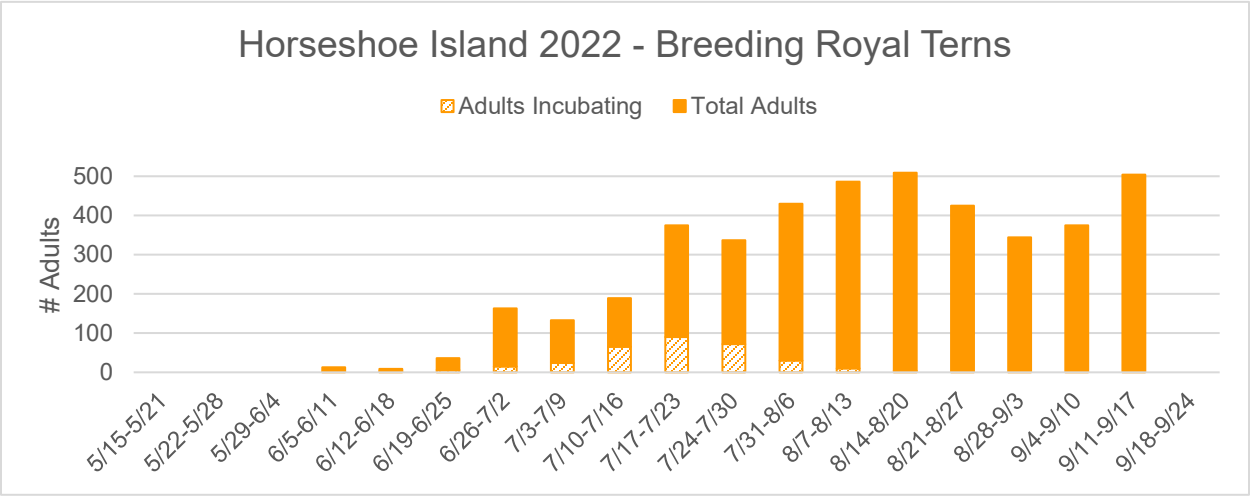

Figure 6. Total breeding Royal Tern adults and proportion incubating, by week.

Black Skimmers nested at seven known colonies statewide but only found success at HOIS (a small number of skimmers may have nested undetected in the state, mainly on the marsh islands). The habitat provided refuge to colonies that had collapsed elsewhere, and it produced the majority of fledglings in the state. Black Skimmers were first observed scouting the habitat on May 20. The colony grew to a peak count of 2,086 breeding adults with 1,080 incubating throughout the season (May – September). Due to failures elsewhere in the state and the continuous immigration of adults from failed sites, the skimmer colony expanded onto the eastern berm, and a small separate colony formed on the southern berm. The Black Skimmer colony fledged a total of 402 chicks and accounted for the vast majority of skimmer fledglings statewide in 2022. A portion of the immigrant birds did not breed due to the late occurrence of failures at other colonies but did utilize the habitat to forage and roost. It is believed that HOIS hosted the entire state's population of Black Skimmers in August. Several skimmers were previously marked in New Jersey and were tracked between all breeding sites accounting for the confirmation of movement between colonies.

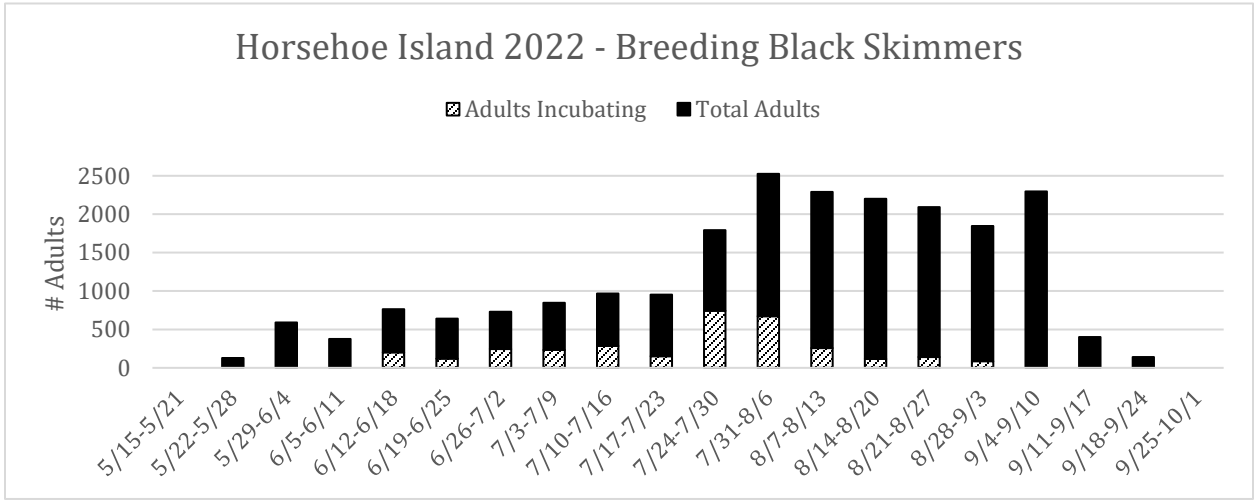

Figure 7. Total breeding Black Skimmer adults and proportion incubating, by week.

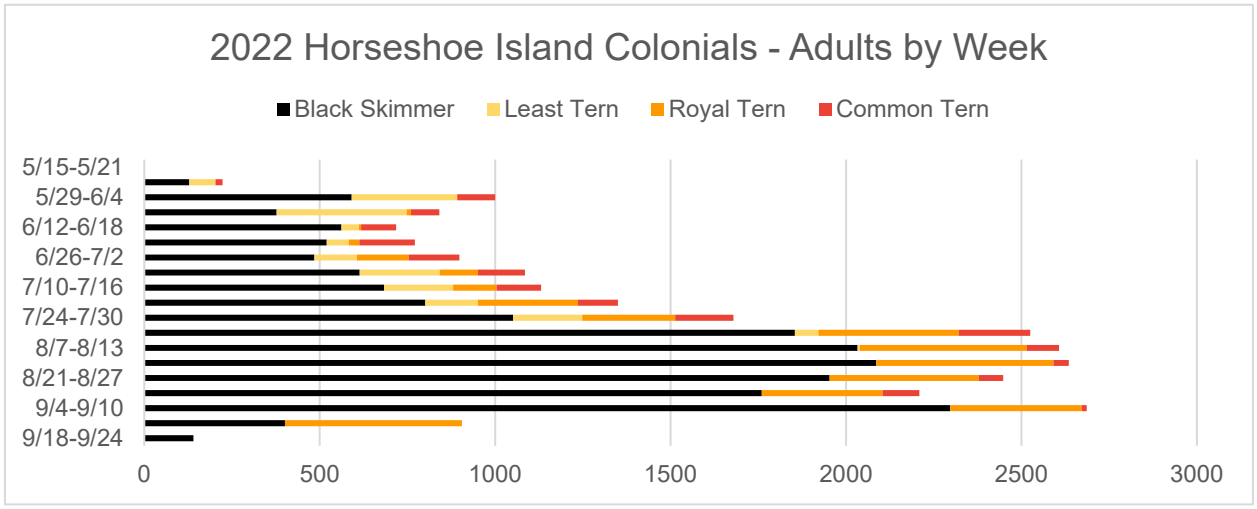

Figure 8. Total breeding adults, all colonial species, by week.

Figure 9. Approximate extent of 2022 tern and skimmer colonies. See Appendix B for species-specific colony perimeters

Migratory Use

Horseshoe Island was used as a migratory stopover site by a variety of shorebirds and other avian species along coastal New Jersey (see Table 1 for full species list). Several shorebird and waterbird species were noted on the island throughout the season which further highlights the island's importance as a disturbance-free refuge for otherwise frequently disturbed bird species. Migrants regularly used the entirety of the island but were particularly attracted to the lagoon area and the intertidal waters surrounding the island for foraging. Roosting migrant flocks were widespread across the island. While the island was used by a diverse group of bird species, this report section will focus on species with priority listing status and/or notable use of the island: Red Knots (federally threatened, state endangered), Piping Plover (federally threatened, state endangered), and Brown Pelican (stable).

Table 1. All avian species observed on HOIS

Species Common Name	Scientific Name	State Listing Status[1]	Breeding on HOIS
Brown Pelican	*Pelecanus occidentalis*	S	N
Double-crested Cormorant	*Phalacrocorax brasilianus*	S	N
Snowy Egret	*Egretta thula*	SC	N
Bald Eagle	*Haliaeetus leucocephalus*	E	N
Peregrine Falcon	*Falco peregrinus*	E	N
Black-bellied Plover	*Pluvialis squatarola*	S	N
Semipalmated Plover	*Charadrius semipalmatus*	S	N
Piping Plover*	*Charadrius melodus*	E	N
American Oystercatcher	*Haematopus palliatus*	SC	Y
Willet	*Tringa semipalmata*	S	N
Rudy Turnstone	*Arenaria interpres*	S	N
Sanderling	*Calidris alba*	SC	N
Red Knot*	*Calidris canutus*	E	N
Dunlin	*Calidris alpina*	S	N
Semipalmated Sandpiper	*Calidris pusilla*	SC	N
Short-billed Dowitcher	*Limnodromus griseus*	S	N
Laughing Gull	*Larus atricilla*	S	N
Ring-billed Gull	*Larus delawarensis*	S	N
Herring Gull	*Larus argentatus*	S	N
Great Black-backed Gull	*Larus marinus*	S	N
Caspian Tern	*Sterna caspia*	SC	N
Royal Tern	*Thalasseus maximus*	S	Y
Common Tern	*Sterna hirundo*	SC	Y
Forster's Tern	*Sterna forsteri*	S	N
Roseate Tern*	*Sterna dougallii*	E	N
Least Tern	*Sternula antillarum*	E	Y
Black Skimmer	*Rhynchops niger*	E	Y

[1] *Status Codes: E=Endangered, T=Threatened, SC=Special Concern, S=Stable*
** Federally listed species*
Species Listing Source: Species Status Review of Birds- DRAFT APRIL 2017

Red Knot occurrence was prioritized during shorebird surveys that were conducted each week. Nineteen surveys included Red Knot sightings, a notably high consistency of use. The site hosted a large flock of knots (approximately 700) on July 27. The flock persisted for two days utilizing the habitat to roost and forage. Previously collected geo-locator data from Red Knots indicate that many Northeastern birds depart the US on long migratory flights over the ocean during their southbound migration (USFWS, 2021*)*. Some make additional stops along the way while others complete their migration uninterrupted to wintering grounds in South America. Data from satellite-tagged Red Knots showed use of the island in 2020 and played a role in expanding the USFWS proposed Critical Habitat designation for Horseshoe and the surrounding shoals (W.Walsh, personal communication, December 12 and 21, 2022). The satellite data showed that knots used the island as part of a habitat complex that also includes the Refuge and adjacent state lands. The proximity of HOIS to these other protected areas increases the island's value for migrating knots by allowing birds to shift among habitats based on food, predators, disturbance, weather, tides, and other conditions.

Piping Plovers were regularly observed on the island throughout the breeding and migratory season. Directly adjacent to HOIS is the Refuge's Holgate and Little Beach units. Holgate and Little Beach host the largest percentage of breeding Piping Plovers in New Jersey. Breeding adults were observed in courtship on the island on May 5. Breeding behavior was not detected after May 20, and no known nesting occurred. Many breeding

adults between Holgate and Little Beach are marked plovers from previous research studies in New Jersey. At least five marked adults from other nesting sites were observed foraging on the island throughout the breeding season. Many unmarked adults were also noted using the island - particularly in spring and fall - indicating that this site is of relative importance to migrating Piping Plovers.

Brown Pelicans were also regularly observed roosting on HOIS in 2021 and 2022. Brown Pelicans are a regular occurrence during the summer months in New Jersey, but large roosting flocks are uncommon. The high count of Brown Pelicans on HOIS in 2022 was 250 adults and juveniles on August 13. Only two other records of high counts above or nearing 250 Brown Pelicans exist in eBird records for New Jersey. Use of the island was mostly spread across the eastern berm and the emergent shoal directly east of HOIS proper. The intertidal waters surrounding the island, which provided excellent foraging opportunities, were heavily used by pelicans.

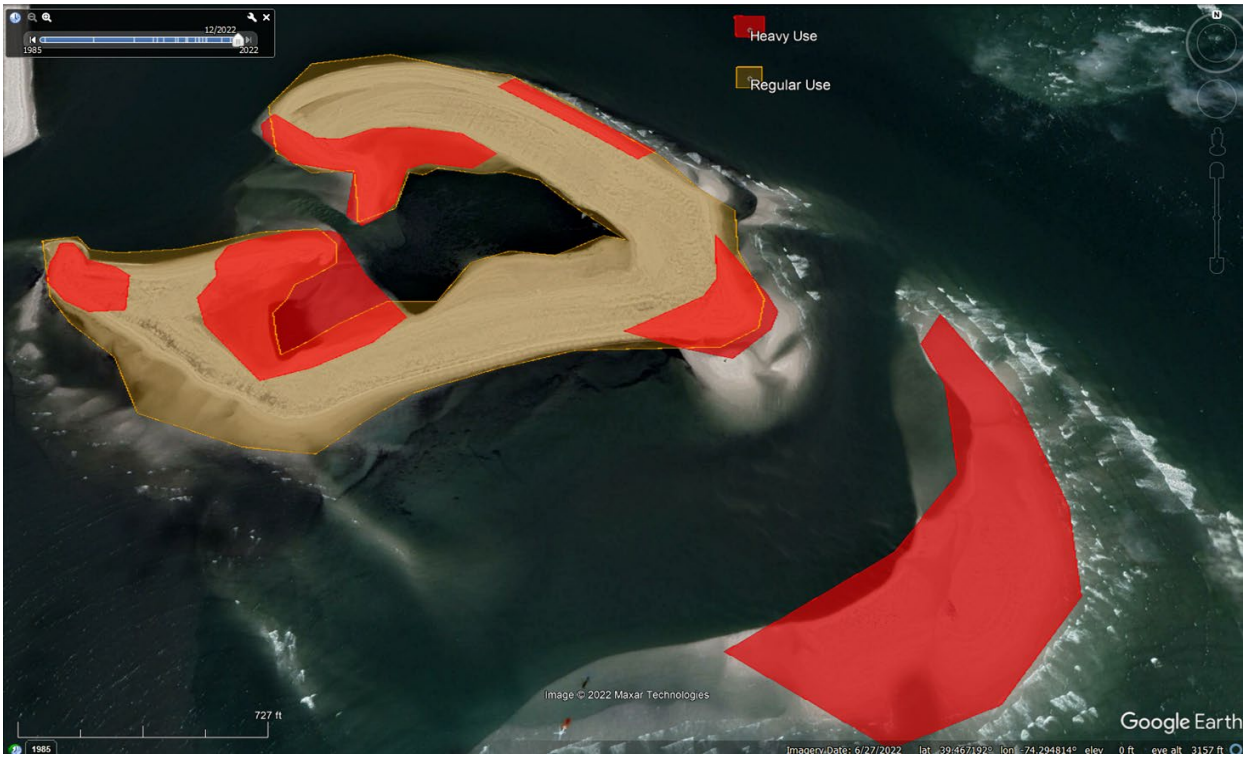

Figure 10. Use of HOIS by migratory species

HUMAN DISTURBANCE

Watercraft landings on HOIS and/or the adjacent sandbar were recorded on 33, or 45.8% of the 72 site visits. As expected, human activity increased as the spring gave way to summer and was higher on weekends/holidays, which represented 24 (72.7%) of days with recorded landings. Supplemental reports taken on weekdays from Little Beach only captured landings on two (7.7%) of 26 total weekday surveys, which further highlights the popularity of weekend landings.

Although monitoring began in April, the first recorded public boat landing did not occur until May 28, during Memorial Day Weekend. The number of landings steadily increased in the following months with 11 total

watercraft landings recorded in June and 26 landings in July. Human use patterns began to shift in August when boaters elected to land on the isolated sandbar just east of HOIS proper. Watercraft landings on the eastern sandbar were recorded on 17 site visits from July 30 through September 18, averaging approximately 55 people, 11 boats, and three jet skis observed per visit. In August, human activity was generally higher on the sandbar with approximately 125 total landings compared to 42 landings on the main island. The vast majority of August landings on HOIS were recorded on two peak activity events, each with approximately 55 people (14 boats on August 7 and 20 boats on August 21) recorded on the island. Human activity on the eastern sandbar peaked shortly after, on Labor Day Weekend, when at least 214 people, 43 boats, seven jet skis, and seven dogs were recorded on Sunday, September 4. The frequency of public landings decreased throughout the rest of September after the Holgate Unit of the Refuge reopened to the public and provided an alternative landing site.

While many boaters complied with the staff's outreach attempts, a small but significant portion deliberately disregarded the island's closure and intentionally landed on the island multiple times throughout the season. At least ten boaters (confirmed by pictures and registration numbers) were recorded landing at HOIS, or the adjacent sandbar, at least two times throughout the season. Of the ten registered boaters with repeat landings, at least four persistently challenged the island's closure by repeatedly landing at the southern end of HOIS throughout the season, despite outreach attempts from both NJFW and CWF staff. When approached by staff members, these boaters refused to cooperate and verbally challenged the legitimacy of the island's closure. Multiple boaters also attempted to avoid documentation by obscuring their boat registration numbers and peeling off registration stickers. One such boater, who was particularly vocal, landed on HOIS at least six times throughout the season (from June 4 to Aug 28) even after interaction with law enforcement on one occasion in July. The same boater also expressed his intention to organize a group of boaters to land on the island, which may be evidence that peak activity days (like those seen in August) resulted from coordinated efforts between boaters.

The southern half of HOIS is typically more susceptible to boat landings since it is more sheltered from wave activity. As a result, human activity from repeat offenders was particularly disturbing to brooding oystercatchers and colonial birds located on the southern end. For example, one repeat offender directly disturbed an oystercatcher brood located on the southwestern corner of the island and refused to move when staff informed him of the disturbance. Staff also recorded multiple instances in which roosting flocks of Black Skimmers and terns flushed from the southern end in response to boat landings. While the sandbar redirected some human activity away from HOIS, large flocks of roosting pelicans and terns were regularly flushed from their preferred roosting habitat on the sandbar as boat landing patterns shifted. The closure also resulted in unintended consequences for Little Beach; boaters redirected from HOIS chose to land on Little Beach Island, which hosts breeding populations of Piping Plovers and American Oystercatchers and is federally protected. Staff recorded at least 26 watercraft landings on Little Beach from May 28 to July 23.

Overall, the posted closure was successful in influencing some boaters' behavior. Staff recorded at least 23 instances of watercraft approaching HOIS (presumably intending to land), but turning around immediately after noticing the "No Landing" signage or interacting with staff. Public outreach attempts with boaters who purposefully ignored the signs identified a potential communication gap regarding the physical extent of the island's closure. The most common argument from trespassers was that they were exempt from restrictions while below the mean high tide line. However, the intertidal zone is specifically included under the MRA and is permitted to be closed in order to reduce disturbance to foraging birds. Members of the public either did not

understand the unique stipulations of the closure, or they based their argument on other closures in which the land below the mean high tide line is exempt under the state's Public Trust Doctrine. Targeted outreach may be needed to clarify the boundaries of HOIS's closure compared to other sites in New Jersey.

RECOMMENDATIONS

- Continue to conduct outreach on the island to educate members of the public about the use of the site by nesting and migrating birds and to convey details of the seasonal closure.
- Continue to conduct outreach off-island through traditional media (newspapers, magazines) and social media. This could include targeted posts with nesting updates and creating additional videos to share with the public.
- Increase presence on the site by law enforcement to reinforce the seasonal closure.
- Increase biological monitoring frequency to a minimum of 4x/week.
- Investigate the feasibility of monitoring the island year-round to provide data on the importance of the site to wintering birds. This could include in-person visits as well as mining spatial data that is collected via GPS tags on a myriad of species.
- Increase protection efforts for the sandbar east of the main island. This bar provides important roosting habitat and is included in the protections afforded by the MRA.

CONCLUSION

Although there are still improvements to be made in coming years, the first year of management under the MRA was a success. The island attracted a wide variety of species, including many listed species, who used the site for migrating, roosting, and/or nesting. More birds occupied the island than in 2021 and their distribution suggested that the seasonal closure to human use, while not entirely effectual, was a successful strategy to ensure greater use of the island by avian species.

Staff presence on the island greatly contributed to the effectiveness of the closure, but improvements can be made to further protect the birds from human disturbance. These will include additional monitoring site visits by seasonal staff, increased law enforcement presence, and more outreach efforts.

The biological data collected in 2022 was greater in both quantity and quality compared to data collected in 2021 (when site visits were limited to 1x/week due to limited resources). This allowed biologists to document the avian use of the island in a more comprehensive manner and to highlight its immense value to these coastal species. Although HOIS has not been a feature of the NJ coastal landscape for very long, it has quickly become one of the most significant sites for avian species in the state. This rapid colonization is due in part to the opportunistic nature of these species and harkens back to a different time, when habitat would move and shift in ways that are largely impossible now, due to the stabilization of much of the coast. However, when habitat like HOIS develops, the birds' strong response indicates just how valuable it is. As such, it is incumbent upon species managers to protect the island to the highest degree possible for as long as it persists.

LITERATURE CITED

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New Jersey Department of Environmental Protection. 2018. New Jersey's State Wildlife Action Plan. New Jersey Dept. of Environmental Protection, Division of Fish and Wildlife, Trenton, NJ.

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Appendix A. 5x7 Informational postcard, front and back

Horseshoe Island – A Very Special Place

This newly formed island is used by birds and is protected for them.

It is important to avoid disturbing birds on this site, which is closed March 1 – September 30

Questions? Contact us!

Call 609-652-1665 or
Email: forsythe@fws.gov

Call 609-628-2103 or Email:
ENSPTrentonvoicemail@dep.nj.gov

Did You Know?

- Horseshoe Island is critically important for birds
- Many birds flew thousands miles to get here
- This site is perfect for nesting and resting
- You can help! Please avoid landing on this island

March 1 - September 30

Appendix B. Species-specific approximate colony locations

Appendix C. Photographs from 2022

C1. Examples of bird activity

Skimmers and terns roosting

Skimmer hatchling

Royal Tern colony
Photo: Emmy Casper

Black Skimmer Colony

Willets

C2. Examples of human disturbance

People landed with unleashed dog in view of “Area Closed” sign

Boaters utilizing east sandbar

Boaters utilizing east sandbar

People landed in view of “No Landing” sign

C3. Examples of signage

HOIS QR code sign

Small “Island Closed” sign

Large “Area Closed” sign

Small “No Landing” sign

Large “No Landing” sign