

2008 NESTING SHOREBIRD REPORT

Dead Neck-Sampsons Island, Barnstable, Massachusetts

prepared by

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Executive Summary

Dead Neck Sampson's Island was monitored and managed by Mass Audubon's Coastal Waterbird Program for nesting Piping Plovers, Least Terns, Common Terns, and American Oystercatchers during 2008. Willets and Spotted Sandpipers nested on the island, though they were not monitored. There were a total of 16 pairs of Piping Plovers that nested on the island. The total number of known eggs laid was at least 96, with 31-39 chicks hatched. Of those chicks, 17 survived to fledge for an overall productivity of 1.06 fledglings/pair. Productivity of Piping Plovers was heavily influenced by both nest predation as well as low chick survival. At least 47% of 32 nest attempts were lost to predation, which is significantly higher compared to 2007 (20%). Washover, though a potential cause of at least two to three nest losses that were unknown, was not identified as a significant factor compared to previous years (20% of nest loss in 2007). Only 44-55% of chicks that hatched survived to fledge; causes of chick loss were not determined but we suspect high rates of predation, lack of available foraging habitat and refuge due to human presence, habitat structure (i.e., severe erosion and the creation of a habitat "trap" on the eastern end of the Island), human disturbance, and weather likely influenced fledging and survival rates of chicks.

A total of 8 pairs of Common Terns, 196 pairs of Least Terns and 1 pair of American Oystercatchers nested on the island. To our knowledge, this is the first record of American Oystercatchers attempting to nest here in at least 20-30 years. Again, productivity of each of these species was heavily influenced by predators, despite use of electric fencing around almost all nests. Least Tern produced an estimated maximum of 18 fledglings for both colonies. Though chicks hatched on both the Sampsons and Dead Neck ends for Common Terns, only three chicks were known to survive to fledging, and these fledglings were killed by a canine predator (possible domestic dog). The pair of breeding American Oystercatchers was disturbed, likely by a predator during foggy weather, which resulted in the entanglement in electric fencing and subsequent death of at least one of the adults; the nest was abandoned and the other adult was never observed again.

Introduction

Dead Neck/Sampsons Island (DNSI) is located between Cotuit Bay and West Bay in the villages of Cotuit and Osterville, MA, with its south shore located on Nantucket Sound. Natural movement of sand via offshore currents and wave action caused the two separate pieces of land, Dead Neck and Sampsons Island, to be joined in the early 1900s, hence the two-part name. The island is approximately

1.5 miles long; Sampsons Island comprises the western third of the island, and Dead Neck the eastern 2/3 of the island (Appendix I). Mass Audubon (MAS) has owned and managed Sampsons Island since the mid-1960s. During that time, the Coastal Waterbird Program (CWP) has also monitored and managed breeding shorebirds and seabirds on Dead Neck, which is owned and managed by the Three Bays Preservation, Inc. (Three Bays). The channel on the eastern end of the island is maintained by dredging. The western channel has not been dredged since the 1950s, but will likely need dredging in the near future due to longshore transport of sand from renourishment activity on the eastern end of the Island in the past ten years. In addition, the eastern end of the Island (Dead Neck) continues to suffer from severe erosion, impacting breeding coastal bird habitat, productivity and survival. Dead Neck/Sampsons Island provides nesting habitat for several species of shorebirds and seabirds, and is also used as a stopover by migrating shorebirds. Dogs are not allowed anywhere on the island, and visitors must be a member of either Mass Audubon or Three Bays to visit DNSI.

Methods

During the 2008 field season, two seasonal field assistants, Nuray Taygan and Jennifer Bradbury, and a crew leader, Mark Renkawitz were assigned to monitor and manage Piping Plovers, Least Terns, Common Terns, American Oystercatchers, and other breeding birds at the site. In addition, staff provided educational programs and informal outreach to visitors at DNSI. DNSI was monitored on all days, weather permitting, from mid-April through mid-September.

Once again, AmeriCorps provided important volunteer service hours to erect symbolic fencing around the majority of the Island in mid-April. Symbolic fencing, using orange bailing twine and metal or wooden posts, was used around nearly the entire circumference of the island. At Dead Neck, metal posts were used for symbolic fencing to prevent vandalism by burning, which has occurred in past seasons, while wooden posts were used at Sampson's Island. Symbolic fencing was first erected at Dead Neck on April 19 and more was added in late April and May. A small portion of the south side (ocean side) of Sampson's Island was not symbolically fenced due to little visitation by the public and unsuitable nesting habitat.

Symbolic fencing is regularly erected above the high tide line in order to allow visitors to pass at high tide and to prevent fencing from washing away. In 2008, symbolic fencing was extended to below the high tide line in select locations in order to protect intertidal foraging zone for Piping Plover chicks and least tern fledglings. On Dead Neck, much of the south side (ocean side) intertidal area was closed

to public access from July 6th through August 8th in order to provide Piping Plover chicks with foraging habitat access. On August 8th, the south side intertidal closed area was made smaller and moved farther toward Sampson's Island to accommodate a new brood of Piping Plover chicks. A section of Dead Neck's bayside (north) intertidal zone was closed from July 4th through August 17th to protect foraging habitat for Piping Plover broods 04 and 11. At Sampson's Island, three small intertidal areas were closed on the north (bayside) for brood 08. The first area was closed from June 29th through July; the second from July 4th through August; and the third from July 4th through July 25th. We strongly believe that protection and closure of these areas allowed increased Piping Plover productivity, particularly on the Dead Neck portion of the island, where productivity was quite low overall and human disturbance is very high due to limited habitat and beach availability.

Electric fencing was used at three locations on the Island during the 2008 field season to discourage mammalian predators, mainly coyote and domestic dogs. The first electric fence encircled the Dead Neck dredge spoil and was erected and electrified on May 7th. The second electric fence encircled the Sampson's Island dredge spoil and was erected/electrified on May 15th. The third electric fence was used on the south (oceanside) of Sampson's Island, enclosing the western tip of the island. Each fence was powered using a solar panel and was monitored for the adequate voltage. The purpose of the electric fence was to deter mammalian predators.

Two blinds were erected in the Sampsons Island dredge spoil Least Tern colony for a foraging study that is ongoing on this portion of the island; we put up anti-perching devices on the tops of these blinds. In addition, we also removed an eastern red cedar from the Sampsons Island dredge spoil to reduce perching in the colony by Great Horned Owls and other avian predators.

Piping Plovers

Daily monitoring of the island for Piping Plovers began on April 19th, when a total of 7 pairs were identified. The pairs were followed throughout the remainder of the season for any signs of breeding activity.

DNSI was monitored daily, unless weather prevented site access. Pair identification, nest searching, and brood monitoring were only conducted on days where weather was appropriate. Piping Plovers were not disturbed during poor weather conditions, including wet weather (any time moisture collected on glasses and/or clothing), light to heavy rain, temperatures <55° Fahrenheit, or

>85°Fahrenheit, winds > 20 mph (i.e. sand blowing across beach near adult, nest site, or brood), or during times of recent extended disturbance by humans and/or predators.

Individual Piping Plovers were followed daily for signs of courtship activity (i.e. scraping, courtship tracks). Once a Piping Plover nest was located, a GPS location was taken and nest site habitat data were collected. All Piping Plover nest attempts were monitored daily for hatching success. After hatching, broods were also observed until chicks reached a fledging age of 26 days, or until capable of sustained flight \geq 50 ft. The annual Piping Plover census was conducted on June 1-9, in which a total of 14 pairs were documented.

Least Terns and Common Terns

As mentioned above, three sets of electric fencing were used on DNSI: Dead Neck's dredge spoil, Sampson's Island dredge spoil, and Sampson's Island south (oceanside) beach. These fences mainly encircled Least Tern colonies, although some Piping Plover and most Common Tern nests were enclosed within an electric fence as well. Decoys were placed inside fencing to attract terns, and chick shelters were added to increase the amount of refuge available on the dredge spoils.

Common Tern nests were monitored daily for hatching success. Once chicks hatched they were difficult to observe, but were monitored as closely as possible. Counts of Least Tern incubating adults were conducted on the Dead Neck dredge spoil as well as the Sampson's Island oceanside whenever possible. Like Common Terns, Least Tern chicks were also difficult to observe. In 2008, we also conducted our third year of the Least Tern Foraging Program, collecting data on the foraging ecology of breeding Least Terns on Sampsons Island. Daily stints, 3 hrs each, were conducted by two staff from blinds inside the colony on Sampsons Island. For more information and/or a full report, please contact the Coastal Waterbird Program.

Results

Piping Plovers

During the 2008 breeding season 16 pairs of Piping Plovers nested on DNSI. However, two of these pairs were believed to have left the site early in the season after their first nesting attempt, and for the majority of the season 14 pairs were regularly observed. The first nest was found on April 20th with two eggs on the Dead Neck dredge spoil. This nest hatched 4 chicks on May 20th. A total of 32 nests

were found on the island throughout the season; 9 nests hatched, and 23 were lost due to predation, abandonment and unknown causes (Figure 1).

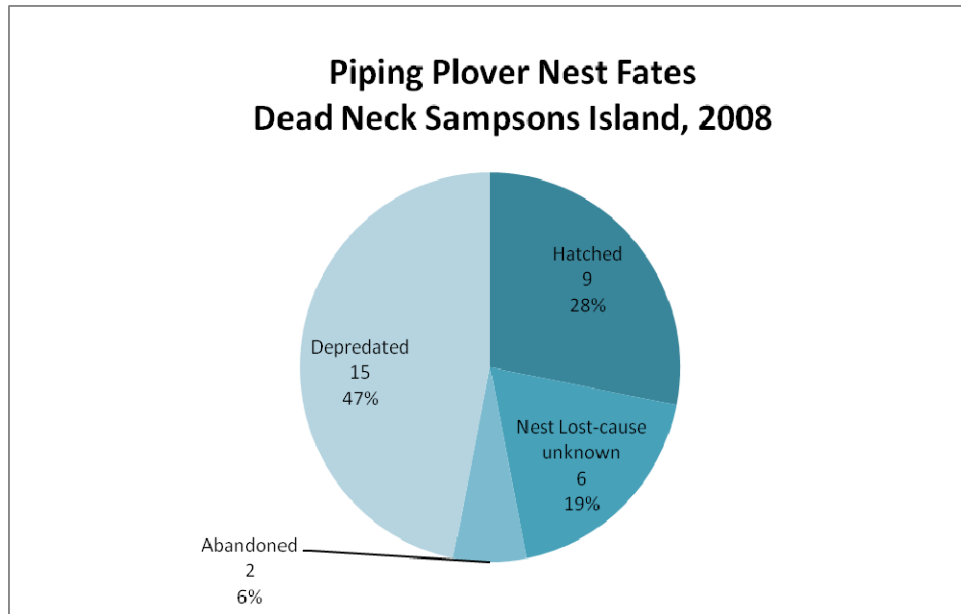


Figure 1. Fates of 32 nest attempts by Piping Plovers on Dead Neck Sampsons Island during 2008.

Each pair of Piping Plovers laid an average of 2 nests, ranging between 1-4 nest attempts per pair. 10 pairs nested on the Dead Neck portion of the island (21 nest attempts), and 8 pairs nested on the Sampson's portion of the Island (11 nest attempts). For site maps, please see Appendix I. Of a total of 32 nest attempts, only 9 hatched (28%), which included 32% of 96 eggs laid. 23 nest attempts were lost to either predation by an unknown predator (11), Eastern Coyote (1), American Crow (2), Great Horned Owl (1), or abandonment (2) or unknown causes which could have included washover or predation, or other causes (6) (Figure 2, Appendix III).

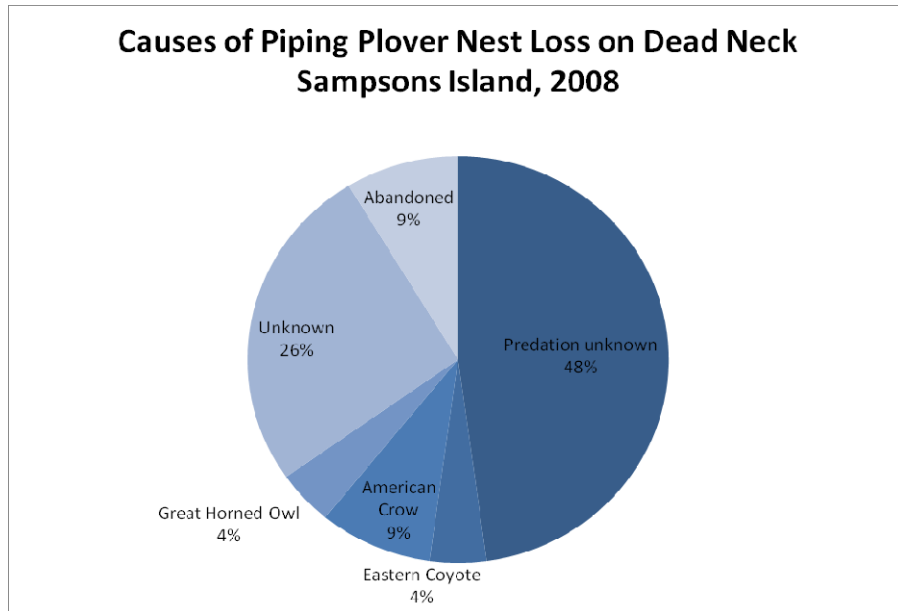


Figure 2. Causes of Piping Plover nest loss on Dead Neck Sampsons Island during 2008.

The majority of first nest attempts were laid during the first two weeks of May, which corresponded with the majority of nest loss (if a range of dates was given for date of nest loss, the middle date was used for actual date of loss; i.e. Lost during May 7 – May 11 became May 9). Hatching began during the third week of May, and continued into late July (Figure 3).

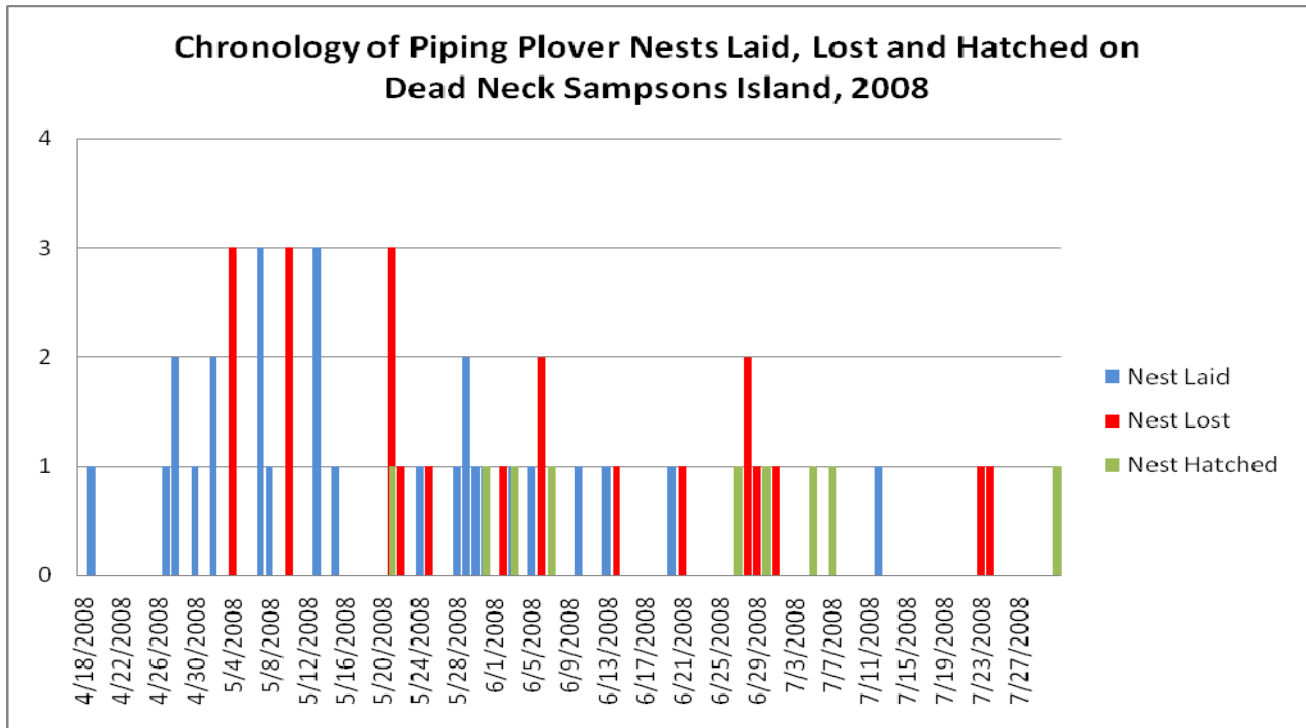


Figure 3. Nesting chronology of Piping Plovers on Dead Neck Sampsons Island during the 2008 field season. Peak laying occurred during the first two weeks of May, and continued into July.

A total of 31-39 chicks hatched (pair 18 was thought to be brooding the last time nest was seen before being depredated but no chicks were seen; 03/13 lost their nest on its hatch date). 17 chicks survived to 25 days of age or more, therefore overall Piping Plover productivity was 1.06 chicks fledged/pair, which is consistent with a downward trend in productivity observed at the site during the past nine years (Figure 4).

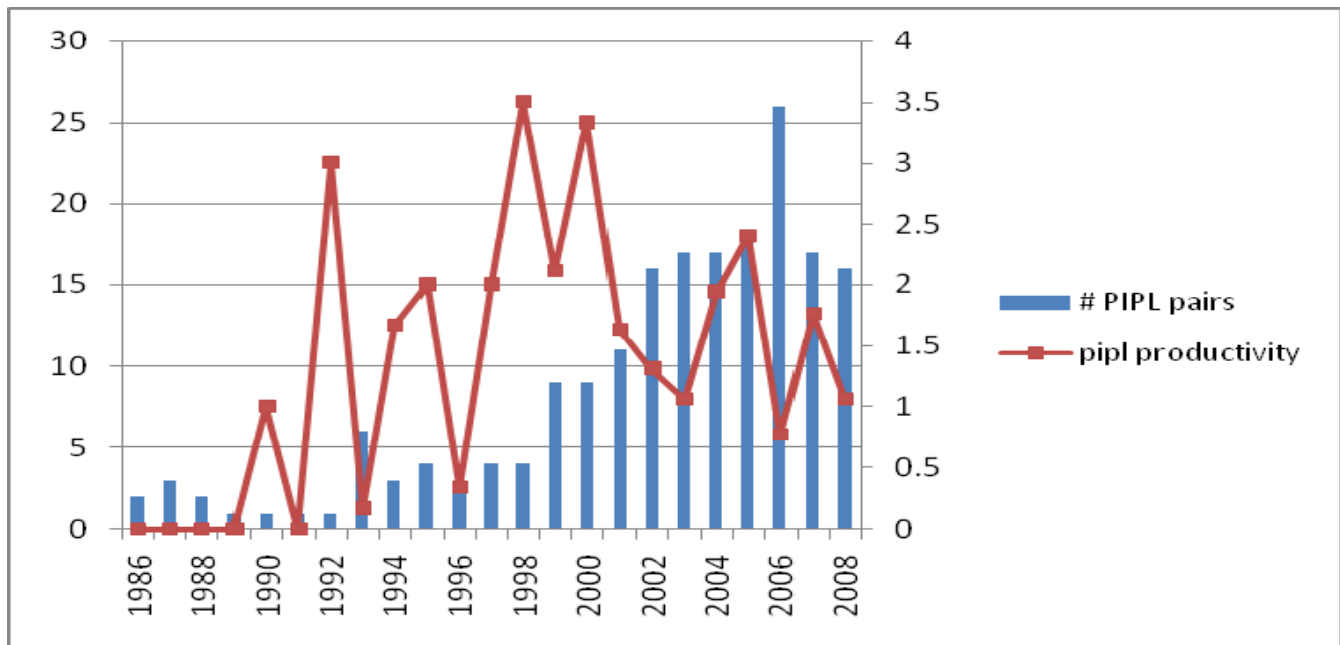


Figure 4: Abundance of Piping Plovers nesting at Dead Neck Sampsons Island, and overall productivity (checks fledged/breeding pair) monitored by the Coastal Waterbird Program at Mass Audubon during 1986 – 2008.

Three electric fences were used this year, enclosing Least Tern colonies and a total of 12 Piping Plover nests: 1A, 2B, 5B, 8A, 8B, 11A, 11B, 17A, 17B, 17C, 17D, 18A. Of these 12 nest attempts, only 5 nests (42%) hatched (this includes one nest that hatched one chick and was subsequently abandoned), and 7 nests (58%) were lost to predation or unknown causes, despite being inside functioning electric fencing.

Tracks of potential predators found on DNSI included American crow, Eastern coyote, Virginia opossum, great black-backed gull, herring gull, great horned owl, and domestic dog. It seemed likely that American crows were responsible for a large proportion of nest loss for Piping Plovers, but many nest fates were unknown and we cannot be sure. Many nests were lost during inclement weather when the island was not monitored, and as a result few predator tracks were found at lost nests. Crows were seen regularly on the island, walking along the upper beach and interdune areas. At the western end of Dead Neck’s oceanside, 5 pairs of Piping Plovers attempted to nest (9, 12, 14, 15, and 16), with a total of 11 nests. Of these 11 nests, only one survived to hatch, and it was the fourth nest attempt for that pair (15D). It is in this same area, that groups of crows were seen daily, and where most of the nests that were identified as being suspected predated by crows.

The threat of coyotes on DNSI appeared to be lessened with the installation of the three electric fences. Before the electric fence was put up on the Sampson's Island dredge spoil, three plover nests were lost, possibly to coyote predation (coyote tracks found throughout the dredge spoil). After the electric fence was put up, coyote tracks were no longer found anywhere near the Sampson's Island dredge spoil.

The electric fencing at the Dead Neck dredge was an effective canid deterrent during the time that Piping Plovers were nesting in the area. However, after all Piping Plover nesting had finished, there was a break into the electric fence by a dog or coyote on July 30th, resulting in the loss of two Common Tern fledglings and three Least Tern fledglings (see Results section for Terns).

Common Terns

A total of 8 pairs of Common Terns nested on Dead Neck Sampson's Island (Figures 5, 6, also Appendix II). On May 6th the first Common Tern was seen flying over the Dead Neck dredge spoil. An electric fence was erected around the Dead Neck dredge tern colony on May 7th, around the Sampson dredge colony on May 15th, and around the Sampson south (oceanside) on June 13th. On May 20th the first Common Tern nest was found on the west end of the Dead Neck dredge spoil. Four pairs of Common Terns nested on the Dead Neck end of the island and 6 pairs nested on the Sampson end (only 4 of these pairs were present during the index count)

On May 21st the first Common Tern scrapes were found on the Sampson oceanside and on May 23rd the first Common nest was found in this same area. One pair of Commons nested on the Sampson dredge spoil inside electric fencing, but the nest was abandoned on June 13th. At the same time this nest was abandoned canid tracks were found all over the Sampson Oceanside and all nests on the Oceanside were depredated. On June 19th one Common pair renested on the Oceanside and hatched one chick (which soon after disappeared). American Crow, Coyote, and Great Horned Owl tracks were regularly observed on the Sampson oceanside.

Once again in 2008, ants were an issue for hatch day tern chicks, though not as severe as 2007. On June 20th, 23rd, and 24th a total of 4 Common Tern chicks were found dead and covered with ants. The ants were identified as *Lazius neoniger* and ant traps were put out in the surrounding area on June 20th. We strongly suspect that ant predation could be related to nocturnal abandonment (caused by Great

Horned Owls). A number of nest attempts were made by each pair of Common Terns but none of the chicks survived to fledge. By August 10th all breeding Common Terns had left the island.

On July 30th at 07:30hrs digging and canid paw prints were found inside the Dead Neck dredge spoil electric fence; unclear as to whether these were dog or coyote tracks. Very clear Coyote tracks were visible on the bay side of the electric fence. A clip was askew on the bayside, creating an opening under the electric fence; the position of the fence and the clip indicated that there was human involvement (perhaps letting a dog out of the fence?). Coyote tracks on the beach appeared very recent and were not yet covered by the tide. Canid tracks were found all through the Dead Neck dredge spoil, and two dead COTE fledglings (in addition to three dead LETE fledglings), were discovered surrounded by canid tracks--all fledglings could fly (not well) prior to when they were found dead. These chicks are currently being necropsied by Tufts School of Veterinary Medicine, and we are awaiting results. More detail is provided below in the Least Tern section.

Least Terns

The first Least Tern was seen flying over the Dead Neck dredge spoil on May 6th (Figures 5 and 6, also Appendix II). Courtship was first observed on May 15th and the first scraping activity was identified on May 23rd. A total of 18 Least Tern nests were present on the Dead Neck end during the tern census on June 19th. Predation prevented first nest attempts from hatching, the first hatch date occurred June 27th. There were significant predation problems throughout the season. We believe the majority was avian predation (crows, great horned owls) however; it was very difficult to tell due to the packed nature of the dredge material. Coyotes were not observed inside the electric fencing until July but were often observed walking in the intertidal zone and throughout the dunes.

On July 1st, two dead Least Tern chicks were found covered in ants in their nest bowl, indicating likely presence of Great Horned Owl. This occurred 6 days after 2 Common Tern chicks were found dead with ants (see above). On July 4th a Least Tern chick that had fallen down the Dead Neck ocean side scarp (about 10 ft high) was picked up by a beachgoer and tossed onto the Dead Neck dredge. Two Least Tern fledglings were first observed on July 28th but were later found dead on July 30th due to the canid that breached the Dead Neck electric fence. By August 10th, there were no Least Terns present on Dead Neck dredge spoil, and no chicks fledged from this site.

The first Least Tern nests on the Sampsons end were located on May 30th on the oceanside and on the dredge spoil. A high count of 80 adults was observed on June 1st and 150 adults were observed on

June 8th. In the census on June 19th we found there to be 163 Least Tern nests inside the Sampson dredge electric fencing and 15 nests inside the Sampson Oceanside electric fencing. The first Least Tern chick was found on the Sampson dredge on June 23rd. On August 12th there were no Least Tern nests left on the Sampson Oceanside and 18 fledglings were observed between the Oceanside and dredge spoil colonies (we suspect most of the productivity was from the dredge spoil). Both of the Sampson colonies suffered from heavy predation from suspected Crow, Coyote, and Great Horned Owl.

Canid tracks were found all throughout the Dead Neck dredge spoil on July 30th inside the Dead Neck electric fencing. The tracks appeared to be domestic dog because they were so erratic all over the dredge spoil. Two least tern fledglings and three common tern fledglings were found dead. The bodies were still in very good condition and had few ants on them, indicating that they were very recently killed. Digging was seen at multiple locations along the bayside of the fence where the dog or coyote was trying to escape. The escape route ended up being a place in the electric fence where the bottom of the fence had been lifted and held up using a plastic clip, something that a dog or coyote could not possibly do, indicating human interference. However human foot prints were not found. Canid tracks were also found below the high tide line so incident must have occurred within the last tide cycle.

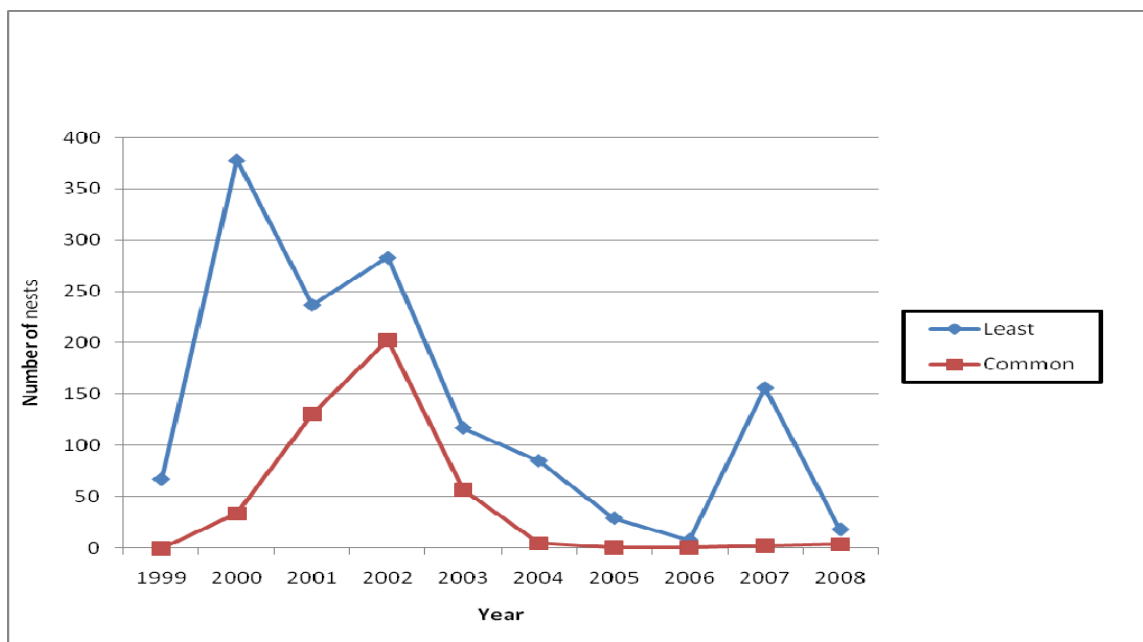


Figure 5: Abundance of Least and Common Terns nesting on the Dead Neck portion of Dead Neck Sampsons Island monitored by the Coastal Waterbird Program of Mass Audubon, 1999-2008.

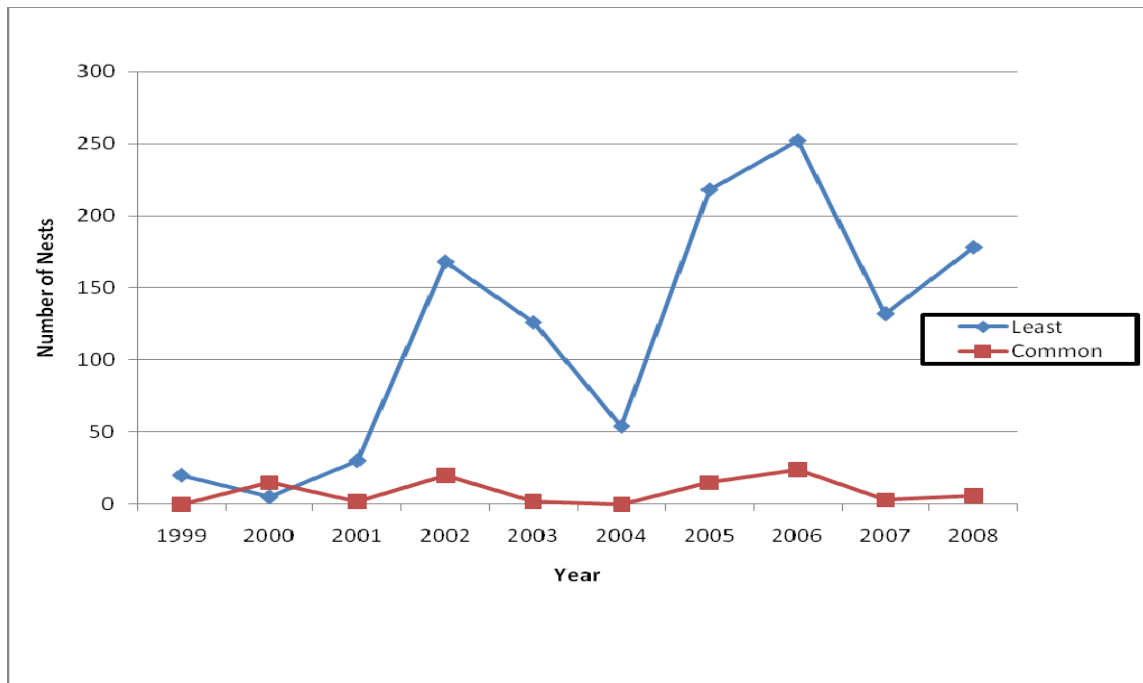


Figure 6: Abundance of Least and Common Terns nesting on the Sampsons portion of Dead Neck Sampsons Island monitored by the Coastal Waterbird Program of Mass Audubon, 1999-2008.

American Oystercatchers

One pair of American Oystercatchers nested on the Dead Neck dredge spoil on Dead Neck Sampsons Island; this is believed to be the first recorded incidence of breeding oystercatchers on the island in at least 20-30years (very likely many more decades). They were first seen as an established pair in late April, and scrapes were subsequently found on 4/27/08, as well as 5/07/08, and during the first two weeks of May. The nest from this pair was found on May 15th with one egg, and their clutch of three eggs was completed on May 20th. Both adults of this pair were trapped and banded on June 3rd by Sean Murphy (College of Staten Island). Each adult was banded above the metatarsal joint on both legs, and a metal (BBL) band on the lower right leg. The male was given yellow band # 39 and the female yellow band # 38 on each upper leg.

On the morning of June 7th the adult male #39 was found dead, entangled in electric fencing, about 20ft from the nest location, on the ocean side of the Dead Neck dredge spoil (see Appendix III for photos and full necropsy report). We suspect that at least one predator was inside the colony the previous evening/day due to amounts of Least Tern nests that were missing. According to the necropsy results, the oystercatcher apparently had died within 24-48 hours prior to being found on the morning of June 7th (see attached report, Appendix III). The entangled male oystercatcher appeared to have flown in low from ocean side towards its nest, and was entangled; cause of death was determined by necropsy

(Woods Hole Oceanographic Institution) to be electrocution. CWP staff were unable to monitor the island on June 4th- 6th due to inclement weather. Sign of coyotes and Great Horned Owls were both observed during the breeding season, and reports of regular crossing by coyotes to the Island were reported by adjacent landowners. We believe either of these two species might have contributed to the disturbance that caused the AMOY to become entangled in the electric fencing, as well as the heavy fog that was prevalent the day before on June 6th. In addition, the diameter of the fencing was relatively narrow due to the structure of the Dead Neck dredge spoil and may have been too narrow, particularly if the oystercatchers were disturbed. However, were the electric fencing not in place (it was placed as wide as possible), Piping Plovers and Least Tern nests and chicks almost assuredly would have not survived to hatch/fledge, and it is likely the oystercatcher nest would have also been predated early in the season.

The female # 38 was not present on the day the dead male was found, and was never observed again elsewhere in Massachusetts during the post-breeding period (despite intense resighting efforts), or during the 2008-09 winter season elsewhere along the Atlantic coast.; we suspect the female may have been killed as well. The eggs were stood up in the nest bowl on June 7th to see if the female would return, and were still standing on June 17, therefore, the nest was considered abandoned and eggs were collected.

Recommendations

Nest predation and low chick survival rates are major problems for all breeding coastal waterbirds on DNSI. Because causes of nest loss are comparatively easier (though not easy) to determine as opposed to causes of chick loss, this tends to be the focus of our efforts, though admittedly this may be ineffective in terms of overall productivity of the site. It is likely that American crows and/or coyotes were responsible for a large proportion of nest loss of Piping Plovers, Least Terns and Common Terns, but we do not have enough definitive information to be certain. Most nests were lost during inclement weather when the island was not monitored. As a result, few predator tracks were found at lost nests. Crows were seen regularly on the island walking along the upper beach and interdune areas. In addition, at least three Least Tern adults, and likely four Piping Plover chicks, and possibly other adults and chicks of Common Terns, were lost to Great Horned Owls, and at least 5 chicks were lost to either depredation by ants/exposure due to nocturnal abandonment by owls. Any attempts to manage predators on DNSI would likely be beneficial to the nesting shorebirds and seabirds.

As noted in past seasons, the Dead Neck dredge-spoil has become *extremely unsuitable* for nesting Least Terns, Common Terns, Piping Plovers and American Oystercatchers (in 2008), due to erosion of both the ocean and bay side beaches, loss/exclusion of foraging habitat (Piping Plovers, American Oystercatchers), loss of available nesting habitat, steep scarping/cliff formation, human disturbance, and encroaching vegetation. New dredge deposition would likely enhance and restore this habitat, but it is critical that a slope be maintained that Piping Plover, Least Tern, and other chicks can maneuver. At present, the steep scarp is over 10 ft tall in some locations. There were two significant problems with the landscape of the dredge spoil itself. Along its entire southern edge, erosion has created a very steep slope. Such a slope or bluff of such a great length, coupled with the open nesting habitat directly above it, creates a Plover and Least Tern chick trap. As chicks become mobile, they have the ability to either move to the bay side or ocean side of the Dead Neck dredge. Because the bay side is often crowded with people during the summer months, we suspect many Plover/least tern chicks make their way down the steep bluff to the ocean side (Nantucket Sound side) beach to less disturbed areas. Once they arrive in this area, they are trapped in a very narrow strip of beach with a wall on the northern side (i.e. the steep bluff they just walked down) and the ocean with relatively high wave action and little wrack line on the other. In this situation both Plover and least tern chicks are vulnerable to predation, exposure and disturbance. Chicks of both species were often observed trying to climb the steep to near-vertical slopes to escape beachgoers and observers; often times the chicks could not traverse the steep slope, and would simply crouch on the side of the slope. Chicks were also observed tripping and tumbling down the slopes while trying to run from passersby. These observations indicate an obvious energy expenditure on the part of the chicks that is not beneficial, particularly when chicks (Plovers particularly) are limited to forage within the wrack lines, and chicks of both species are subject to higher rates of exposure through wind (prevailing wind is SW at this site) and tides.

As soon as staff realized that we were affecting chicks in this way, we made every effort to walk either on top of the dredge spoil or out in the water in order not to chase broods, however this was not always possible. Walkers also pushed broods along the beach on a very regular basis, several times an hour on busy weekends. Creating a more chick-friendly interface between the dredge-spoil and the beach is absolutely necessary, and we suspect this would enhance the productivity of the whole western end of Dead Neck Plovers and terns. This might be accomplished by creating several gullies that cut into dredge from the ocean-side of the beach. These gullies would serve as ramps and provide shelter and varied habitat. It would also be helpful to have the entire Dead Neck ocean side closed off once

chicks are feeding in this area. This would prevent some human disturbance and allow for chicks to feed in a less stressful environment. Next year, we recommend using buoys and/or floats to close off areas for this purpose on both the bay side and ocean sides of the beach.

A second problem is that heavy rain cause pooling and channeling of rainwater on top of the open dredge spoil at the northeast end of Dead Neck. A visibly darker and less porous layer of sediment appeared to be the source of the problem. During future dredging projects planners must be cognizant of the potential effects of such impermeable sediments and incompatible material buried under material deemed suitable may have on surface water runoff.

Additional Education and Outreach

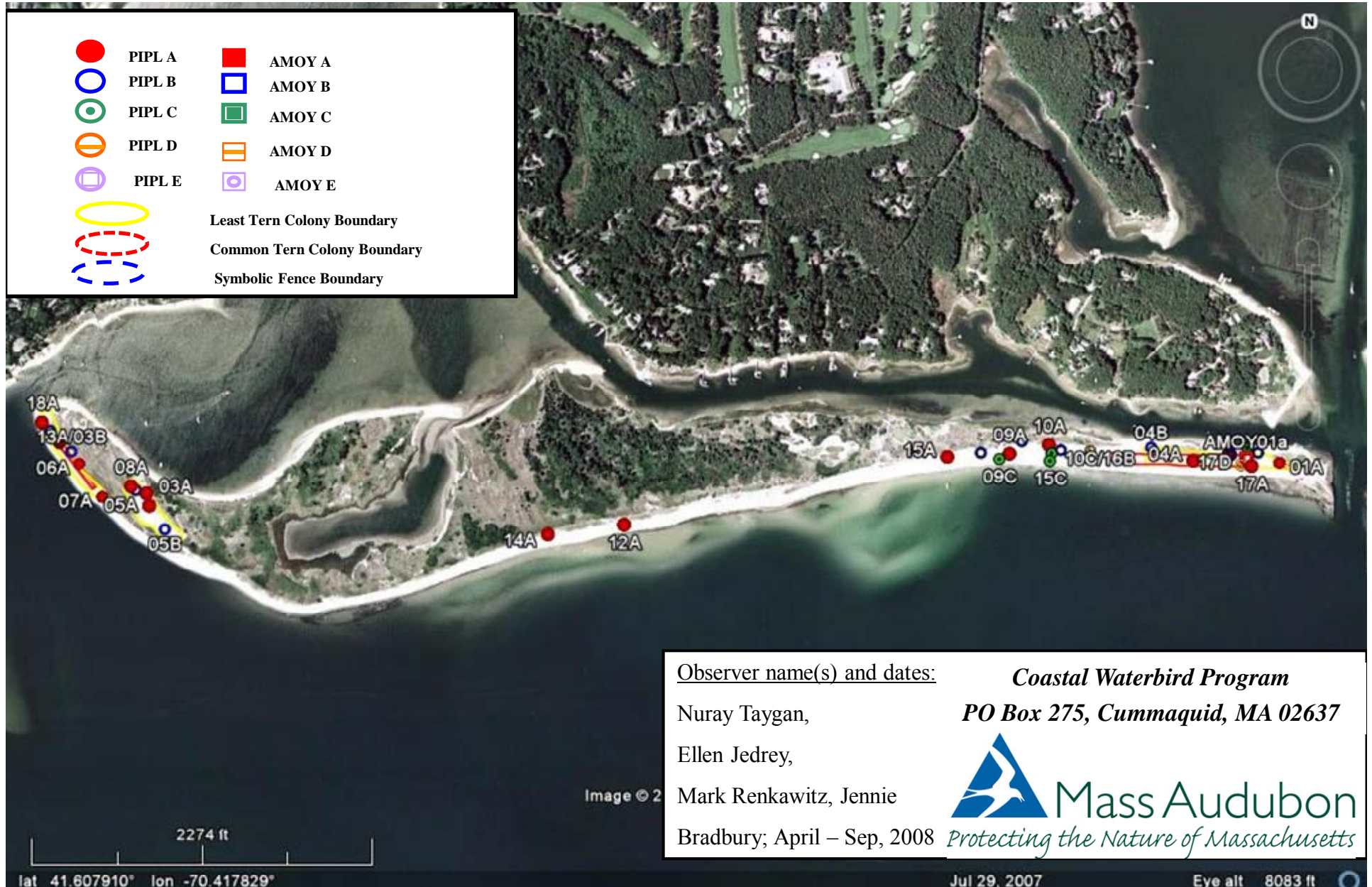
More effort should be put towards public outreach and education on the island. On Saturday mornings July 12th through August 16th, staff led a family beachcombing program called “Explore the Shore.” This was a great success and is a great tool for connecting with the public. DNSI has a very high rate of visitor usage on weekends in July and August and it would be beneficial for education staff to take advantage of this opportunity. The size of the island offers a great deal of space and diversity of habitats in which to conduct educational programs. In addition to family intertidal exploration, birding, kayaking, and botany programs are possibilities as well.

Appendix I


Dead Neck Sampsons Island Site Maps 2008

Coastal Waterbird Nest Locations, wide view

Dead Neck Sampsons Island, Barnstable, MA 2008 Map 1 of 5



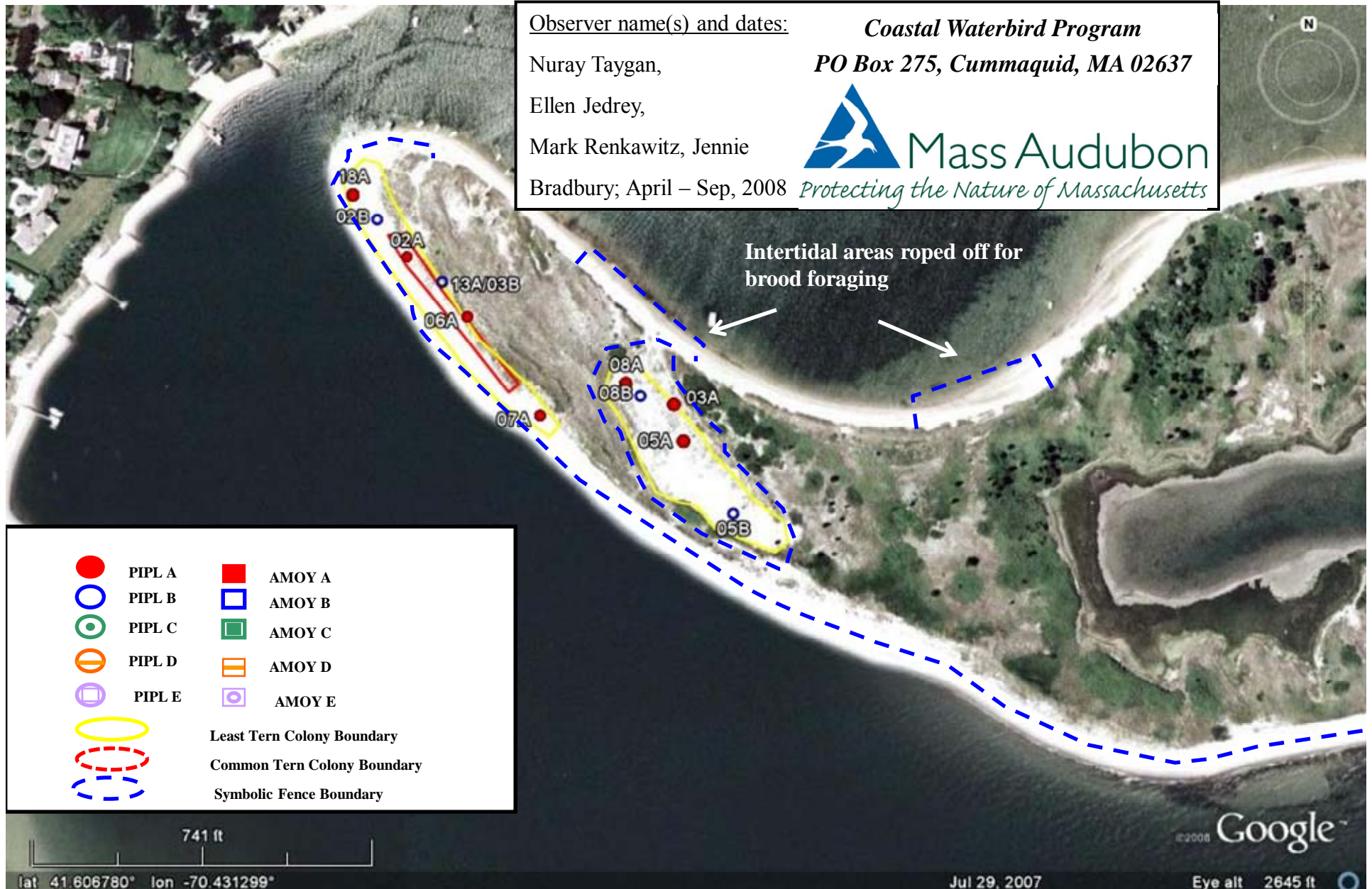
Observer name(s) and dates: *Coastal Waterbird Program*
 Nuray Taygan, *PO Box 275, Cummaquid, MA 02637*
 Ellen Jedrey,
 Mark Renkawitz, Jennie
 Bradbury; April – Sep, 2008



Mass Audubon
Protecting the Nature of Massachusetts

Coastal Waterbird Nest Locations

Dead Neck Sampsons Island, Barnstable, MA 2008 Map 2 of 5



Coastal Waterbird Nest Locations

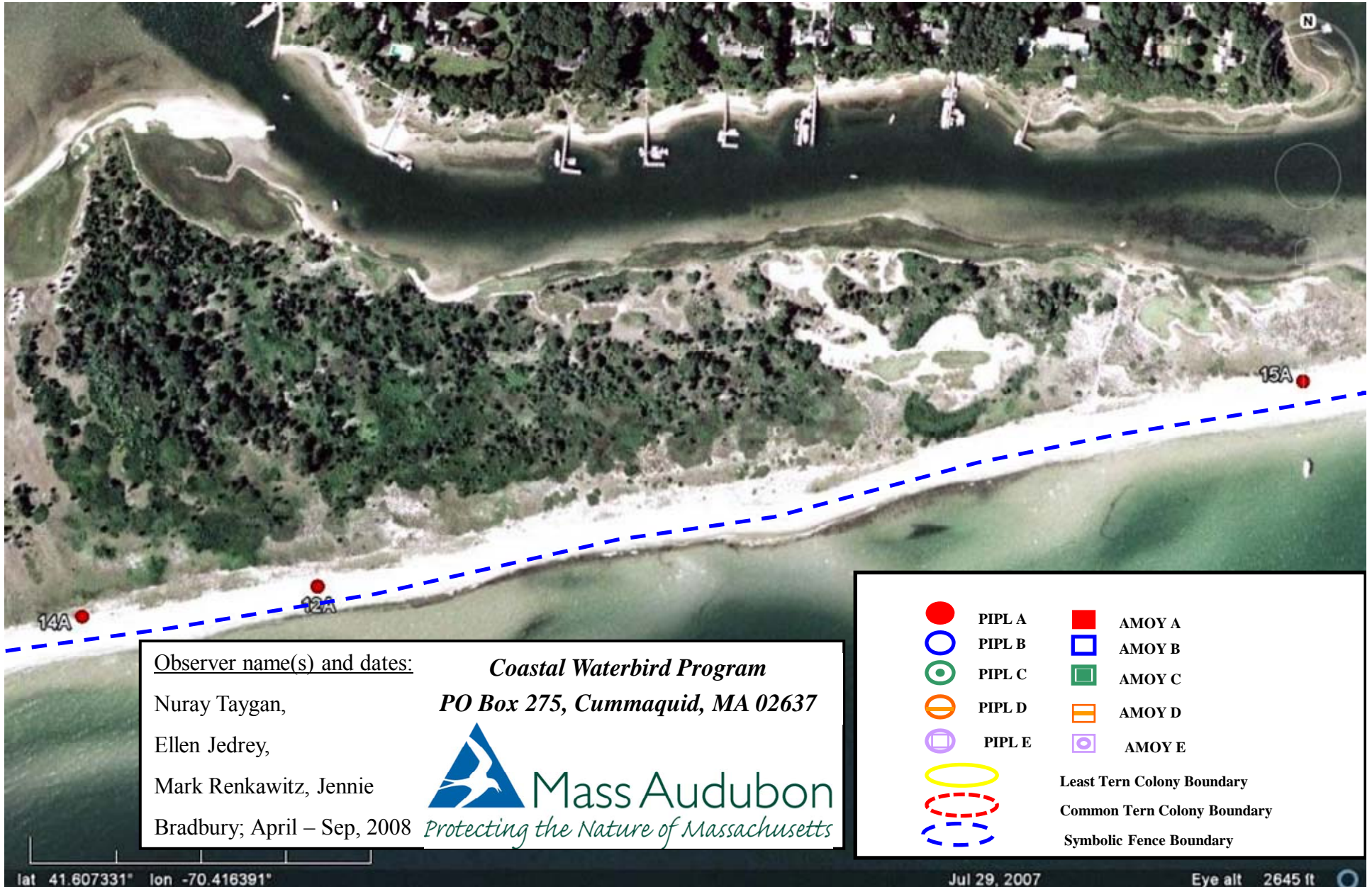
Dead Neck Sampsons Island, Barnstable, MA 2008 Map 3 of 5

Observer name(s) and dates: *Coastal Waterbird Program*
 Nuray Taygan, *PO Box 275, Cummaquid, MA 02637*
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 Mark Renkawitz, Jennie
 Bradbury; April – Sep, 2008 *Protecting the Nature of Massachusetts*



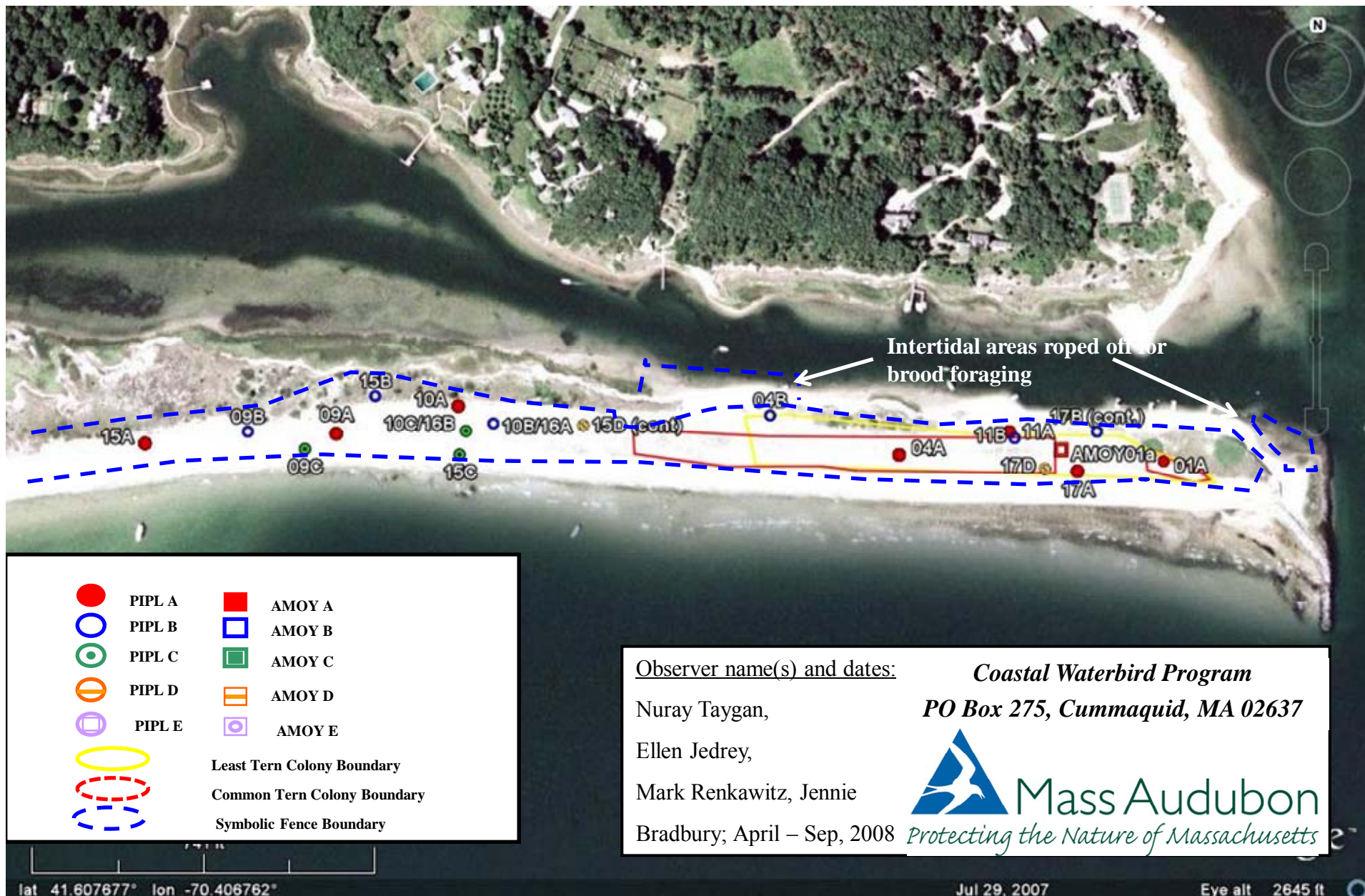
Coastal Waterbird Nest Locations

Dead Neck Sampsons Island, Barnstable, MA 2008 Map 4 of 5



Coastal Waterbird Nest Locations

Dead Neck Sampsons Island, Barnstable, MA 2008 Map 5 of 5



Appendix II

State Data Forms 2008

Piping Plover Census Form, Tern Census Form (2) and American Oystercatcher Census Form
submitted to MA Natural Heritage and Endangered Species Program

Massachusetts Tern Census Form, Year 2008

Colony Site Name: Sampson's Island Dredge Spoil and Oceanside (combined); colony 2 of 2 at Dead Neck Sampsons Island in 2008
 Subcolony ID:
 Town: Barnstable
 Ownership: Mass Audubon

Observer/Agency: Jennie Bradbury, Nuray Taygan, Mark Renkawitz of Mass Audubon
 Street: 345 Bone Hill Rd.
 Town, State, & Zip: Cummaquid, MA 02637
 E-mail: ejedrey@massaudubon.org
 Telephone: 508-362-7475 x 9352

⇒⇒ PLEASE: (1) provide a **map** outlining the location of the colony, and (2) read the instructions on the reverse of this form before filling out. ⇐⇐

Species Code	A-Count				B-Count				P	Remarks: (e.g., evidence of predation, tide or storm washout, human disturbance, etc.) *INDICATE (if known) DATE OF FIRST EGGS LAID AND FIRST EGGS HATCHED.
	Date	No. Pairs	M	Q	Date	No. Pairs	M	Q		
ROST	06/19/08	0	AC	HC						
COTE	06/05/08 06/13/08	4 0	NC AC	HC HC					0	On 5/21, 1 st scrapes found on oceanside. On 5/23, 1 st nests on oceanside (total of 3). Total of 5 pairs nested on oceanside, add 1 pair nested on Sampsons dredge spoil (all present on 5/30). By 06/06, COTE nest on SI dredge abandoned, and on 06/13, canid tracks found all over oceanside, and rest of COTE nests gone. Electric fence erected on 06/13. On 6/19, only 1 pair of COTE nesting; other 3 pairs later renested, and on 07/20: first (and perhaps only) chick to hatch on SI oceanside, soon disappeared. COTE nests were lost to coyote, but crow also likely; GHOW could have taken adults/chicks. All three species' tracks were observed regularly. Crow chased by COTE on 5/31.
ARTE	06/19/08	0	AC	HC						
LETE	06/19/08	178	NC	HC	07/23	56	AC	RC	1-2	Site 1 st monitored 04/19. Symbolic fencing put up 5/11, electric fencing put up on SI dredge 5/15, Oceanside on 6/13. 1st nests 5/30 on the oceanside and dredge spoil. High count 06/01: 80 adults; 06/08 150 adults. Census on 06/19, 163 nests w/in electric fencing on dredge spoil, and 15 nests on oceanside, most w/in E-fence. 150 adults 6/20; 06/23, 1st chick on SI dredge ; 120 adults 6/27, and LETEs seen mobbing crows on ocean side. Suspect some of LETE may have renested at Dowses Beach, which started to increase around this time in June; high count 07/23: 70 adults; 60 adults on 7/23; 60 adults on 7/30 and only 10 visible nests. By 8/2 only 1 chick observed, 10 incubating adults. On 08/12, 0 nests left on Sampsons oceanside. A maximum of 18 fledgers observed between oceanside and dredge spoil colonies; we suspect most of the productivity was from the dredge spoil, which was protected by electric fence, however both colonies suffered from heavy predation throughout the season. On 07/01, SI Oceanside electric fence washed over; replaced on 07/09; but on 08/01, ocean side electric fence washed over by extreme high tides, 2 sections of fence destroyed. Remaining sections of electric fence connected into 2 areas, 1 powered by solar panel, the other not powered. COTE kleptoparasitism observed on LETE adults on 06/13. Coyote tracks observed regularly on ocean side, suspected of taking eggs/chicks not protected by electric fence; crow tracks on dredge on 5/23; on 06/01, 25 American crows counted; 8 crows 06/13. Crows observed harassing LETE/COTE/PIPL regularly during season. In addition, Great Horned Owl sign documented on Sampsons end multiple occasions, including remains of adult LETEs (2), remains of MODO, and PIPL nest that likely just hatched and predated by GHOW (tracks leading directly to the nest observed).
LAGU	06/19/08	0	AC	HC						
BLSK	06/19/08	0	AC	HC						
OTHER	06/19/08	0	AC	HC						

MASSACHUSETTS PIPING PLOVER CENSUS FORM

Year: 2008

Observer(s): Jennie Bradbury, Nuray Taygan, Mark Renkawitz, Ellen Jedrey

Site Name: Dead Neck / Sampson's Island

Agency: Mass Audubon, Coastal Waterbird Program

Town: Barnstable

Address: P.O. Box 275, Cummaquid, MA 02637

Ownership: Three Bays Preservation / Mass Audubon

⇒ *Please attach a map of this site that shows locations of all nests and pairs that did not nest.*

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Census Results:	Index Count^a	Total Count^b
No. of Pairs	14	16
Unpaired Adults	0	0

<p>Notes on pairs that did not nest (include dates present, activities)/Census remarks:</p> <p>List pairs <u>not</u> present during Index Count: 12, 14. Both pair 12 and 14 disappeared after losing their nests during the same time period. They were not observed again, and could not be accounted for by any other pairs that nested on Dead Neck Sampsons over the breeding season.</p>

Month	Average # of visits to site per week
April	5
May	4-6
June	5-7
July	5-7

Indicate type(s) of enclosure design(s) used: none used

Exclosure Design	A	B	C
Shape			
Diameter/Length of side			
Size of wire mesh			
Total Height			
Height above ground:			
Depth buried:			
Cover material			
Cover spacing/Mesh size			

Other management undertaken or needed/Remarks:

Symbolic fencing erected in late March/April around entire Island. Three electric fences were used this year, enclosing Least Tern colonies and the following Piping Plover nests: 1A, 2B, 5B (suspected), 8A, 8B, 11A, 11B, 17A, 17B, 17C, 17D, 18A.

Symbolic fencing used around all nests; also roped off intertidal areas for the first time because of high human disturbance and inability of chicks to access foraging habitat. Intertidal foraging areas closed off to public access using symbolic fencing for the following broods: 4B, 8B, 11B, 15D, 01a. We roped off areas on both the Sampsons and Dead Neck portions of the island, and plan to use floats to do so in 2009.

Human disturbance continues to a major issue on both the Dead Neck and Sampsons portion of the island, however this is more pronounced on Dead Neck due to the high density of Least Terns, Common Terns and Plovers (and American Oystercatchers for the first time this year). There is currently very little habitat available for coastal waterbirds due to vegetation overgrowth, and the dredge spoil has eroded so badly it has created a 10+ foot scarp on the ocean side. Plover and least Tern chicks were both observed falling down the cliff, and landing on the ocean side beach, where waves at high tide would easily wash them away (there is currently no backshore here, only an eroded scarp). On the bay side, high numbers of people during may, June and July prevent (often unknowingly) chicks from being able to access foraging habitat, and force them back into the Least Tern colony/Plover nesting area, where aggression by both LETEs and PIPL is high. There is often no room for Plovers on the bay side, and they cannot access the ocean side habitat.

Coyotes continue to be a regular predation problem on the island for both Plovers and terns; tracks were observed throughout the season of 1-2 adults; it appears that the coyotes are accessing the island from Oyster Harbors, swimming over from the closest point of land just north of the east end of Dead Neck. Coyotes were observed to jump the electric fence/dig under it when voltage was not high at the end of the season. In addition, American Crows continue to be a significant problem as predators, particularly on the Dead Neck portion of the island, and predated/were suspected of predated a number of Piping Plovers nests. Great Horned Owl sign was frequently observed in the Sampsons and Dead Neck Least Tern colonies. We found dead Least Tern/Common Tern chicks thought to be either predated by ants/scavenged by ants during nocturnal abandonment caused by an owl (maximum of 5 chicks in 2008, not as great of a problem compared to 2007).

A major disturbance in early June caused the loss of a number of Least Tern nests, as well as an American Oystercatcher nest that was within electric fencing on Dead Neck. One of the AMOY adults (male YL #38) was killed through electrocution when it was entangled in the fencing, after flying in low from the ocean; it had rained from 6/4-6/6; we believe the mortality occurred the evening of 6/6 in heavy fog. The female adult was ever observed again.

We removed an Eastern Red Cedar from the Sampsons Island Least Tern dredge spoil colony in order to decrease the amount perches available to the owl. However, we continued to find remains of Least Tern adults (in addition to a predated Plover nest) attributed to Owl on the ocean side beach.

We believe Pair 2 hatched 4 chicks, then lost all chicks within 9 days, and immediately began scraping and courting; we assigned nest Brood 2b may not have been pair 2, but very difficult to tell. The day the chicks were lost, a pair was observed courting/copulating in the same area where 2a had nested. Though these chicks survived for at least 9 days, we believe that the pair renested (though this is rare). Brood 5b was found with 4 chicks on 7/7, estimated to be 1 day old, therefore estimated hatch date is 7/6. Pairs 10 and 16 were collapsed into 1 pair (pair 10) after the season was over; this was assumed due to dates and also drawings of the collars of the adults. Nest 13a was later assigned to pair 3 (as nest 3b) after looking through field notes and determining that timing made sense, as well as behavior and drawings of the neck bands of adults.

^aThe Index Count includes those pairs seen during the Index Count period (1-9 June) and also those that may have been missed during the Index Count, but that must have been present then (based on laying or hatching dates).

^bTo be included in the Total Count, a pair must have been present at the site for ≥ 2 weeks and exhibiting courtship or territorial behavior during that period, if not actual nesting.

Site Name: Dead Neck / Sampson's Island

Year: 2008

Observer(s): Jennie Bradbury, Nuray Taygan, Mark Renkawitz

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Pair No.	Nest No.	No. eggs laid	No. eggs hatched ^c	No. chicks fledged ^d	Date clutch found	No. eggs when clutch found	Date clutch completed	Date nest hatched or failed ^c	Exclosure		
									Y/N	Design (A, B...)	Date installed
01	A	4	4	2	04/20	2	04/24	05/20 H	N		
02	A	4	4	0	04/26	1	05/05	05/30 H	N		
	B	4	1	0	06/21	2	06/25	07/23 H/F	N		
03A/13	A	≥2	0	0	04/27	1	unknown	05/01 – 05/05 F	N		
03B/13A	B	4	0-4	0	05/14	2	05/18	06/13 F/H?	N		
04	A	≥1	0	0	05/01	1	NC	05/01 – 05/05 F	N		
	B	2	2	2	06/02	1	06/03	07/04 H	N		
05	A	≥3	0	0	05/01	3	unknown	05/01 – 05/05 F	N		
	B	4	4	3	Est. 06/04	unknown	Est. 6/10	07/06 H	N		

^cIndicate below the reasons for nest failure and egg/chick mortality (if known) and the evidence, or indicate "unknown." Attach additional sheets if necessary.

^dChicks are considered "fledged" if they are ≥ 25 days old or are observed in flight for ≥ 50 ft., whichever occurs first. *NC= Not completed **NF= Not found

Nest No.	Cause of egg mortality/Evidence	Nest No.	Cause of chick mortality/Evidence
02B	1 chick hatched, other 3 eggs abandoned, cause unknown.	01A	2 chicks lost cause unknown; 4 chicks last seen on 5/24, 2 chicks 5/26 and later. On 5/25, chicks could not be found and were in highly disturbed area (>50 people) which we believed were preventing them from foraging; we had to rope off additional intertidal zone in order to provide them with foraging habitat near western jettie. No ocean foraging habitat available to them (which was closest to where their nest was located).
03A/13	Nest disappeared, predation suspected, cause unknown, no evidence. –nest last seen on 5/1, on 5/5 no nest. Recent heavy rain and wind. Similar to nest 5a loss. No electric fencing at this time; coyote tracks had been observed on dredge spoil on 5/1.	02A	4 chicks lost; causes unknown. 4 chicks on 5/31, adults defending them from adult LETEs. 4 chicks 6/1, 1 chick seen upsidedown, limping and adult brooded it while LETE adults dive bombed adult Plovers. 3 chicks on 6/2, 6/3, 1 chick on 6/6, and 0 chicks on 6/9. Bad weather 6/4-6/5. Adults seen courting/copulating on 6/9-6/18.
03B/13A	Nest/chicks lost, cause unknown. Possible 3b hatched, but if so chicks never observed. Adults last seen incubating 6/11. Not visited 6/12; on 6/13, no chicks, adults in area scraping. Clear canid tracks (domestic dog or coyote) leading up to 4 predated COTE nests; no tracks leading to PIPL nest bowl however.	02B	Chick observed once on 7/23; bad weather 7/24, 7/25 no sign of pair or chick, cause unknown, 3 eggs abandoned. Piles of adult LETE feathers, scattered LETE eggs surrounded by GHOW tracks found in same area on 07/16. Nest 18A lost in same general area on 06/28, w/owl tracks leading up to nest bowl.
04A	Predation – suspect coyote. Coyote tracks on top of nest bowl (footprint in nest bowl) but no other evidence; could not tell if nest had been predated earlier during bad weather (5/2-5/4) and then coyote walked through, or if depredation happened 5/4 overnight to morning of 5/5. Dug under sand for eggs, nothing there.		
05A	Nest disappeared, predation suspected, cause unknown, no evidence. –nest last seen 5/1, on 5/5 no nest. Recent heavy rain and wind. Similar to nest 3a loss. No electric fencing at this time; coyote tracks observed on dredge spoil on 5/1.		

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Pair No.	Nest No.	No. eggs laid	No. eggs hatched ^c	No. chicks fledged ^d	Date clutch found	No. eggs when clutch found	Date clutch completed	Date nest hatched or failed ^c	Exclosure		
									Y/N	Design (A, B...)	Date installed
06	A	4	4	1	05/01	2	05/05	06/02 H	N		
07	A	4	4	3	05/05	2	05/08	06/06 H	N		
08	A	≥3	0	0	05/06	1	05/14	Est. 5/18-05/20 F	N		
	B	4	3	2	05/30	2	06/07	06/29 H (2 chicks)	N		
09	A	≥1	0	0	05/06	1	Unknown	05/7-05/11 F	N		
	B	4	0	0	05/24	3	05/27	06/02-06/07 F	N		
	C	4	0	0	06/13	2	06/18	06/27 F	N		

^cIndicate below the reasons for nest failure and egg/chick mortality (if known) and the evidence, or indicate "unknown." Attach additional sheets if necessary.

^dChicks are considered "fledged" if they are ≥ 25 days old or are observed in flight for ≥ 50 ft., whichever occurs first.

Nest No.	Cause of chick mortality/Evidence	Nest No.	Cause of chick mortality/Evidence
08A	Predation suspected, no tracks, yolk outside nestbowl. Nest was inside electric fencing; did not look as though coyote had breached fencing.	6a/7a	Broods 6a and 7a formed a "superbrood" on 6/13. Adults also seen occasionally harassing/fighting and beating up on chicks and each other early; size difference was main determining factor in assigning 1 chick fledged for 6a, 3 chicks fledged for 7a. Chicks lost to unknown causes.
08B	1 egg unhatched; abandoned; cause unknown.		
09A	Unknown. Nest was on dune slope/cliff could have fallen down very easily. High winds (15-25 mph) and rain on 5/8-5/10.		
09B	On 06/02, nest partially covered in sand, appeared possibly abandoned-- 1 adult was sitting in area, not defensive. Last seen active 5/30/08. Predation suspected, no tracks, eggshells found 10-15 m from nest but not sure if they were from this nest or 15a (was also depredated this date).	08B	Unknown . 1 chick disappeared between 07/04-07/06. Chicks foraged on the bay side and were subjected to very high human disturbance and had a difficult time accessing foraging habitat; we erected fencing inside intertidal zone on the day they hatched and tried to move it around to accommodate chicks. 2 chicks hatched 6/29 and 2 eggs still in bowl. 1 egg hatched 6/30 and 3 chicks observed foraging. On 07/04, 3 chicks but bad weather on 7/5, and only saw 2 chicks after that.
09C	Predation suspected, cause unknown. Rained previous evening, last observed 6/26. Crows seen regularly in area, but no evidence. Monitored nest from very far away with scope because crows often seen perching in dunes/on trees behind nesting area—including 6/26.		

Page 5 of 6		No. eggs laid	No. eggs hatched ^c	No. chicks fledged ^d	Date clutch found	No. eggs when clutch found	Date clutch completed	Date nest hatched or failed ^c	Exclosure		
Pair No.	Nest No.								Y/N	Design (A, B...)	Date installed
10A/16	A	≥1	0	0	05/06	1	NC	05/07-05/11 F	N		
10B/16A	B	4	0	0	05/15	3	05/18	05/19-05/21 F	N		
10C/16B	C	≥1	0	0	05/30	1	NC	05/31-06/02 F	N		
11	A	4	0	0	05/06	3	05/07	05/07-05/11 F	N		
	B	4	2	1	05/30	3	06/01	06/26 H	N		
12	A	4	0	0	05/07	1	05/15	05/19-05/21 F	N		
14	A	4	0	0	05/14	2	05/18	05/19-05/21 F	N		

^cIndicate below the reasons for nest failure and egg/chick mortality (if known) and the evidence, or indicate "unknown." Attach additional sheets if necessary.

^dChicks are considered "fledged" if they are ≥ 25 days old or are observed in flight for ≥ 50 ft., whichever occurs first.

Nest No.	Cause of chick mortality/Evidence	Nest No.	Cause of chick mortality/Evidence
10A/16	Nest lost, cause unknown, no evidence. Last saw nest on 5/7. Rained 5/8-5/10, wind 15-25 mph; nest gone 5/11.	11b	Chick lost 6/29-07/01, cause unknown.
10B/16A	Nest lost, cause unknown but suspect predation; last seen 5/19, high wind (>25 mph), rain 5/19-5/21, no evidence (washed away by rain).		
10C/16B	Nest lost, cause unknown but suspect predation; last seen 5/30, high wind (>25 mph), rain, 5/31-6/1, rain washed area of any sign.		
11A	Nest lost, cause unknown, no evidence. Last saw nest on 5/7. Rained 5/8-5/10, wind 15-25 mph; nest gone 5/11. No sign.		
12A	Nest lost, cause unknown. Nest bowl gone; last seen 5/19, high wind (>25 mph), rain 5/19-5/21, washed area of any sign. 4 m from high tide line, so possible that nest was washed away, but can't rule out predation.		
14A	Nest lost, cause unknown. Nest bowl gone; last seen 5/19, high wind (>25 mph), rain 5/19-5/21, washed area of any sign. 6 m from high tide line, but no evidence.		

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Year: 2008

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Pair No.	Nest No.	No. eggs laid	No. eggs hatched ^c	No. chicks fledged ^d	Date clutch found	No. eggs when clutch found	Date clutch completed	Date nest hatched or failed ^c	Exclosure		
									Y/N	Design (A, B...)	Date installed
15	A	4	0	0	05/14	1	05/21	05/21-05/23 F	N		
	B	4	0	0	06/09	4	unknown	06/20 F	N		
	C	1	0	0	06/28	1	NC	06/29-07/01 F	N		
	D	3	3	3	07/08	3	Est. 07/04	07/30 H	N		
17	A	1	0	0	05/23	1	NC	05/24-05/25 F	N		
	B-CONT.	3	0	0	05/30	2	06/01	06/03-06/07 F	N		
	C	3	0	0	06/13	3	unknown	06/27 F	N		
	D	≥1	0	0	07/11	≥1	unknown	07/22 F	N		
18	A	4	0-4	0	05/27	1	06/02	06/28 F/H	N		

^cIndicate below the reasons for nest failure and egg/chick mortality (if known) and the evidence, or indicate "unknown." Attach additional sheets if necessary.

^dChicks are considered "fledged" if they are ≥ 25 days old or are observed in flight for ≥ 50 ft., whichever occurs first.

Nest No.	Cause of chick mortality/Evidence	Nest No.	Cause of chick mortality/Evidence
15A	Predation, crow suspected, crow tracks present around nest bowl, egg shell fragments in and around nest bowl, yolk splattered around bowl; rained previous night and likely happened w/in hrs of 0900hr. Nest located very close to "Welcome to Dead Neck" sign that could have provided perch for crows; crows seen daily here.	18A	Predation, strongly suspect GHOW. Nest lost day after estimated hatch date, great-horned owl tracks leading up to bowl, appearance of bowl (flattened, chick track indicating brooding adult). Suspect GHOW predated all chicks/eggs.
15B	Predation, likely American crow. Crow tracks all around w/in 2 ft of nest bowl, all over area where nest was. PIPL tracks heavy and likely obscured crow tracks immediately around bowl. Last seen 6/19.		
15C	Cause unknown. Not sure whether overwash or predation. Nest 4.8 m from high tide line. Last seen 6/29, gone 7/1. Rain, 25+ mph wind, obscured evidence. Wrackline right at edge of where nest was, found no washed eggs.		
17A	Predation suspected, no evidence. Inside electric fence, near AMOY nest/LETE nests. Last seen 5/24 w/1 egg, vocal adult. Gone 5/25, found continuation nest 17b on 5/30 w/2 eggs.		
17B-cont	Predation suspected, no evidence. Last seen 6/3. Inside electric fence.		
17C	Predation suspected, cause unknown, no evidence. Inside electric fence (high voltage), no tracks, multiple LETE nests lost in area at same time.		
17 D	Nest lost, cause unknown. Nest not actually observed, however pair seen daily, territorial and broken wing display prior to 7/11. On 7/11, found nest by watching adult go back to very densely vegetated area, observed settling on nest/incubating. Pair seen incubating/mate switches for 11 days. Dense vegetation and high predation rate on the Dead Neck dredge spoil; watched from scope from one location. Nest was located w/in 1m of COTE nests/COTE chicks. On 7/22, stopped seeing adults in area, nest may have been predated; no sign of pair later in the season..		

Appendix III

Photos of breeding American Oystercatcher that died in the electric fence surrounding the Dead Neck dredge spoil during the 2008 field season. Necropsy Report attached.



