# Shorebird Monitoring and Management
# Cape Cod National Seashore
# 2018



*Photo by Keegan Burke*

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Cape Cod National Seashore

Wellfleet, MA 02667

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# 1 Executive Summary

Cape Cod National Seashore (CACO) manages the protection of federal and state listed ground-nesting shorebirds (piping plover [*Charadrius melodus*], least tern [*Sternula antillarum*], and American oystercatcher [*Haematopus palliates*]), and various migrating shorebird species following procedures outlined in the 2012 CACO Shorebird Management Standard Operating Procedures (SOP). This report summarizes scientific results and management actions during 2018.

Piping plover, least tern, and American oystercatcher nesting and brood-rearing behaviors were monitored over 43 miles of coastline from Provincetown to Orleans, Massachusetts.

Piping plover:

- 98 breeding pairs were observed (highest number of pairs since 2012)
- 139 chicks fledged (highest number of fledged chicks since 2008); 54 pairs successfully fledged at least one chick
- Park-wide average productivity = 1.42 chicks fledged/pair (USFWS Northeastern piping plover population annual recovery target rate is 1.5 chicks fledged/pair)
- Depredation accounted for 79% of nest failures
- Predominant nest predators were corvids (American crow and fish crow) and Eastern coyote
- Predator exclosures were installed around a total of 58 nests. Exclosures significantly improved nest success and reduced predation rates

Least tern:

- Nine colonies were established from Eastham to Provincetown
- 140 breeding pairs were observed (second highest since 2012)
- 41 chicks fledged (second highest since 2012)
- Average productivity = 0.29 chicks fledged/breeding pair (third highest since 2011)
- Depredation, mainly by coyote, was the principal cause of egg loss
- Cause of chick loss is difficult to determine, but depredation by coyote was often suspected

American oystercatcher:

- One pair nested at Jeremy Point, Wellfleet
- Zero chicks fledged from the pair's first attempt; eggs hatched from the second nest but chicks were lost
- Productivity = 0 chicks fledged/breeding pair
- Depredation was the main cause of egg loss
- Cause of chick loss is unknown, but depredation by coyote was suspected

Staging migrating shorebirds:

- Large mixed-species flocks including those with up to approximately 6,000 individuals of the federally endangered roseate tern (*Sterna dougallii dougallii*) and the state-listed species of concern common tern (*Sterna hirundo*), were observed throughout the park mid-July through October
- Large mixed flocks of up to 1,000 individuals including red knot, semipalmated sandpipers, piping plovers, black-bellied plovers, semipalmated plovers, sanderlings, and other shorebird species were observed throughout the park mid-July through October

# 2 Introduction

Cape Cod National Seashore (CACO) provides miles of prime habitat for beach-nesting birds that breed on beaches used by millions of human visitors every year. Some of the species are listed by federal and state agencies as endangered, threatened, or of special concern, such as piping plover, least tern, and American oystercatcher. Additional threatened and endangered species use CACO beaches as a staging

ground to forage and build reserves during migratory stop-overs: the roseate tern, common tern, and red knot. CACO manages the beaches with the goal of increasing shorebird species' productivity while providing for visitor access and recreation. Management practices include those designed to keep people out of nesting areas (e.g. temporary beach closures, off-road-vehicle restrictions, symbolic fencing and signs) and those designed to reduce predation on birds (e.g. predator exclosures around nests, food waste reduction, pet restrictions). These practices are adjusted day-to-day and are informed by ongoing monitoring.

CACO shorebird staff regularly monitor the timing, survival, and reproductive success of shorebirds throughout the breeding season (spring-fall). This document summarizes biological data and associated management actions in 2018 for three species of breeding shorebirds. It also summarizes observations of other species of shorebirds that use CACO as a staging ground during their annual migration.

CACO encompasses a matrix of private, federal and town-owned lands with varying beach management and natural resource protection practices. In order to achieve continuity in beach regulations and make signage and management less confusing to the general public, CACO regularly communicates and coordinates with adjacent landowners.

# 3 General Shorebird Protection and Monitoring Methods

## 3.1 Nesting Habitat Protection

Habitat assessments were conducted prior to the onset of the breeding season in order to identify suitable habitat for ground nesting shorebirds. Those assessments and historic nesting locations were used to demarcate pre-nesting areas closed to recreational activities. Symbolic fencing, wooden posts connected by string and signs ("bird use area") to prohibit entry, were installed around these sites before nesting activity was observed. These closures helped to minimize habitat disturbance in potential breeding areas and also enabled birds to establish territories and nests in their preferred habitat. The closures were modified throughout the season in order to maintain a sufficient buffer around nests and to provide adequate protection for staging areas used by migratory birds (NPS 2012).

## 3.2 Monitoring

CACO follows the monitoring and protection methods outlined in the U.S. Fish & Wildlife Service (USFWS) *Piping Plover Atlantic Coast Population Revised Recovery Plan* (1996), a protocol designed specifically for CACO (Erwin 2003), and *The Massachusetts Tern and Piping Plover Handbook: a Manual for Stewards* (Blodget and Melvin 1996) for nesting least terns. To inform decisions regarding daily operations that affect shorebird management and protection and that are not addressed by these two documents, CACO staff consults its 2012 Standard Operating Procedures (SOP; NPS 2012).

Shorebirds were monitored in 27 survey units at CACO from Provincetown to Orleans (Table 1). Survey units were established for logistical purposes and do not necessarily represent ecologically meaningful differences. Beaches are divided into two districts, again for logistical purposes. The North District (ND) includes all CACO beaches located in Provincetown and Truro: Wood End/Long Point, Herring Cove, Hatches Harbor, Race Point, Race Point North, Race Point South, Mission Bell, Exit 9, Armstrong, High Head, Head of the Meadow, Coast Guard (Truro), Longnook, and Ballston. The South District (SD) includes all CACO beaches located in Eastham and Wellfleet: Coast Guard Beach (Eastham), Nauset Light Beach, Marconi Beach, Marconi Station, LeCount Hollow, White Crest, Cahoon Hollow, Newcomb Hollow, Bound Brood, Duck Harbor, Great Island, and Jeremy Point. New Island in the town of Orleans is considered a SD site but in 2018 it was monitored and included in the town of Orleans data.

Monitoring began in early April. Field staff searched the beaches daily for signs of shorebird nesting activity (e.g., nesting behavior, nest scrapes, and concentrated tracks on the upper beach). Almost all nests were located before clutch completion, and thus hatch windows could be predicted with high accuracy. Shorebird nests, broods, and colonies were generally monitored every one to two days to ensure restrictions on visitor use were applied or lifted in a timely manner. Nests and broods in Off-Road Vehicle (ORV) corridors were monitored at least daily, and often twice a day. Symbolic fencing was adjusted in response to breeding or staging behaviors. To minimize disturbance, observations were made from a distance of 5 to 30 meters, through binoculars.

# 4 Species-Specific Methods and Results

## 4.1 Piping Plover

### 4.1.1 Background

The piping plover was federally listed under the Endangered Species Act in 1986. Its breeding range extends from Newfoundland to North Carolina, and wintering range extends from North Carolina to the Bahamas and West Indies. The Atlantic coast piping plover population size began to decline in the late 1800's due to unregulated hunting and the millinery trade. The population rebounded with the introduction of the Migratory Bird Treaty Act in 1918; however, the population declined again due to beach development and increased recreational use of breeding habitat. It is currently listed as Threatened.

### 4.1.2 Management Methods

#### *4.1.2.1 Predator Management*

In addition to the symbolic fencing described in Section 3.1, CACO staff installed predator exclosures around some piping plover nests. These exclosures were designed to protect nests from predatory birds and mammals (crows, coyotes, foxes, etc.). They were made of metal wire cages approximately three feet in height and seven feet in diameter, buried in the sand and stabilized with wood posts. The top of the exclosure is covered with bird netting, with holes no bigger than half an inch, secured to the metal cage. To minimize the risk of nest abandonment and adult mortality, the majority of exclosures were installed only after egg incubation began, where vegetation did not hinder the bird's detection of approaching threats (e.g., predators), and where the risk of overwash by waves and sand was low (Darrah, 2017). Exclosure parameters to consider at CACO were reviewed at the Predator Exclosure Session, Atlantic Coast Piping Plover and Least Tern Workshop, Shepherdstown, West Virginia, in January 2012 (Hecht, 2014).

#### *4.1.2.2 Flexible Management*

In 2010, USFWS issued a biological opinion and incidental take statement that permits CACO to flexibly manage (by reducing protective measures) up to 3 piping plover pairs nesting on beaches where buffers around nests would render the beach unusable by visitors at high tide. To date, flexible management has been conducted only once, in 2010. No flexible management was conducted in 2018.

#### *4.1.2.3 Monitoring Broods*

Recreational restrictions are lifted when broods are determined to be fledged or have not been present for five consecutive days. Piping plover chicks are considered fledged when they are observed in sustained flight for at least 15 meters, irrespective of age (USFWS, 2015). In accordance with the 2012 SOP, if chicks are not observed for five consecutive days they are deemed as lost. In the majority of cases, the cause of chick loss is unknown. Documenting the cause of chick mortality presents additional challenges compared to nest loss because chicks are highly mobile, hard to track, hide from potential predators such as pedestrians and dogs, and may go unobserved for days at a time. Brood monitoring is critical for tracking chick movement, identifying causes of chick loss, and observing initial flights

### 4.1.3 Results

#### *4.1.3.1 Nesting*

The first piping plovers were observed at Coast Guard Beach in Eastham on 1 April. They were present at most beaches by early April and continued to arrive until mid-June. The total number of breeding pairs was determined by the number of pairs observed nesting, or exhibiting territorial or nesting behavior for at least two weeks. Most plovers departed by late August, although some remained through September and early October.

The first nest was found on 28 April at Race Point Beach (nest initiated on 27 April). Peak nesting occurred the week of 1 June-8 June, with a high of 69 nests at one time on 3 June (Figure 1). Nests with eggs were present from 27 April to 5 August. Hatching dates ranged from 5 June to 28 July. Most nests were located along the backshore and areas of sparse vegetation along the foredune. Nest loss and egg loss events were recorded independently due to the potential for multiple causes for egg loss from one nest (e.g. two different predators, unviable eggs) (Table 3 and Table 4).

Nesting results are summarized in Table 1. Ninety eight breeding pairs laid 180 nests, of which 114 (63%) were lost and 66 (37%) were successful. Of those that were lost, almost half (52) were lost before full incubation began. The proportion of successful nests did not differ between districts, landscapes (ocean or bayside), vegetation (present or absent), or among habitats (berm, dune, or overwash) (GLM, $p > 0.05$ in all cases). Re-nests accounted for 46% of the total nests. Success of re-nests was 5% lower than first nests.

Of the 98 breeding pairs, 54 fledged at least one chick, 12 had complete brood losses and 32 failed to hatch any eggs (Appendix C).

A total of 573 eggs were laid, of which 39% hatched (Table 1). Of the 352 failed eggs, 34 (10%) were unviable (Table 4). All unviable eggs were dissected and all but one revealed only partial development and yolk. The one egg was pipped and a developed chick was inside, determined to be abandoned before it hatched. Three nests (with 9 eggs) were completely unviable, which is the highest incidence of complete unviability since 2003 (Table 3). These nests were located at Race Point North, Coast Guard Beach in Truro, and Armstrong. The nests at Race Point North and Armstrong were abandoned after the hatch window had passed. The nest at Coast Guard, Truro was not abandoned however the eggs were removed on 30 July, after 63 days of incubation and consultation with US Fish and Wildlife Service.

Among total nest failures (in which all eggs were lost), predation was the most common cause for egg loss (79%), followed by overwash (8%), unknown causes (7%), abandonment (3%), unviable (3%), and being crushed by gulls (1%) (Table 3). Most predation was by crows (62%) and Eastern coyotes (23%), though foxes, grackles, and other unknown predators were important causes of egg loss (Table 4). Of the 180 nests laid, 128 made it to clutch completion and the incubation stage (71%). The other 52 nests were lost before clutch completion (29%).

One additional breeding pair was located on New Island in Orleans, laid one nest of four eggs and all eggs hatched. Three of the four chicks were lost likely due to predation and one chick fledged. Adults moved from New Island after hatching to an ocean beach managed, monitored, and reported by the town of Orleans.

#### *4.1.3.2 Banded Birds*

Two banded piping plovers nested at CACO this season. One bird was banded as a chick on 4 August 2013 at Spring Hill Beach in Sandwich, MA. It has returned to nest at CACO several seasons since banding and has fledged a total of 9 chicks from 2015-2018 at Armstrong Beach. In 2018 it fledged the last chick from CACO beaches on 10 September at Armstrong Beach.

The second banded piping plover failed to produce any chicks in 2018. It nested three times at High Head Beach in Truro, then left the area and renested twice with a new mate at Great Island. Nest loss was attributed to crow and unknown cause due to lack of tracks.

#### *4.1.3.3 Exclosure Results*

There were 128 nests that reached completion (i.e. nests in which the clutch reached four eggs or active incubation was observed and no further eggs were added for several days). Predator exclosures were installed around 58 (45%) of these complete nests; the remaining 70 were unexclosed (Table 5). Outcomes differed substantially between exclosed and unexclosed complete nests. Exclosures significantly increased the rate of hatching success (74% vs. 33%) and decreased the rate of predation (9% vs. 59%) (GLM, $p<0.0001$ for hatching success). Proportional loss to overwash and abandonment was slightly higher among exclosed nests (7% vs. 1% and 3% vs. 0%, respectively), though these rates are dwarfed by the differences in survival and predation.

No adult mortalities were associated with exclosure use, however a full brood of four chicks was attributed as a loss due to an exclosure. A crow depredated the chicks leaving the shelter of the exclosure just after hatching (Table 6).

Hatch rate per completed nest (eggs hatched/total number eggs laid) was significantly higher among exclosed nests than unexclosed nests (68% vs. 29%; GLM, $P < 0.0001$). Exclosed nests accounted for a higher proportion of all fledglings than unexclosed nests (61% vs. 39%, respectively) Productivity (fledged chicks per breeding pair) was significantly higher for pairs with exclosed nests versus pairs with unexclosed nests (GLM, $p = 0.0032$).

#### *4.1.3.4 Fledging Results*

Of 221 eggs that hatched, a total of 139 chicks fledged (fledge rate = 63%; Table 1). From the 98 breeding pairs, 139 chicks fledged, resulting in an overall productivity rate of 1.42 chicks fledged/breeding pair (Table 1). Fledging dates in 2018 ranged from the 6th July to the 10th September. Active broods of unfledged chicks were present on CACO beaches from 5 June until 10 September, with the peak number of broods occurring the first week in July (Figure 2). The average number of days, from hatch to fledge, was 32.5 in 2018. Hatch dates did significantly impact the number of days to fledge (GLM, $p = 0.0331$). Chicks that hatched at later dates in the season took longer to fledge than those that hatched earlier. The overall fledge rate (number of chicks fledged/total number of eggs hatched) was 63% (Table 1). Fledge rates did not statistically differ between districts, landscapes, vegetation, or among habitats (GLM, $p > 0.05$ in all cases). Fledge rates for re-nests and first nest attempts were similar, 64% and 62% respectively.

One chick required intervention at Race Point North after it surpassed typical fledging age but was still unable to fly. The chick hatched on 8 June and seemed smaller than the other three chicks from this brood for quite some time. The three other chicks fledged (flew over 15 meters) on 16 July. The smaller chick was observed for several more weeks to see if it would gain in size and be able to fly. As the chick grew, it became evident that one of its wings was significantly smaller and causing issues for the bird. In coordination with (USFWS and Wildcare of Cape Cod, the decision was made to capture the chick for evaluation. Staff captured the chick on 23 August and transferred it to Wildcare who determined it had been injured early on in development and would not be able to be released. Wildcare and USFWS placed the chick in captivity at the New England Aquarium in Boston. This chick is considered fledged (as it survived beyond 25 days in the state of Massachusetts) and is a member of the Atlantic Coast piping plover population.

### 4.1.4 Discussion

The observed productivity rate of 1.42 chicks fledged per breeding pair was just below the species recovery target of 1.5 and is consistent with a multi-year pattern of annual fluctuations above and below the target rate. Although the five-year average productivity remains below the target, the number of chicks fledged has been steadily increasing since 2012, when productivity was lowest and only 30 chicks fledged (Figure 3).

Over the last 15 years, the top three factors causing nest failure have been predation, overwash, and abandonment (Table 2). No nests were lost due to direct human activity; this is a highly managed area. Predation has consistently been the greatest cause of nest failure during that time frame, including in 2018. Also consistent with past years, crows were the leading cause of nest loss (Table 3), followed closely by Eastern coyote. Increased predation may have also been a cause of decreased fledge rate this year (63%) compared to the previous two years (68% - 73%), though it is difficult to document predation on chicks.

The use of predator exclosures around piping plover nests in 2018 resulted in reduced nest depredation. Although exclosure use has become a common tool for piping plover protection efforts, there is concern that the use of exclosures may make nest locations known to the public as well as increase the number of adult mortalities, abandonments, and depredations. Depredations of exclosed nests may be caused by predators learning to associate the exclosure structure with a food supply. The North District experienced three, possibly four, instances of depredation events on exclosed nests: two depredations occurred by coyotes jumping into exclosures, one fox digging below an exclosure, and one unknown predator loss but holes were ripped open in the netting. There also was one instance of vandalism on an exclosure at Lecount Hollow by humans this season. The netting was ripped open on the exclosure, but the eggs were not tampered with and the nest made it to hatch after the exclosure was repaired. Nevertheless, our results strongly indicate that exclosures substantially increase nest success and reduce predation but have little or no effect on abandonment or overwash, or on adult mortality. Thus, exclosures remain a valuable management tool that benefits piping plover productivity on CACO beaches.

In 2018, CACO had the second highest number of breeding pairs observed in fifteen years of monitoring (Table 2, Figure 3). Further investigation is needed to determine factors influencing the increase in the number of pairs this season. One possible factor is the higher productivity during the last two seasons along the U.S. Atlantic Coast and at CACO. Recovery and viability of piping plover populations requires both an increase in abundance and a sustained level of annual productivity.

## 4.2 Least Tern

### 4.2.1 Background

The least tern is listed by the Massachusetts Division of Fisheries and Wildlife (MDFW) as a species of special concern and as a Bird of Conservation Concern by the USFWS. The Massachusetts least tern population size increased from 1985 to 2001, declined for several years, and then increased sharply after 2006; however, because initial counts were often conducted using inferior survey techniques and less inclusive survey coverage area than recent years, early increases in numbers do not necessarily indicate increasing populations (Thompson et. al 1997). Since 1985, numbers of nesting least terns in Massachusetts have ranged from 2,109 to 4,309 pairs with an average of 2,914 pairs (Mostello 2014). In the mid-1970s – 1980s, the population of nesting least terns at CACO generally ranged from 200- 600 pairs. Over the past twelve years (2007 – 2018), the least tern population fluctuated between a high of 268 pairs in 2011 and a low of 52 pairs in 2016 at CACO (Table 8).

### 4.2.2 Management Methods

Due to concerns of predators keying into human scents or visual clues during monitoring activities in the nesting areas (e.g., footprints leading up to a nest), visual estimates of least tern colony size were made from outside the symbolic fencing several times per week (i.e., a count of incubating adults, and unfledged chicks). Nests or chicks present within or in proximity to the ORV beach driving corridor were monitored daily. Shorebird staff occasionally walked through colonies to obtain better estimates of numbers of nests and chicks than can be obtained from more distant visual observations. The number of pairs in each colony was reported based on pairs present and incubating adult counts during two standard periods defined by Massachusetts Division of Fisheries and Wildlife ("A-count" from June 5-20 and "B-count" after June 20).

### 4.2.3 Results

In 2018 least terns returned to CACO beaches during the first week of May. The first least tern nests were found on 30 May at Race Point North and Armstrong. Most were incubating eggs by early June. Re-nesting attempts continued throughout late August. The number of breeding pairs was 126 for the "A" count and 140 for the "B" count (Table 7). Colony sizes fluctuated throughout the season but most were relatively small with fewer than 50 pairs. Coast Guard Eastham, Race Point North, Wood End/Long Point, and Head of the Meadow supported the largest colonies with high counts of 50, 39, 24 and 22 breeding pairs, respectively (Table 7).

Chicks began hatching in late June (the first hatch was 20 June at Coast Guard Eastham). Least terns are considered fledged when they are observed in sustained flight for at least 15 meters. The first least terns fledged the second week in July at Coast Guard Eastham and the last fledged during the first week in September at Marconi Station. The 140 nesting pairs produced 41 fledged chicks, yielding a productivity of 0.29 from CACO beaches in 2018 (Table 8).

### 4.2.4 Discussion

The total number of breeding pairs of least terns observed in 2018 was slightly lower than 2017 (142 pairs) but the second highest since 2012. The five-year running average number of pairs for 2014-2018 was 107. The number of fledged chicks had been trending upward from 2013 (2 fledges) to 2017 (69 fledges; Figure 4). A 68% decrease in number of chicks fledged occurred from 2017 to 2018. In 2018, 71% of chicks fledged at just two locations: Coast Guard Beach, Eastham (17) and Race Point North (12). Least terns are relatively long-lived, meaning the effect of poor productivity on population status is delayed. Thus, annual reproductive success is just as critical an indicator of least tern's population stability as annual numbers of individuals counted (Thompson et. al 1997).

The number of breeding pairs and chicks fledged decreased from last year with productivity over the past five years remaining low (average 0.36 chicks fledged/breeding pair). Low numbers of breeding pairs may be due to low productivity in recent years, intense predation on eggs and chicks, and the fragmentation of colonies due to human disturbance at prime nesting areas. With the seemingly increasing numbers of predators (Eastern coyote and two species of crow) in the area, more robust protective measures may be required in the future. In addition, the narrowing of beaches and increased frequency of late spring/summer storms limits the available habitat and makes nesting areas more vulnerable to wash-overs.

This season several large predation events occurred which limited least tern productivity. In mid-July, the Wood End/Long Point colony was reduced from approximately 100 individuals and 24 incubating adults to 20 individuals and 2 incubating adults in one week. A similar occurrence was observed at Race Point North within the same time frame, reducing a colony of approximately 39 pairs to 6 pairs. Both instances were due to coyote predation. Field observations of physical tracks, scat, and individuals of Eastern coyote within the least tern colonies at CACO suggest the coyotes visited colonies almost daily and

preyed on nests or chicks. Eastern coyotes may develop search patterns that are highly effective in locating ground nesting bird nests in open habitat.

Determining the cause of chick mortality is more difficult than attributing causes of nest loss. Chicks move, are difficult to track, and can hide and go unobserved for days, but it is likely that the same species (mainly Eastern coyotes) that are preying on eggs are also preying on chicks. The high frequency of visitation to colonies by predators combined with daily human disturbances adds stress to nesting least terns and may be responsible for late re-nesting efforts into August, movement onto sub-standard nesting habitat, and fragmentation of colonies.

The colonial defensive strategy used by adult terns as a means of protecting eggs and chicks is called 'mobbing'. Adult terns react as a group to any perceived threat that comes close to the colony and use mobbing and defecating on intruders to deter potential predators from the area. Colony sizes at CACO have decreased perhaps to the point where there are insufficient numbers of adults to mob and successfully deter predators away from a nesting area. Colony fragmentation may also occur when pedestrian access paths are made through the tern's preferred nesting habitat, possibly dividing the colony up into smaller, less effective groups to deter predators.

## 4.3 American Oystercatchers

### 4.3.1 Background

The American oystercatcher is designated a Species of High Concern and is one of the most uncommon species of breeding shorebirds in North America due to a restricted range, small population size, widespread habitat loss, and threats during the breeding and non-breeding seasons (Brown et al. 2001). In addition, it is listed as a Bird of Conservation Concern by the USFWS (2008). The oystercatcher population has undergone a substantial range expansion along the Atlantic Coast, reaching Massachusetts only 40 years ago. The northward range expansion may be a re-colonization of formerly occupied habitat (Forbush 1912). The eastern U.S. population of oystercatchers was estimated by Brown et al. (2005) at about 11,000 birds. In 2011, observers reported totals of > 418 adults and > 202 pairs of American Oystercatchers at 110 sites in Massachusetts (Melvin, 2012). The American oystercatcher is still an uncommon bird at CACO. Over the last 12 seasons (2007-2018), only 1-5 pairs have nested at CACO each year (Table 9). Nesting has been observed only in the South District at Jeremy Point in Wellfleet, Coast Guard Beach in Eastham, and New Island in Orleans.

### 4.3.2 Results

One American oystercatcher pair nested at CACO in 2018 at Jeremy Point. The first oystercatcher nest was found on 19 May with two eggs and completed with three eggs on 22 May. This nest was lost likely to depredation on 3 June; eggs were gone but no tracks were present and the pair was still in the area. The pair initiated their second nest on 14 June and completed it by 17 June with three eggs. Two of the three eggs hatched on 11 July, at which time two chicks were observed being brooded by one adult while the second adult incubated the remaining third egg. The same situation was observed on 12 July. On 13 July both chicks and the third egg were gone, and coyote tracks were present around the habitat. Likely depredation occurred for the remaining egg and chicks but was not confirmed. The pair remained in the area for several days but did not re-nest again. Productivity for American oystercatchers was zero in 2018.

### 4.3.3 Discussion

American oystercatchers were first recorded nesting on CACO beaches in 2002. Since then, 1-5 pairs have nested in the South District each year. Between 2007 – 2018, productivity fluctuated between zero and 1.5 chicks fledged/breeding pair (Table 9, Figure 5). Eastern coyote predation has been the main cause of nest loss and the likely cause of chick loss when nests have hatched. American oystercatchers are a long-lived species that benefits from high annual adult survival and variable annual productivity. The

latter could be considered a benefit because modeling results have shown that as variability in productivity decreases, the probability of population decline increases (Davis 1999).

Threats to American oystercatchers during the breeding and non-breeding seasons include direct habitat loss, recreational disturbance, increases in predators, potential contamination of food resources, and alteration of habitat through beach stabilization. Unfortunately, the relative impact of each threat on oystercatcher population is poorly understood (Schulte et al. 2007).

At CACO, boat recreation at Jeremy Point is a major source of disturbance to incubating oystercatchers. In addition, while dogs are prohibited seasonally on Jeremy Point, shorebird monitors observe dogs (often unleashed) brought in by boaters. Unleashed dogs pose a serious threat to unfledged oystercatcher chicks, which are larger and lack the cryptic coloration of other ground-nesting shorebird species, making them more noticeable to predators and domestic dogs.

## 4.4 Post Breeding/Staging Shorebirds

### 4.4.1 Background

In late summer/early fall, thousands of migrating shorebirds congregate on mudflats and beaches along CACO to feed and rest. While dozens of species use CACO during migration, three of the most notable are the federally endangered roseate tern, state-listed common tern, and the federally threatened red knot. Nauset Marsh, Coast Guard Beach in Eastham, Jeremy Point, Hatches Harbor, Race Point North and Wood End/Long Point are particularly important sites, as they represent the most important staging areas for these birds on Cape Cod (Hadden 2001, Trull et al. 1999, Jedrey et al. 2010).

### 4.4.2 Management Methods

To reduce disturbance to migratory and staging shorebirds, areas were closed to pets when greater than 50 migratory birds were observed in an area. As in past years, sections of upper beach and intertidal zone with concentrations of staging and migrating shorebirds or nurseries were posted with symbolic fencing and/or signs to reduce human disturbance throughout CACO. This management practice is guided by the 2007 ORV Environmental Assessment/Finding of No Significant Impact and the 1993 *Guidelines for Managing Recreational Use of Beaches to Protect Piping Plovers, Terns, and Their Habitats in Massachusetts* (Blodget and Melvin 1996). Beaches where staging and migrating shorebirds required signage included: Coast Guard Beach in Eastham, Jeremy Point, Race Point North, Armstrong, and Hatches Harbor. Additional areas which had smaller flocks but required signage were at Herring Cove, Mission Bell, Race Point, Race Point South, Exit 9, High Head, Head of the Meadow, Coast Guard Truro, Lecount Hollow, Duck Harbor, Great Island, and Marconi Station.

In addition, interpretive and "No Pet" signs were installed on buoys and metal channel posts placed throughout the marsh at Hatches Harbor.

### 4.4.3 General Results

The following results are estimates because CACO staff does not systematically collect data on numbers of individual staging migrant species. Field staff monitor and report general locations of large flocks > 50, and report estimates of numbers and individual species.

Flocks of common and roseate terns were observed staging throughout the park from mid-July to early October in 2018. Mixed flock high counts for CACO sites include approximately: 250 at Race Point South, 1,000 at Race Point North, 5,000 at Hatches Harbor, 300 at Race Point, 150 at High Head, 200 at Armstrong, 240 at Head of the Meadow, 150 at Exit 9, 500 at Wood End/Long Point, 200 at Mission Bell, 30 at Coast Guard Truro, 6,000 at Jeremy Point, 700 at Duck Harbor, 200 at Great Island, 60 at Marconi Station, 65 Lecount Hollow, and 1,000 at Coast Guard Eastham.

### 4.4.4 Species-Specific Results and Discussion

#### *4.4.4.1 Roseate Tern*

Research estimates that approximately 70% of the entire Northwest Atlantic breeding population of roseate terns and their fledglings use CACO beaches from mid-July through October for staging (Jeff Spendelow, USGS personal communication, 5 November 2018). During staging, roseate terns must build up fat reserves required for their long migration to South America (more than 7,000 km). Young roseate terns' migration and overwintering survival depends on parental care, both on staging grounds after they have fledged, as well as throughout migration. Disturbance to staging areas can cause flocks to flush and young birds to be separated from their parents. Even if this displacement is only temporary, it forces both adults and young to expend valuable energy stores needed for their long migration.

The Northwest Atlantic roseate tern population has declined more than 20% since 2000, despite extensive management efforts at breeding colony sites. Studies confirm that most mortality of this species takes place away from breeding sites, during migration or on wintering grounds. However, little information is available about causes of death during these periods. Results from a 20-year study of adult survival, and a review of recent productivity data, strongly suggest that post-fledging survival during the first year of life could be a major factor limiting population recovery (Lebreton et al. (2003), Nisbet & Spendelow (1999), Spendelow et al. (2008, 2010) USFWS (2010), and Spendelow et al. 2014 unpublished data).

#### *4.4.4.2 Common Tern*

The common tern is listed by the Massachusetts Division of Fisheries and Wildlife (MDFW) as a Species of Special Concern. In Massachusetts, from 1985 to 2003, common tern numbers rose steadily in Massachusetts. Since then, however, the population has been stable at about 16,000- 17,000 pairs. Since 1985, population size has ranged from 6,483 to 16,829.5 pairs (Mostello 2014).

No common terns nested at CACO in 2018. Many were observed in mixed flocks from July to October.

#### *4.4.4.3 Red Knot*

The Rufa red knot (*Calidris canutus rufawas*) was listed as a threatened species under the Endangered Species Act in 2014, with critical habitat designations identified in 2015. CACO provides essential staging and foraging habitat for red knots, which can be found in the greatest numbers during fall migration (mid-July through October), using sandy ocean beaches and tidal mudflats to feed and rest. Historically, the greatest concentrations of red knots within CACO have been observed in Eastham at Coast Guard Beach and Nauset Marsh, along the ocean beach in Truro and Provincetown, and in Hatches Harbor. In 2018, the largest flock, 75 individuals, was observed 8 August at Nauset Bay. Smaller concentrations of red knots were also observed at Coast Guard Eastham, Armstrong Beach, Jeremy Point and Race Point North in 2018.

#### *4.4.4.4 Piping Plover and Least Tern*

CACO shorebird biologists not only monitor piping plover and least tern nesting areas, but also feeding, staging, roosting, and nursery areas. Groups of post-breeding piping plovers were observed in late summer, feeding and resting throughout the park; most notably at Armstrong Beach, where groups of 5-20 plovers were observed in mid-late August through early October. Smaller groups of piping plovers were observed including five at the southern tip of Coast Guard Beach on 31 July, six at Jeremy Point on 7 September and a group of five at Race Point North on 6 September. Least tern nurseries were observed starting in late July until mid-September at Hatches Harbor (20-60 individuals) and Race Point North (4-100 individuals). Symbolic fencing and/or interpretive signs were installed to protect least terns and piping plovers still using critical habitat later in the breeding season.

## 4.5 Education, Outreach, and Public Involvement

Educating the public about impacts threatening nesting and staging shorebirds is important for garnering local support for management and protection efforts, thereby facilitating shorebird recovery. Along with day to day impromptu field interactions with visitors by shorebird staff, one ACE intern staffed a shorebird information and outreach table at Provincelands Visitor Center, twice a week. Many visitor contacts were made.

Five volunteers donated a total of 812 hours to CACO's shorebird management program in 2018. Volunteers assisted biological technicians and ACE interns with fencing and field observations from April through August.

# 5 Tables and Figures

**Table 1. Summary of piping plover (*Charadrius melodus*) nest success at CACO, 2018.**

| Site | Pairs | Nests | Eggs laid | Nests hatched | Eggs hatched | Chicks fledged | Hatch rate[1] | Fledge rate[2] | Productivity[3] |
|---|---|---|---|---|---|---|---|---|---|
| Bound Brook | 2 | 4 | 8 | 0 | 0 | 0 | 0% | 0% | 0.00 |
| Cahoon Hollow | 0 | 1 | 1 | 0 | 0 | 0 | 0% | 0% | 0.00 |
| Coast Guard (Eastham) | 13 | 14 | 55 | 11 | 40 | 16 | 73% | 40% | 1.23 |
| Duck Harbor | 4 | 8 | 30 | 2 | 8 | 8 | 27% | 100% | 2.00 |
| Great Island | 8 | 13 | 41 | 5 | 15 | 11 | 37% | 73% | 1.38 |
| Jeremy Point | 2 | 2 | 8 | 2 | 6 | 1 | 75% | 17% | 0.50 |
| Lecount Hollow | 1 | 1 | 3 | 1 | 2 | 1 | 67% | 50% | 1.00 |
| Marconi Beach | 3 | 4 | 11 | 2 | 6 | 1 | 55% | 17% | 0.33 |
| Marconi Station | 4 | 6 | 22 | 4 | 16 | 8 | 73% | 50% | 2.00 |
| Nauset Light | 0 | 0 | 0 | - | - | - | - | - | - |
| Newcomb Hollow | 2 | 4 | 13 | 1 | 4 | 4 | 31% | 100% | 2.00 |
| White Crest | 0 | 1 | 1 | 0 | 0 | 0 | 0% | 0% | 0% |
| **South District Totals** | 39 | 58 | 193 | 28 | 97 | 50 | 50% | 52% | 1.28 |
| Armstrong | 9 | 31 | 80 | 3 | 5 | 3 | 6% | 60% | 0.33 |
| Ballston Beach | 1 | 2 | 8 | 0 | 0 | 0 | 0% | 0% | 0.00 |
| Coast Guard (Truro) | 3 | 9 | 24 | 0 | 0 | 0 | 0% | 0% | 0.00 |
| Exit 9 | 2 | 2 | 7 | 2 | 5 | 4 | 71% | 80% | 2.00 |
| Hatches Harbor | 3 | 4 | 16 | 2 | 8 | 3 | 50% | 38% | 1.00 |
| Herring Cove | 0 | 0 | 0 | - | - | - | - | - | - |
| Head of the Meadow | 6 | 13 | 33 | 4 | 15 | 9 | 45% | 60% | 1.50 |
| High Head | 2 | 7 | 15 | 0 | 0 | 0 | 0% | 0% | 0.00 |
| Longnook | 2 | 2 | 7 | 1 | 3 | 3 | 43% | 100% | 1.50 |
| Mission Bell | 2 | 5 | 19 | 1 | 3 | 1 | 16% | 33% | 0.50 |
| Race Point | 3 | 4 | 15 | 3 | 11 | 6 | 73% | 55% | 2.00 |
| Race Point North | 15 | 24 | 88 | 12 | 39 | 31 | 44% | 79% | 2.07 |
| Race Point South | 2 | 7 | 23 | 1 | 4 | 3 | 17% | 75% | 1.50 |
| Wood End/ Long Point | 9 | 12 | 45 | 9 | 31 | 26 | 69% | 84% | 2.89 |
| **North District Totals** | 59 | 122 | 380 | 38 | 124 | 89 | 33% | 72% | 1.51 |
| **Grand Totals** | **98** | **180** | **573** | **66** | **221** | **139** | **39%** | **63%** | **1.42** |

[1]Total number of eggs hatched /total number of eggs laid.
[2]Total number of chicks fledged/ total number of eggs hatched.
[3]Total number of chicks fledged/ total number of nesting pairs.

**Table 2. Summary of piping plover (*Charadrius melodus*) nesting parameters by year from 2003-2018 at CACO**

| Year | # Pairs | # Nests Laid | # Successful Nests (%)[1] | % Renests[2] | # Eggs Laid | # Eggs Hatched (%)[3] | # Chicks Fledged (%)[4] | Productivity[5] |
|---|---|---|---|---|---|---|---|---|
| 2003 | 84 | 121 | 54 (45%) | 31% | 450 | 189 (42%) | 130 (69%) | 1.55 |
| 2004 | 85.5 | 115 | 59 (51%) | 26% | 425 | 220 (52%) | 124 (56%) | 1.45 |
| 2005 | 77 | 118 | 48 (41%) | 35% | 378 | 163 (43%) | 87 (53%) | 1.13 |
| 2006 | 74 | 96 | 70 (73%) | 23% | 336 | 233 (69%) | 122 (52%) | 1.65 |
| 2007 | 82 | 113 | 66 (58%) | 25% | 368 | 233 (63%) | 146 (63%) | 1.78 |
| 2008 | 85 | 109 | 70 (64%) | 21% | 386 | 243 (63%) | 157 (65%) | 1.85 |
| 2009 | 83 | 108 | 54 (50%) | 20% | 362 | 186 (51%) | 60 (32%) | 0.72 |
| 2010 | 85 | 115 | 68 (59%) | 26% | 386 | 235 (61%) | 136 (58%) | 1.60 |
| 2011 | 82 | 110 | 61 (55%) | 25% | 378 | 210 (56%) | 90 (43%) | 1.10 |
| 2012 | 99 | 212 | 27 (13%) | 53% | 636 | 72 (11%) | 30 (42%) | 0.30 |
| 2013 | 85 | 173 | 30 (17%) | 51% | 532 | 100 (19%) | 46 (46%) | 0.54 |
| 2014 | 68 | 121 | 38 (31%) | 45% | 375 | 129 (34%) | 52 (40%) | 0.76 |
| 2015 | 73 | 113 | 41 (36%) | 39% | 388 | 143 (37%) | 64 (45%) | 0.88 |
| 2016 | 66 | 95 | 48 (51%) | 31% | 344 | 169 (49%) | 124 (73%) | 1.88 |
| 2017 | 66 | 114 | 53 (46%) | 42% | 386 | 176 (46%) | 119 (68%) | 1.80 |
| 2018 | 98 | 180 | 66 (37%) | 46% | 573 | 221 (39%) | 139 (63%) | 1.42 |
| **mean** | 81 | 126 | 53 (46%) | 34% | 419 | 183 (46%) | 102 (54%) | 1.28 |
| **median** | 82.5 | 115 | 54 (48%) | 31% | 386 | 188 (47%) | 120.5 (55%) | 1.43 |
| **min** | 66 | 95 | 27 (13%) | 20% | 336 | 72 (11%) | 30 (32%) | 0.30 |
| **max** | 99 | 212 | 70 (73%) | 53% | 636 | 243 (69%) | 157 (73%) | 1.88 |

[1] % = number of successful nests/total number of nests
[2] % = number of renests (including continuation nests)/total number of nests
[3] % = number of eggs hatched/total number of eggs laid
[4] % = number of chicks fledged/number of eggs hatched
[5] % = number of chicks fledged/number of nesting pairs

**Table 3. Summary of piping plover (*Charadrius melodus*) nest loss, and cause of nest loss from 2003-2018 at CACO.**

| | | Number of nests lost by cause (Percentage of total lost) | | | | | | Percent depredated by species | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | # Unsuccessful Nests | # Overwash/ Sanding Over (%) | # Abandonment (%) | # Unviable (%) | # Unknown (%) | # Other[1] (%) | # Depredation (%) | Crows | Coyote | Gull | Skunk | Fox | Unknown Predator | Grackle |
| 2003 | 67 | 13 (19%) | 16 (24%) | 0 (0%) | 0 (0%) | 5 (7%) | 33 (49%) | 15% | 27% | 12% | 15% | 0% | 30% | 0% |
| 2004 | 56 | 15 (27%) | 13 (23%) | 0 (0%) | 0 (0%) | 0 (0%) | 28 (50%) | 43% | 21% | 11% | 7% | 0% | 18% | 0% |
| 2005 | 70 | 33 (47%) | 11 (16%) | 1 (1%) | 0 (0%) | 4 (6%) | 21 (30%) | 24% | 29% | 10% | 0% | 0% | 38% | 0% |
| 2006 | 26 | 8 (31%) | 4 (15%) | 0 (0%) | 3 (12%) | 0 (0%) | 11 (42%) | 82% | 0% | 0% | 0% | 0% | 18% | 0% |
| 2007 | 47 | 24 (51%) | 12 (26%) | 0 (0%) | 2 (4%) | 0 (0%) | 9 (19%) | 44% | 22% | 0% | 0% | 0% | 33% | 0% |
| 2008 | 39 | 8 (21%) | 8 (21%) | 1 (3%) | 1 (3%) | 0 (0%) | 21 (54%) | 43% | 5% | 5% | 19% | 0% | 29% | 0% |
| 2009 | 54 | 16 (30%) | 9 (17%) | 1 (2%) | 2 (4%) | 1 (2%) | 25 (46%) | 68% | 4% | 4% | 0% | 0% | 24% | 0% |
| 2010 | 47 | 3 (6%) | 2 (4%) | 1 (2%) | 3 (6%) | 0 (0%) | 38 (81%) | 74% | 5% | 0% | 0% | 0% | 21% | 0% |
| 2011 | 49 | 8 (16%) | 9 (18%) | 1 (2%) | 2 (4%) | 0 (0%) | 29 (59%) | 83% | 10% | 0% | 0% | 0% | 7% | 0% |
| 2012 | 185 | 55 (30%) | 9 (5%) | 0 (0%) | 13 (7%) | 5 (3%) | 103 (56%) | 34% | 40% | 0% | 0% | 5% | 21% | 0% |
| 2013 | 143 | 28 (20%) | 7 (5%) | 0 (0%) | 2 (1%) | 2 (1%) | 103 (72%) | 23% | 30% | 0% | 0% | 5% | 40% | 1% |
| 2014 | 83 | 16 (19%) | 5 (6%) | 0 (0%) | 4 (5%) | 0 (0%) | 58 (70%) | 33% | 16% | 0% | 0% | 10% | 41% | 0% |
| 2015 | 72 | 17 (24%) | 8 (11%) | 1 (1%) | 0 (0%) | 1 (1%) | 45 (63%) | 33% | 33% | 0% | 0% | 9% | 25% | 0% |
| 2016 | 47 | 7 (15%) | 4 (9%) | 1 (2%) | 2 (4%) | 1 (2%) | 32 (68%) | 38% | 25% | 0% | 0% | 3% | 28% | 0% |
| 2017 | 61 | 17 (28%) | 6 (10%) | 2 (3%) | 6 (10%) | 0 (0%) | 30 (49%) | 63% | 13% | 0% | 0% | 0% | 23% | 0% |
| 2018 | 114 | 9 (8%) | 3 (3%) | 3 (3%) | 8 (7%) | 1 (1%) | 90 (79%) | 62% | 23% | 0% | 0% | 2% | 11% | 1% |
| **Total** | **1160** | **277** | **126** | **12** | **48** | **20** | **676** | **48%** | **19%** | **3%** | **3%** | **2%** | **25%** | **1%** |

[1]Other in 2018, nest crushed by gull.

**Table 4. Summary of piping plover (*Charadrius melodus*) egg loss, and cause of nest loss from 2016-2018 at CACO.**

| | | Number of nests lost by cause (Percentage of total lost) | | | | | | Percent depredated by species | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **# Eggs lost** | **Overwash/ Sanding Over** | **Abandonment** | **Unviable** | **Unknown** | **Other[1]** | **Predation** | **Crows** | **Coyote** | **Gull** | **Skunk** | **Fox** | **Unknown Predator** | **Grackle** |
| 2016 | 175 | 25 (14%) | 12 (7%) | 10 (6%) | 13 (7%) | 0 (0%) | 115 (66%) | 45 (39%) | 29 (25%) | 0 (0%) | 0 (0%) | 4 (3%) | 37 (32%) | 0 (0%) |
| 2017 | 211 | 56 (24%) | 12 (5%) | 31 (13%) | 14(6%) | 0 (0%) | 98 (42%) | 62 (63%) | 12 (12%) | 0 (0%) | 0 (0%) | 0 (0%) | 24 (24%) | 0 (0%) |
| 2018 | 352 | 22 (6%) | 10 (3%) | 34 (10%) | 23 (7%) | 4 (1%) | 259 (74%) | 161 (62%) | 65 (25%) | 0 (0%) | 0(0%) | 7 (3%) | 22 (8%) | 4(2%) |

**Table 5. Piping plover (*Charadrius melodus*) Exclosure results, CACO, 2018.**

| **Predator Management Type** | **Total Number of Nests** |
|---|---|
| Nests Exclosed (Complete) | 58 |
| Nests Unexclosed (Complete) | 70 |
| Nests Unexclosed (Incomplete) | 122 |

| **Cause of failure** | **Exclosed (Complete)** | **Unexclosed (Complete)** | **Unexclosed (Incomplete)** |
|---|---|---|---|
| Depredated | 5 | 41 | 85 |
| Coyote | 3 | 11 | 18 |
| Crow | 0 | 28 | 56 |
| Fox | 1 | 0 | 1 |
| Unknown | 1 | 1 | 9 |
| Grackle | 0 | 1 | 1 |
| Overwash | 4 | 1 | 5 |
| Abandoned | 2 | 0 | 1 |
| Unknown | 1 | 4 | 7 |
| Unviable | 3 | 0 | 0 |
| Crushed | 0 | 1 | 1 |
| Sanded Over | 0 | 0 | 0 |

**Table 6. Piping plover (*Charadrius melodus*) Nests Exclosed, CACO, 2003-2018.**

| Year | # Circular Erected | # Adult Deaths | Rate[1] |
|---|---|---|---|
| 2003 | 57 | 2 | 4% |
| 2004 | 57 | 3 | 5% |
| 2005 | 35 | 1 | 3% |
| 2006 | 32 | 1 | 3% |
| 2007 | 27 | 1 | 4% |
| 2008 | 15 | 0 | 0% |
| 2009 | 39 | 0 | 0% |
| 2010 | 49 | 0 | 0% |
| 2011 | 43 | 1 | 2% |
| 2012 | 0 | 0 | 0% |
| 2013 | 0 | 0 | 0% |
| 2014 | 32 | 1 | 3% |
| 2015 | 31 | 3 | 10% |
| 2016 | 25 | 0 | 0% |
| 2017** | 31 | 0 | 0% |
| 2018** | 58 | 0 | 0% |

[1]number of deaths related to circular exclosure use/total number of circular exclosures used.
**4 chick deaths associated with an exclosure

**Table 7. Least tern (*Sternula antillarum*) breeding pair counts and fledging success, CACO, 2018.**

| Site | A Count[1] | B Count[2] | # Chicks Fledged |
|---|---|---|---|
| Armstrong | 3 | 5 | 0 |
| Ballston | 0 | 0 | 0 |
| Bound Brook | 0 | 0 | 0 |
| Cahoon Hollow | 0 | 0 | 0 |
| Coast Guard Beach (Eastham) | 50 | 28 | 17 |
| Coast Guard Beach (Truro) | 0 | 0 | 0 |
| Duck Harbor | 0 | 0 | 0 |
| Great Island | 2 | 11 | 2 |
| Head of the Meadow | 22 | 19 | 2 |
| High Head | 0 | 0 | 0 |
| Jeremy Point | 0 | 0 | 0 |
| Lecount Hollow | 0 | 0 | 0 |
| Marconi Beach | 0 | 0 | 0 |
| Marconi Station | 0 | 1 | 1 |
| Nauset Light Beach | 0 | 0 | 0 |
| Newcomb Hollow | 0 | 0 | 0 |
| Race Point North | 31 | 39 | 12 |
| Race Point | 9 | 8 | 1 |
| Race Point South | 2 | 5 | 0 |
| White Crest Beach | 0 | 0 | 0 |
| Wood End Lighthouse (Wood End/Long Point) | 7 | 24 | 6 |
| **TOTAL** | **126** | **140** | **41** |

[1]"A-Counts" are taken within the state census window, on June 15-16

[2]"B-Counts" are taken outside the state census window; after June 20

**Table 8. Least Tern (*Sternula antillarum*) Productivity at CACO, 2007-2018.**

| Year | # Nesting Pairs | # Chicks Fledged | Productivity | Primary Cause of Loss |
|---|---|---|---|---|
| 2007 | 86 | 40* | 0.45* | overwash, canids |
| 2008 | 89 | <136* | >1* | overwash, coyote |
| 2009 | 236 | 25 | 0.11 | overwash, coyote |
| 2010 | 226 | 26 | 0.12 | coyote |
| 2011 | 268 | 99 | 0.37 | coyote |
| 2012 | 257 | 66 | 0.26 | coyote |
| 2013 | 138 | 2 | 0.01 | coyote |
| 2014 | 77 | 7 | 0.09 | coyote |
| 2015 | 122 | 19 | 0.16 | coyote |
| 2016 | 52 | 39 | 0.75 | coyote |
| 2017 | 142 | 69 | 0.49 | overwash, coyote |
| 2018 | 140 | 41 | 0.29 | coyote |

*estimate

**Table 9. American Oystercatcher (*Haematopus palliatus*) Productivity at CACO, 2007-2018.**

| Year | # Nesting Pairs | # Chicks Fledged | Productivity | Primary Cause of Loss |
|---|---|---|---|---|
| 2007 | 5 | 3 | 0.60 | overwash, unk. predator |
| 2008 | 5 | 5 | 1.00 | unk. predator, crow |
| 2009 | 1 | 0 | 0.00 | unk. predator |
| 2010 | 2 | 0 | 0.00 | coyote |
| 2011 | 2 | 0 | 0.00 | coyote |
| 2012 | 3 | 0 | 0.00 | coyote, gull |
| 2013 | 3 | 0 | 0.00 | overwash, coyote, unknown |
| 2014 | 2 | 0 | 0.00 | coyote, unk. predator |
| 2015 | 2 | 3 | 1.50 | coyote, unk. predator |
| 2016 | 2 | 3 | 1.50 | coyote, unk. predator |
| 2017 | 2 | 2 | 1.00 | overwash, coyote |
| 2018 | 1 | 0 | 0.00 | coyote |

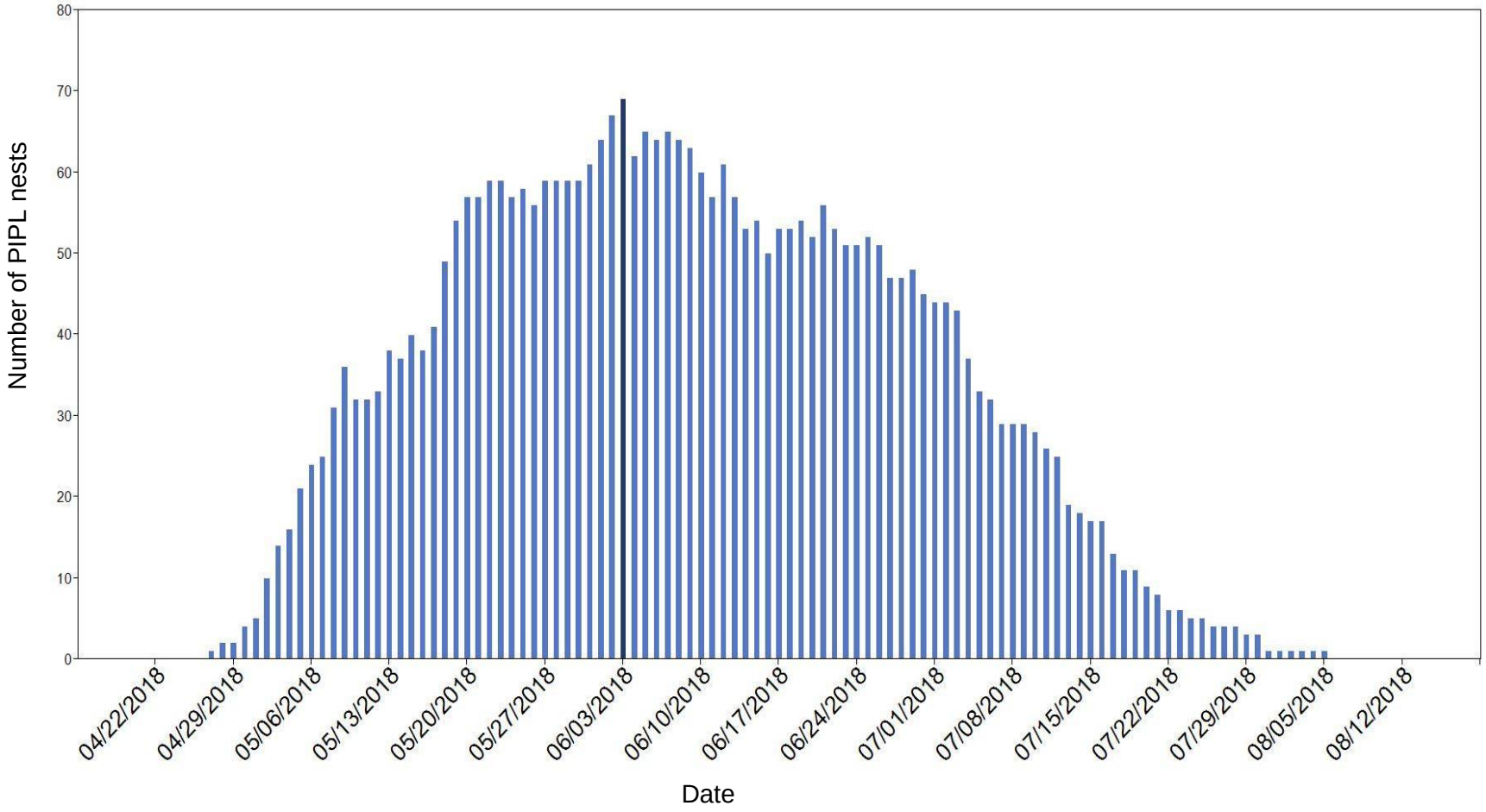



**Figure 1. Number of active piping plover (*Charadrius melodus*) nests by date at CACO.**

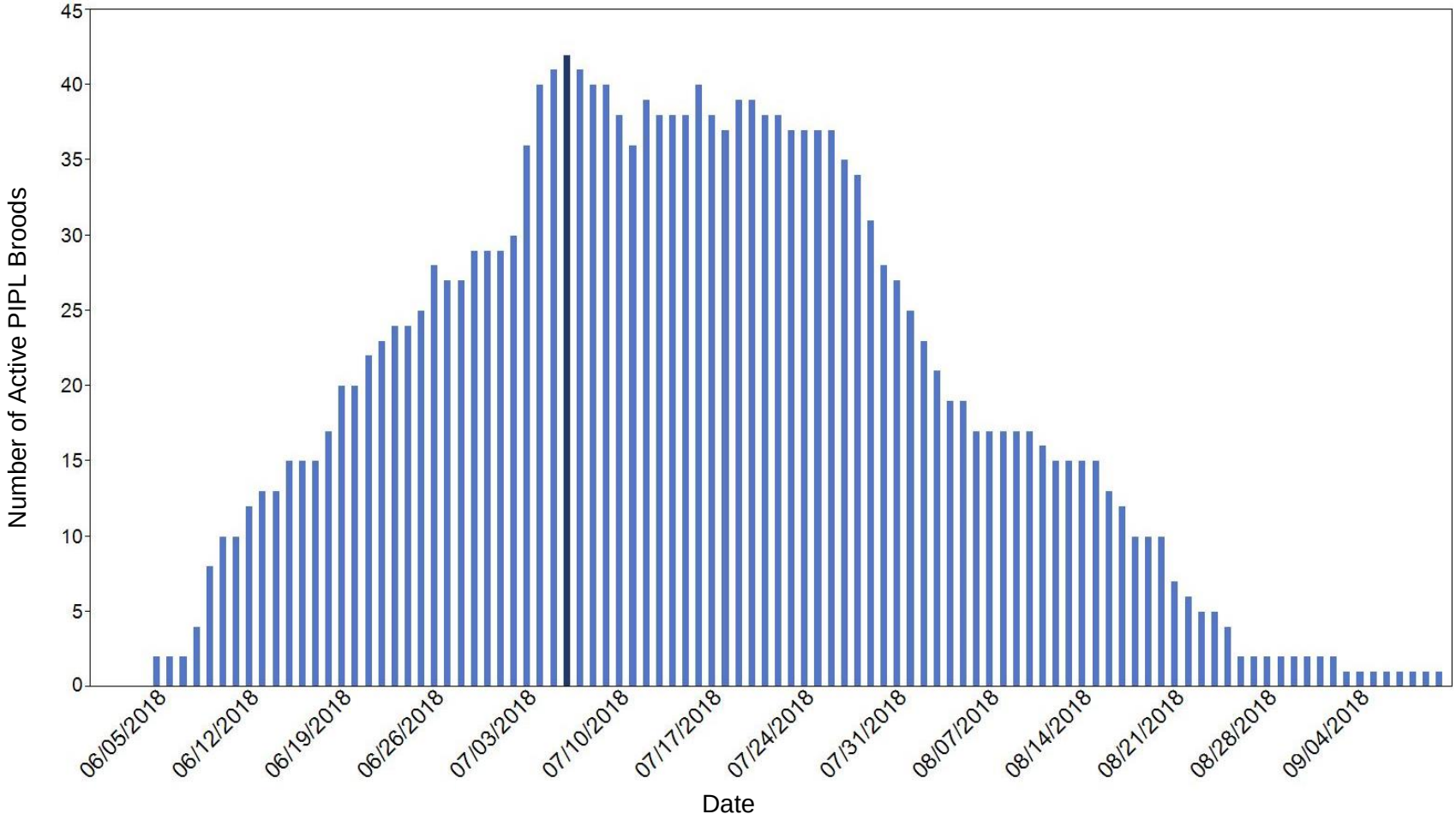



**Figure 2. Number of active piping plover (*Charadrius melodus*) broods by date at CACO.**

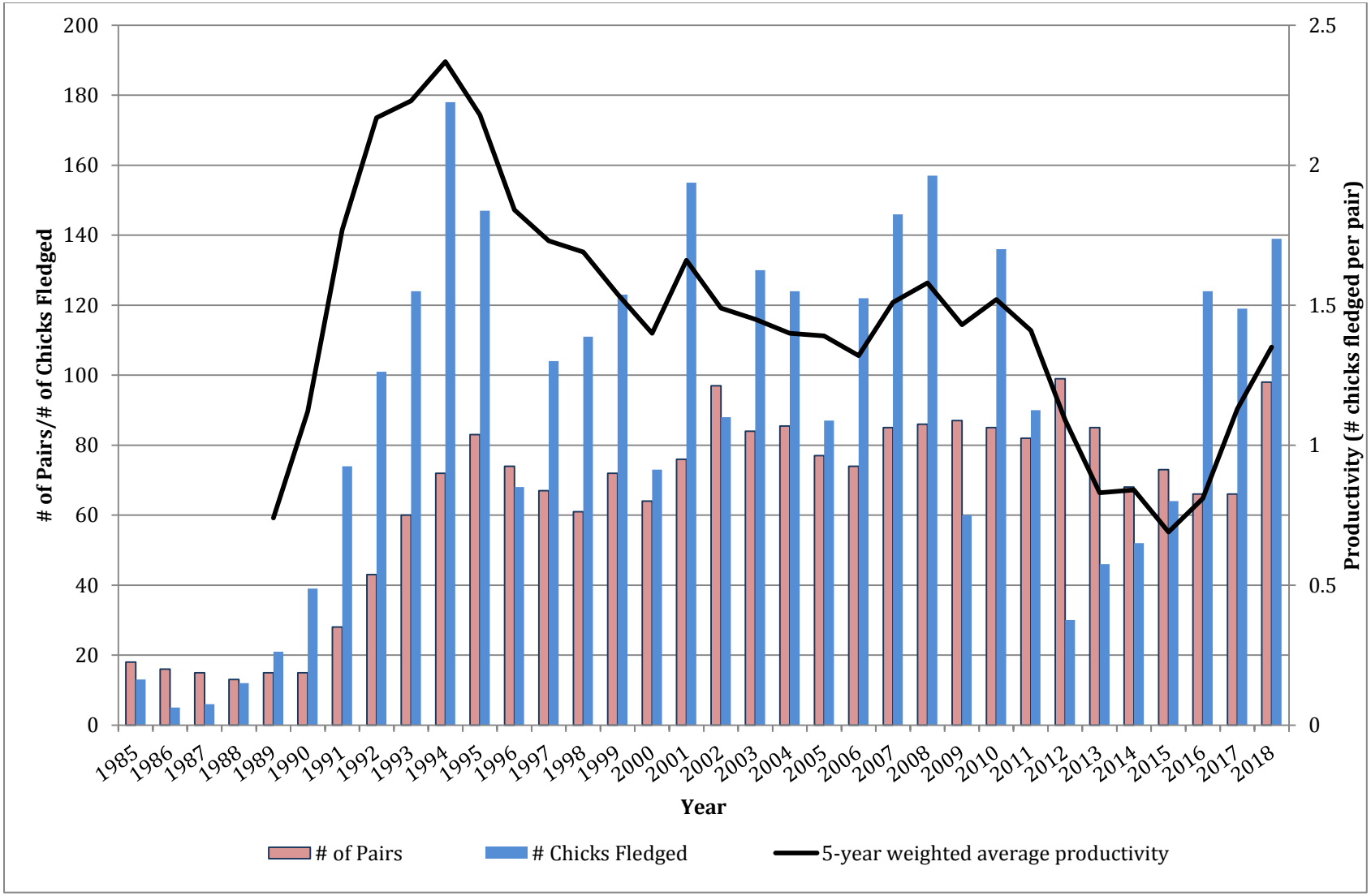



**Figure 3. Number of piping plover (*Charadrius melodus*) pairs and overall productivity (chicks fledged/nesting pair) from 1985 – 2018 at CACO.**

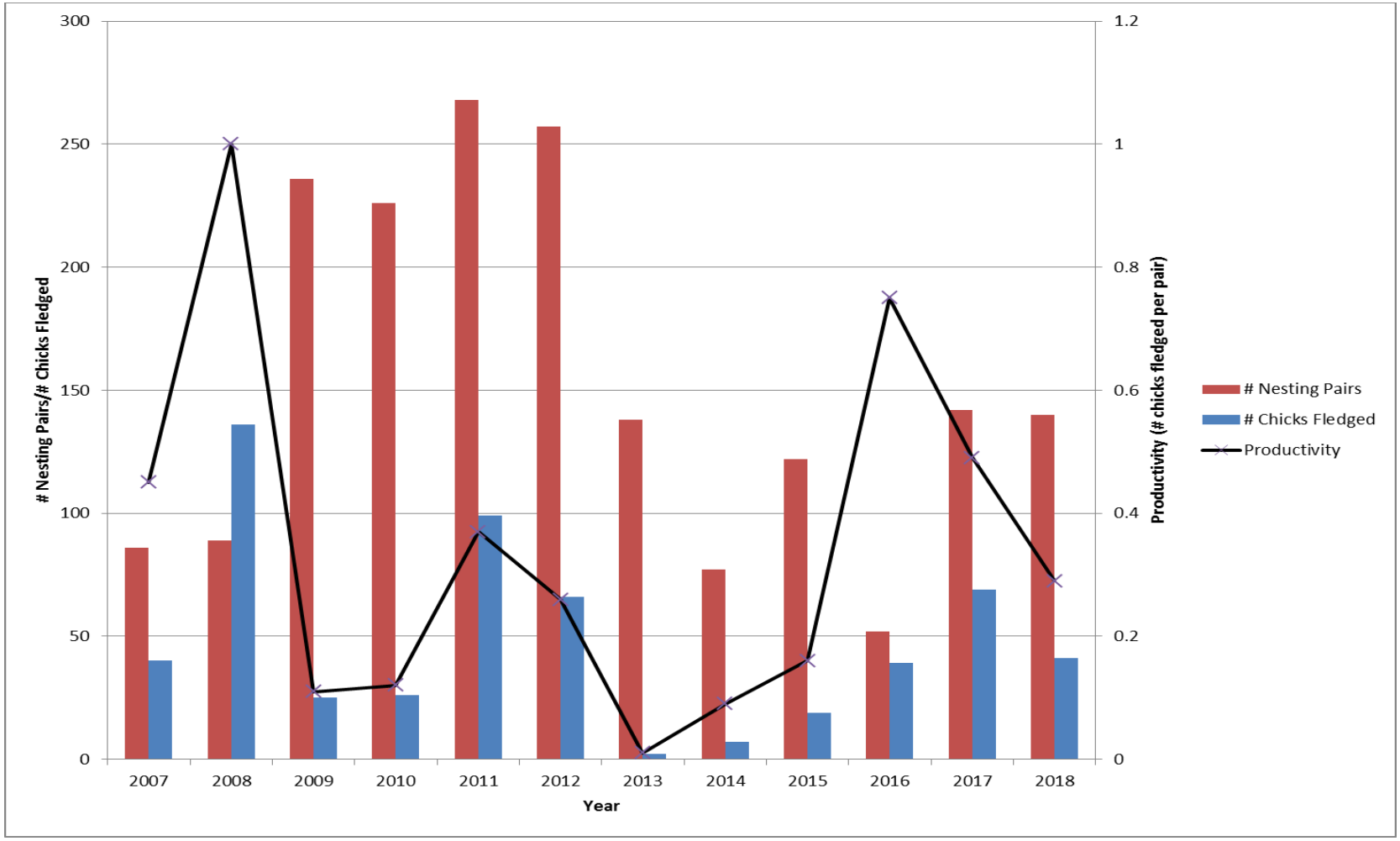



**Figure 4. Least tern (*Sternula antillarum*) breeding pairs and nesting sites, by year from 2003-2018 at CACO.**

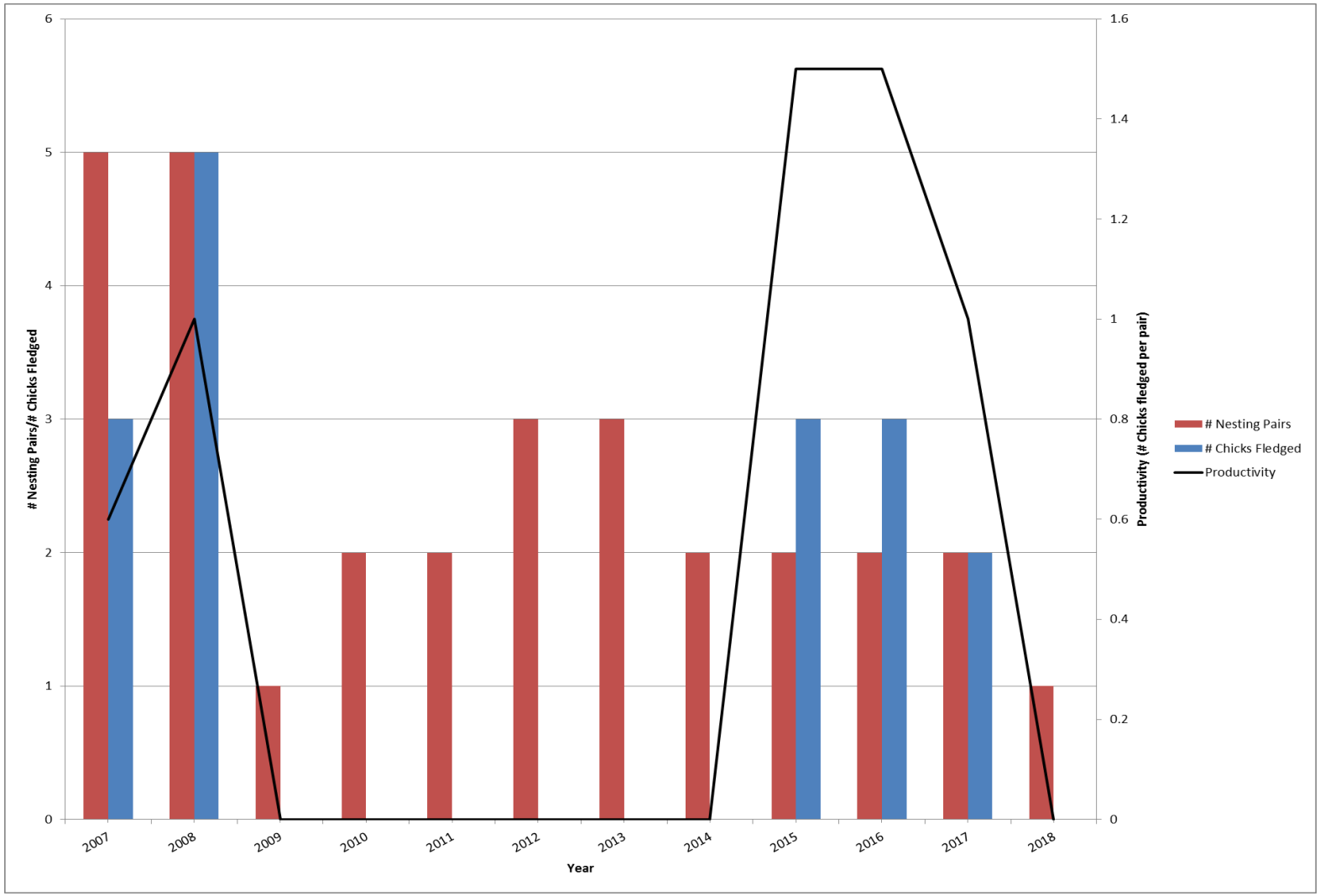



**Figure 5. American Oystercatcher breeding pairs, chicks fledged, and productivity, by year from 2007-2018 at CACO.**

# 6 Appendix

## a. Appendix A: Recreation Management

### i. Symbolic Fencing

Pre-fencing of suitable and historic shorebird nesting habitat began on 4 April in 2018 at Hatches Harbor and Race Point North and continued through mid-April to include: Wood End/Long Point, Herring Cove, Hatches Harbor, Exit 9, Armstrong, High Head, Head of the Meadow, Coast Guard Beach in Truro, Longnook, Ballston, Newcomb Hollow, Cahoon Hollow, White Crest, Marconi Station, Marconi Beach, Nauset Light, Duck Harbor, Bound Brook, Great Island, Jeremy Point, and New Island.

Symbolic fencing remained up on some sections of beach through September and early October to protect late nesting least terns and piping plovers as well as staging and migrating shorebirds along the upper and lower (intertidal) beach (e.g. Coast Guard Beach in Eastham, Jeremy Point, Armstrong, and Race Point North). It is important to maintain symbolic fencing while chicks are in the area as it has been documented that human recreation can reduce the survival of chicks and increase the time it takes chicks to fledge. Protecting foraging and suitable habitat while chicks are present may help reduce the impacts of recreation on the ability of chicks to forage (DeRose-Wilson et al. 2018).

The importance of retaining symbolic fencing to protect resting migrants from disturbance, especially on high visitation beaches, was apparent at the southern tip of Coast Guard Beach in Eastham, at Jeremy Point, Armstrong and on western sections of Race Point North. For example, hundreds of semipalmated plovers and up to twenty piping plovers were observed resting inside the fencing and the wrack line at Armstrong in the late summer through early October. In the North District, (from 8 August through early September) there was a temporary lower beach closure approximately 0.4 miles west of the Race Point North ORV access to protect up to 1,000 staging common and roseate terns and a nursery of 30-75 least terns using the end of a sand spit for staging. Since the spit was cut off from points north at high tide, signs were installed directing pedestrians to walk along the upper beach to pass by this area.

In 2018, shorebird staff made multiple observations of visitors entering protected/closed shorebird use areas for recreational purposes. There were many instances of beachgoers walking inside fenced areas to recreate or retrieve beach debris, coming within feet, or in some cases inches, of stepping on piping plover or least tern nests. In addition, a total of fifteen separate instances of vehicles backing into and/or knocking over fencing were observed in the North District this season.

Throughout the season, shorebird staff documented acts of vandalism in shorebird use areas. The North District documented at three separate cases (in different locations) where string between fence posts for long stretches of beach was cut, entire sections of fencing removed, and one instance of a sign being written on. In the south district, there were several instances of fencing being destroyed, “No Pets” signs being burned, and an exclosure was tampered with at Lecount Hollow Beach. These violations were reported to CACO Visitor and Resource Protection rangers and investigated.

### ii. Temporary Pedestrian/Parking Lot/Boat Landing Closures and Detours

In 2018, sections of Head of the Meadow, Jeremy Point, Duck Harbor, and Coast Guard in Eastham were temporarily closed or detoured to pedestrians, at high tide, from early May through the middle of August. Certain access paths at Armstrong, Race Point North and Head of the Meadow were temporarily closed to pedestrians to protect piping plovers and least terns nesting close to the paths.

In addition, to protect approximately 1,000 staging common and roseate terns, there was a temporary lower beach closure approximately 0.4 miles west of the Race Point North ORV access from early August through September. Pedestrians were able to walk along the upper beach to pass by this area towards the Race Point Lighthouse.

#### iii. Hand-held Kites/Kite Surfing

To prevent disturbance to nesting birds, hand-held kites, model planes or any other airborne devices are prohibited above or within 200 meters of any area designated by symbolic fencing (NPS 2012).

Kite surfing is prohibited on all open waters and on all ocean and bayside beaches within CACO from 15 March through 15 October, except for 1.75 miles of beach from Coast Guard in Eastham to Nauset Light and a small section of beach owned by the town of Wellfleet, at Duck Harbor.

In 2018, the designated kite surfing area within park boundaries was moved further north of Coast Guard Eastham due to the presence of a piping plover nest and chicks to maintain the required 200 meter buffer from kites; the 1.75 mile designated area for kite surfing was maintained.

#### iv. Pets

Pets are required to be on a six-foot leash at all times within CACO, all year long. There are also a number of areas that are closed to pets seasonally to protect park resources. The south side of Coast Guard Beach in Eastham and all of Jeremy Point are closed to pets from 1 April through 30 September to protect nesting and migrating shorebirds. The marsh area of Hatches Harbor was closed to pets from 1 July through 30 September, while the ocean side of Hatches Harbor remained open to leashed pets within the ORV corridor.

Additional sections of bay and ocean beaches were also temporarily closed to pets, as needed, to protect nesting, staging, and migrating areas. "No Pet Area" signs were posted in a row perpendicular to the water, approximately 50 meters away on either side of the nesting area, extending down into the intertidal zone. The only exception to this was along the ORV corridor where a dog inside a vehicle can pass pet closures to access areas of beach beyond closures that are open to pets. These sections of beach were closed to pets until all chicks in the area fledged. Signs informing visitors of temporary pet closures were moved as necessary to reflect the closures in effect at any one time. Beaches that did not have nesting shorebirds remained open to leashed pets.

Shorebird monitoring staff recorded a total of 419 dogs off leash on CACO beaches from April through September (199 in the South District and 220 in the North District). Unleashed dogs were encountered most frequently at Lecount Hollow (55), Wood End/Long Point (33) and Coast Guard Truro (32). Dogs were also observed by shorebird staff on multiple occasions within areas seasonally closed to pets at Coast Guard in Eastham, Jeremy Point, and Hatches Harbor. Dogs in 'No Pets' areas were consistently observed in both districts, including one instance of a piping plover chick harassed by an off-leash dog in a 'No Pets' area at Lecount Hollow. The chick survived but was separated from its parents for several days.

#### v. Off-Road Vehicles

Off-road vehicle access is permitted along a designated beach corridor in Provincetown and Truro. The ORV corridor was open to vehicles during the egg laying and incubation phase of the shorebird nesting season in areas where there was an adequate protective buffer between the incubating shorebirds and vehicles. In areas where an appropriate buffer did not allow two lanes of driving within the corridor, sections of corridor were temporarily made "drive through only" to prevent vehicles from stopping in front of nests or flocks of staging and migrating terns, red knots and other shorebirds.

As nests hatched, sections of the beach were closed to vehicles to protect the flightless chicks. These vehicle closures extended 0.2 miles (322 meters) on each side of a brood of plover chicks and 0.06 miles (91 meters) on each side of a brood of least tern chicks. Actual closure limits for each brood were adjusted based on beach morphology and brood behavior to ensure chicks were protected.

All plover chicks were monitored daily, noting their movements, location, and numbers in each brood. Plover broods adjacent to ORV corridor closures were often monitored twice a day, in the mornings and early afternoons, to ensure that there was an adequate protective buffer between the flightless plover chicks and ORVs. Field observations of unfledged plover chick movements suggested that plover broods tended to move greater distances along the beach when there were no neighboring nesting birds or high pedestrian use areas keeping them within a defined territory.

Vehicle closures were lifted on sections of beach when chicks fledged or the chick(s) were not seen for five consecutive days. Additional information on ORV management can be found in the 2018 Off-Road Vehicle Activity Report.

#### vi. Park Beach Operations/Essential Vehicles

CACO staff routinely operate vehicles on beaches with nesting and staging shorebirds while performing their functions of public beach operations, monitoring and protecting threatened and endangered species, enforcing park regulations, and providing visitor safety.

To reduce the risk of accidentally crushing adults and chicks, the use of vehicles on beaches with nesting shorebirds is avoided or minimized, and speed limits are reduced. Essential vehicles refrain from driving on sections of beach when piping plover chicks <5 days old are present (NPS 2012).

In 2018, the Atlantic Lighthouse Foundation in accordance with an agreement with NPS, provided escorts to and from Race Point Lighthouse past unfledged piping plover chicks (Appendix F). Escorts by NPS shorebird staff were also performed for the construction of the Marconi Beach Stairs due to piping plover nest and chicks in the area.

#### vii. Flexible Management

In May 2010, the USFWS issued a biological opinion and incidental take statement for the national seashore to flexibly manage a very limited number of piping plovers nesting on or near high visitation beaches where the beach has eroded to the point where 164-foot (50-meter) buffers around plover nests would render the beach unusable to visitors at high tide. The biological opinion has been extended to cover management through the 2019 piping plover nesting season.

To date, flexible management has only been used once, in 2010, since the permit was granted. Flexible management was not used in 2018.

#### viii. Managing Shorebirds on non-NPS land

CACO has an agreement with the Town of Wellfleet and Town of Truro to help manage and protect nesting shorebirds on town property within park boundaries (Appendix D and E). For Town of Wellfleet beaches, the town agreed to follow the management practices used by CACO and CACO agreed to take the lead role in protecting any nesting shorebirds on these town-owned sections of beach. The town of Truro adopted a similar agreement in 2013 and contracted Mass Audubon for monitoring efforts on their town beaches (Appendix E). The towns of Orleans and Chatham take the lead role in the protection and management of nesting shorebirds on town-owned and managed lands inside CACO. Staff at CACO

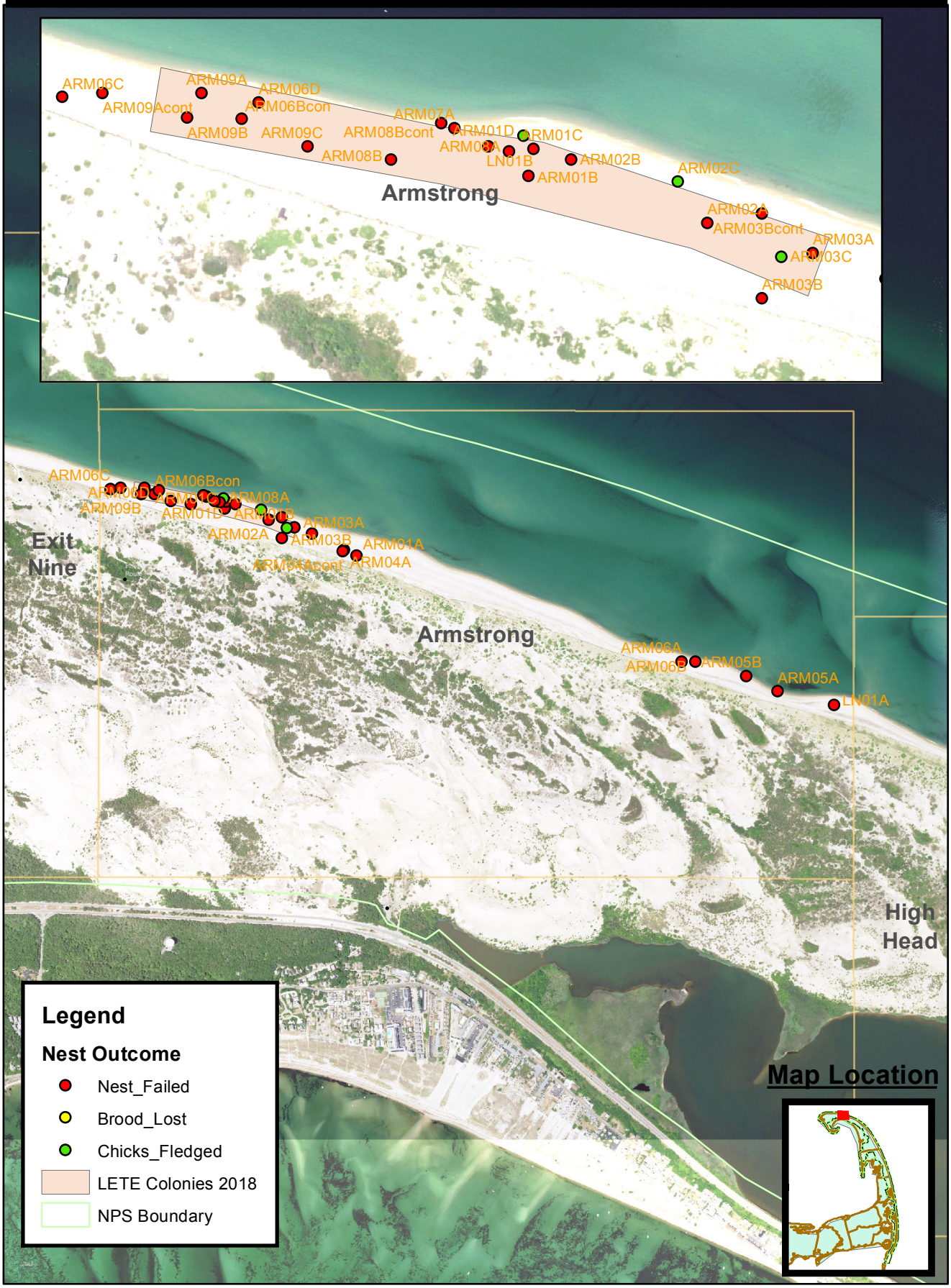
worked closely with town managers and Mass Audubon, providing regular updates and site visits when needed.

In addition, for 2018, letters were sent to all beachfront private property landowners within park boundaries requesting permission to allow NPS to install symbolic fencing on their land (if needed) to protect nesting shorebirds. Landowners could deny this request by contacting the park. Letters were also distributed to dune shacks in Truro and Provincetown that have access through or near symbolically fenced areas.

## b. Appendix B. Maps of 2018 Piping Plover, Least Tern, and American Oystercatcher Nest Sites at Cape Cod National Seashore

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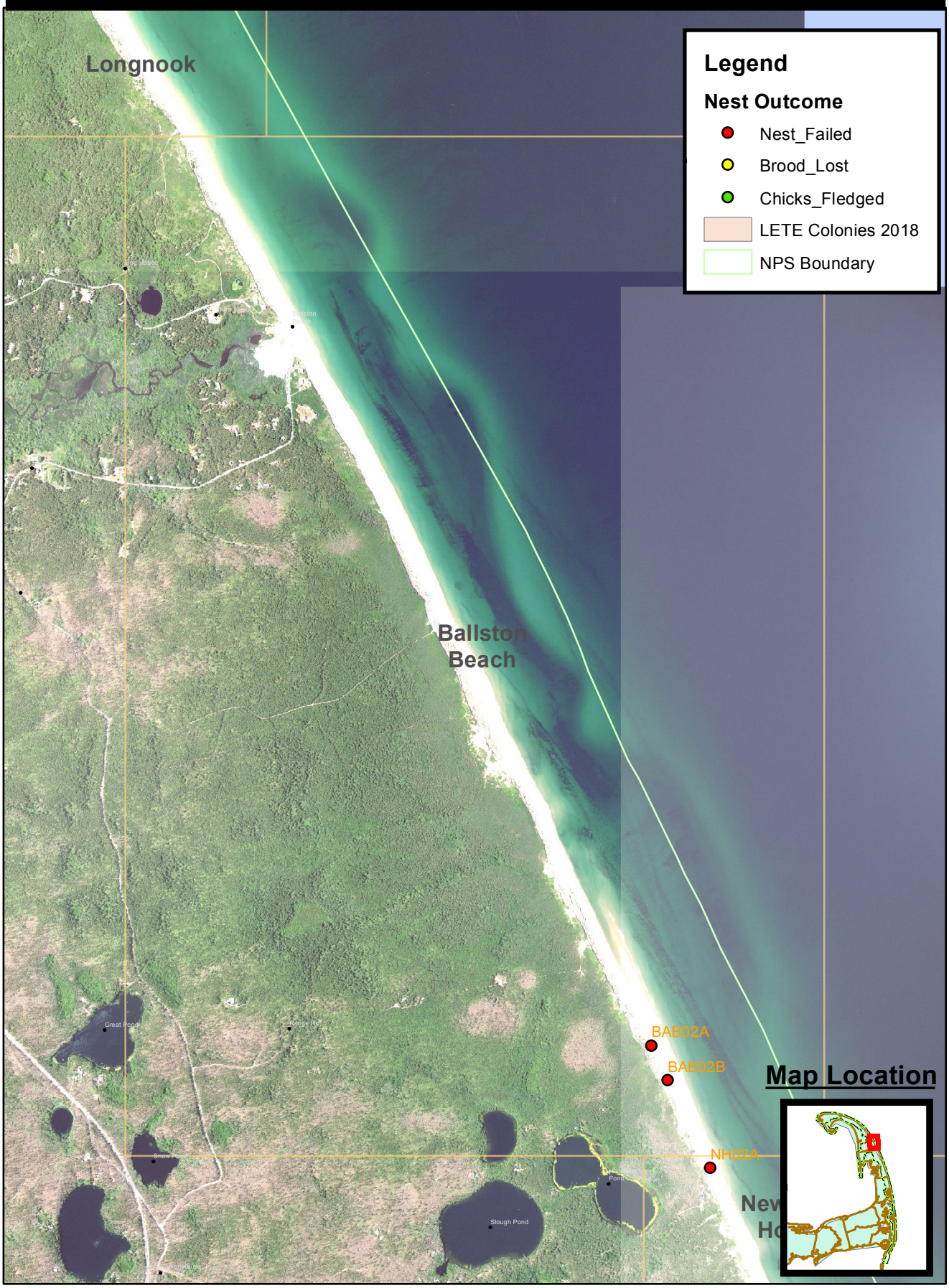
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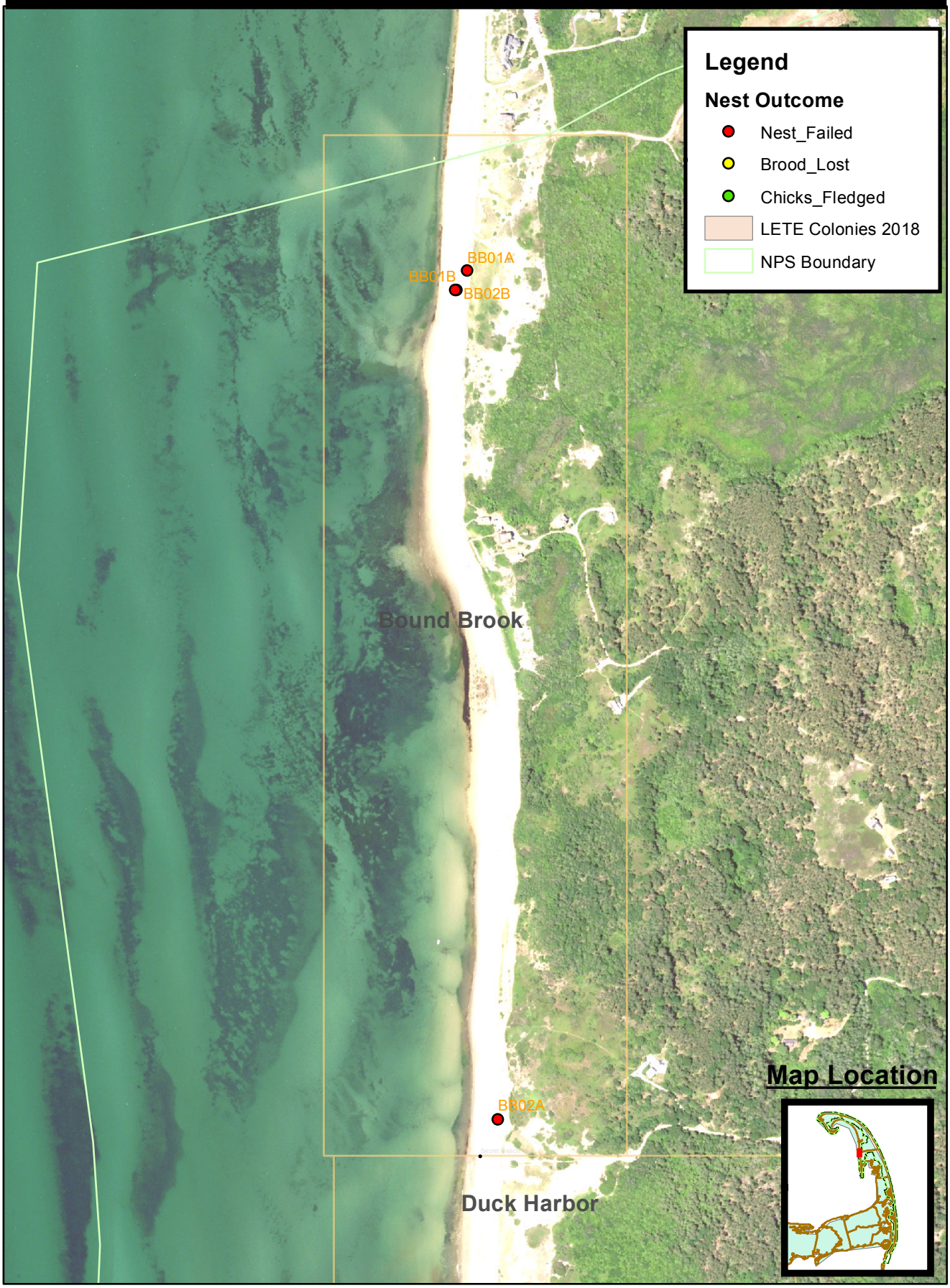
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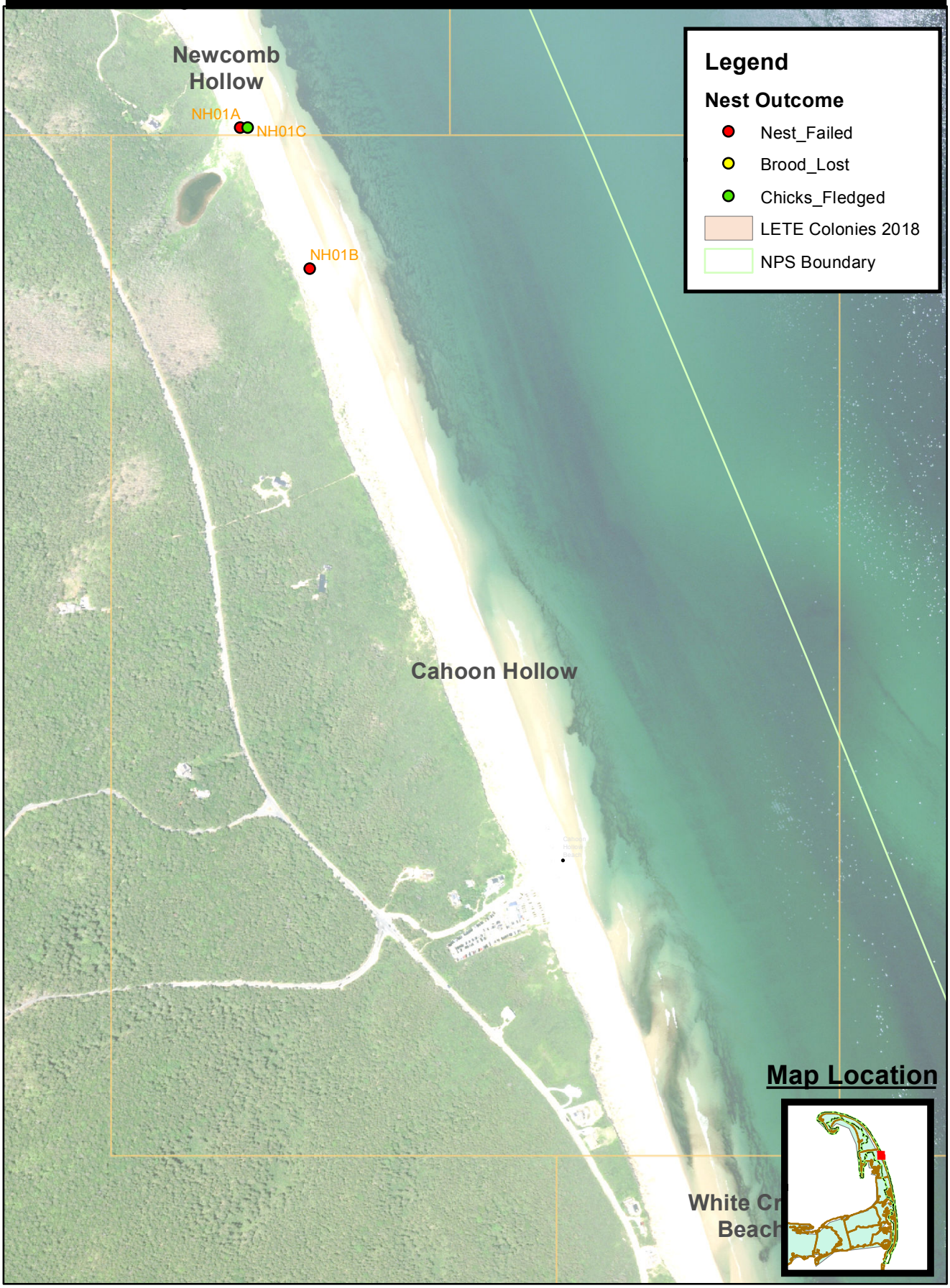
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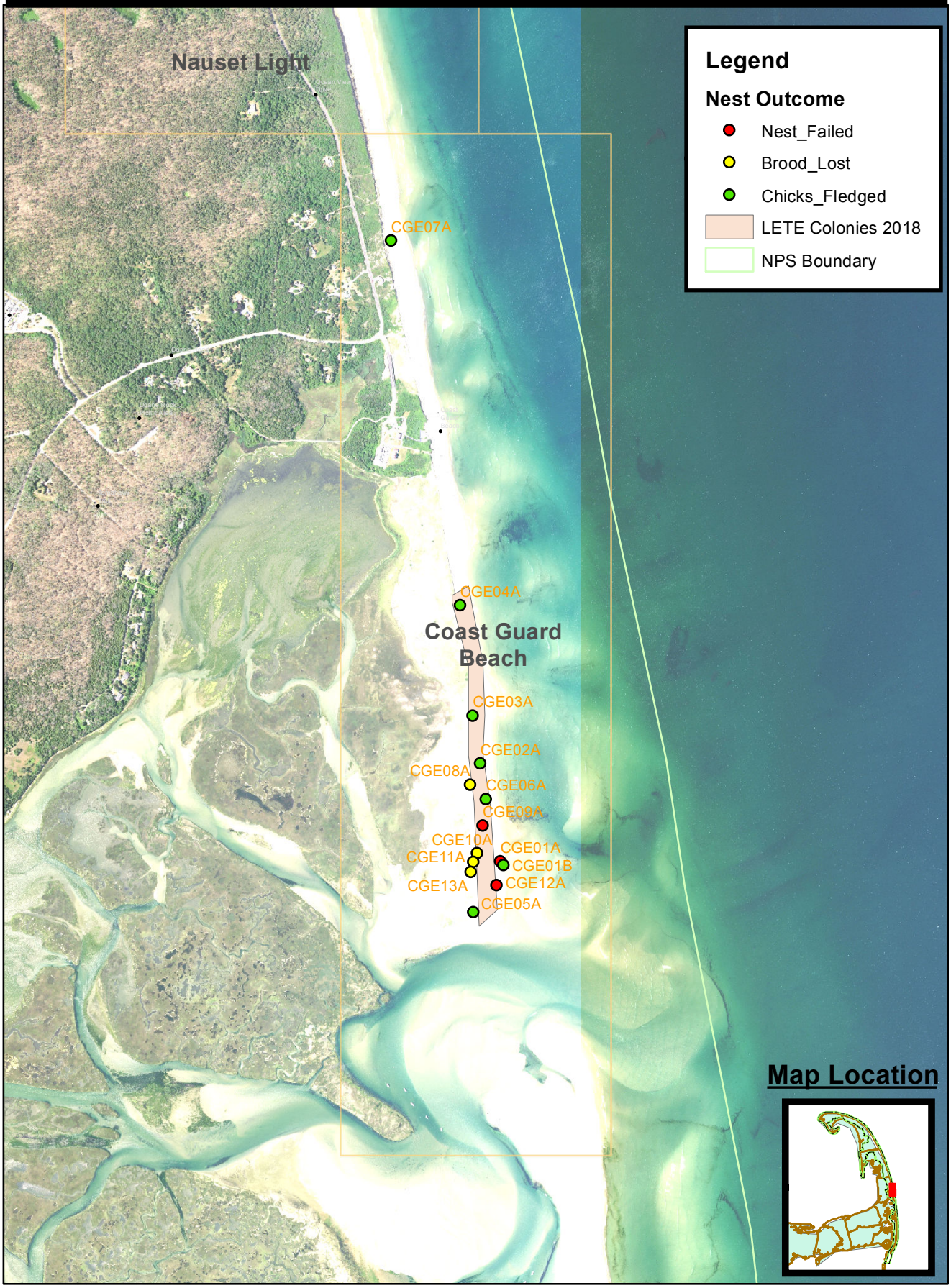
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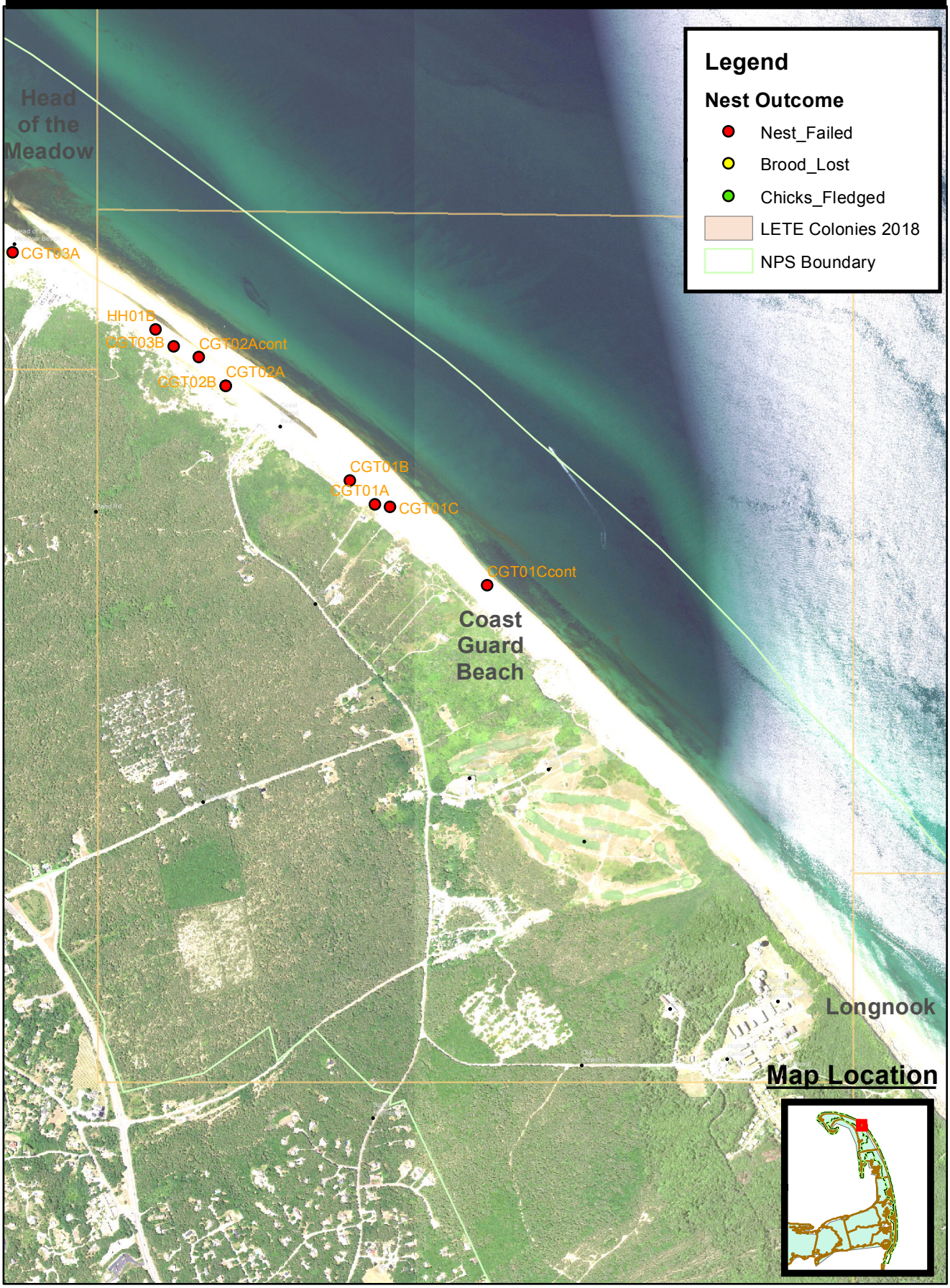
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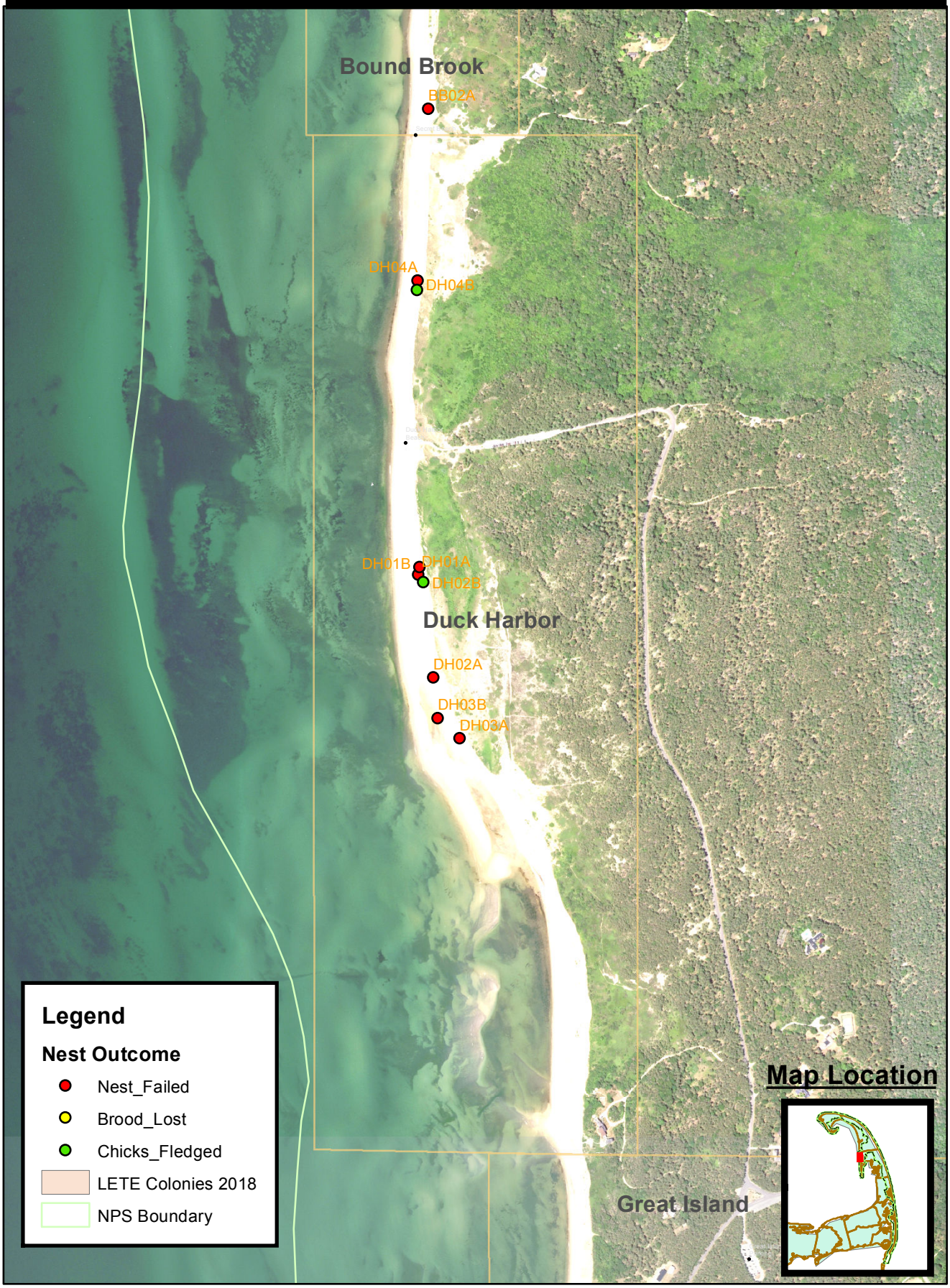
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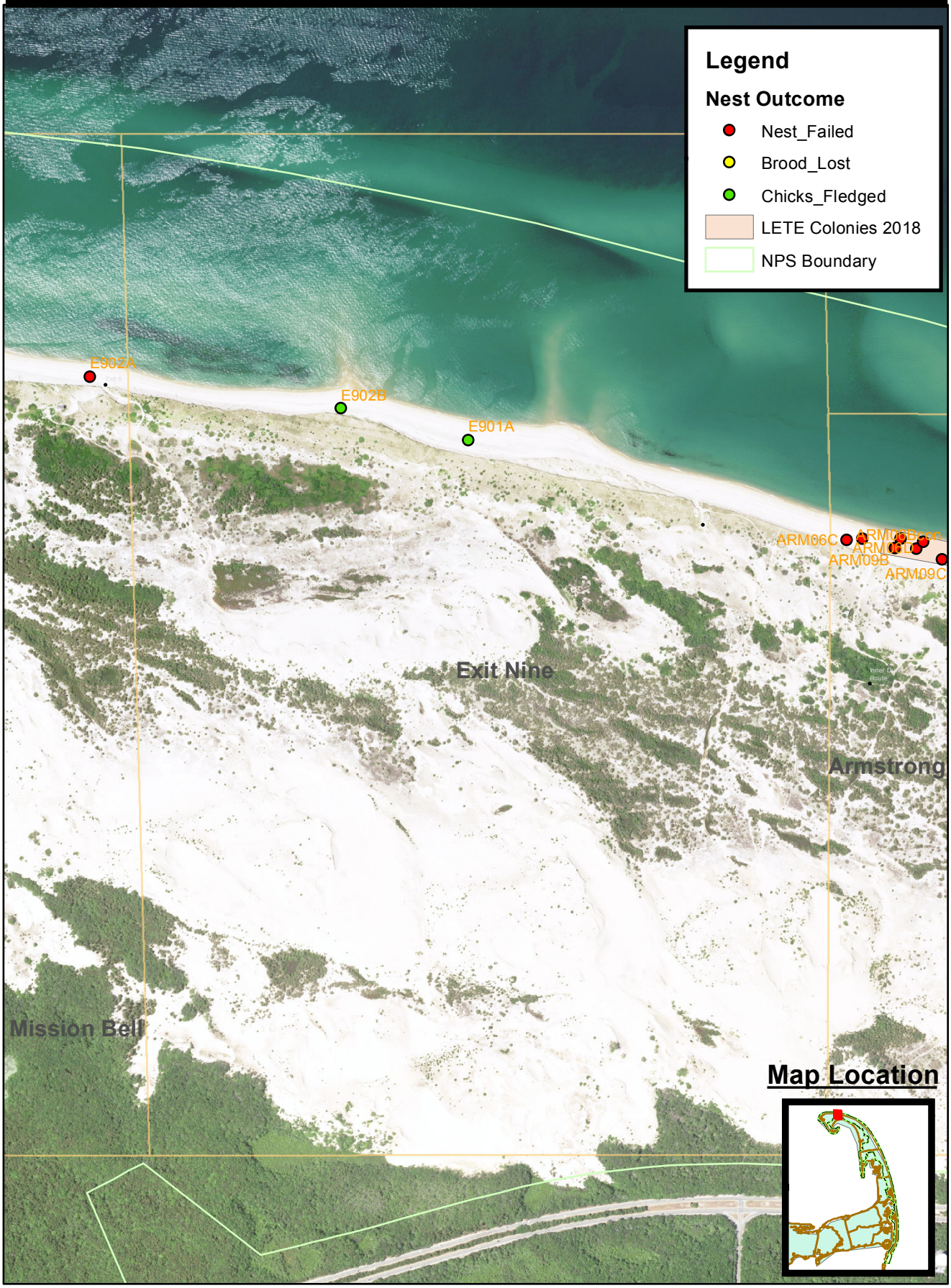
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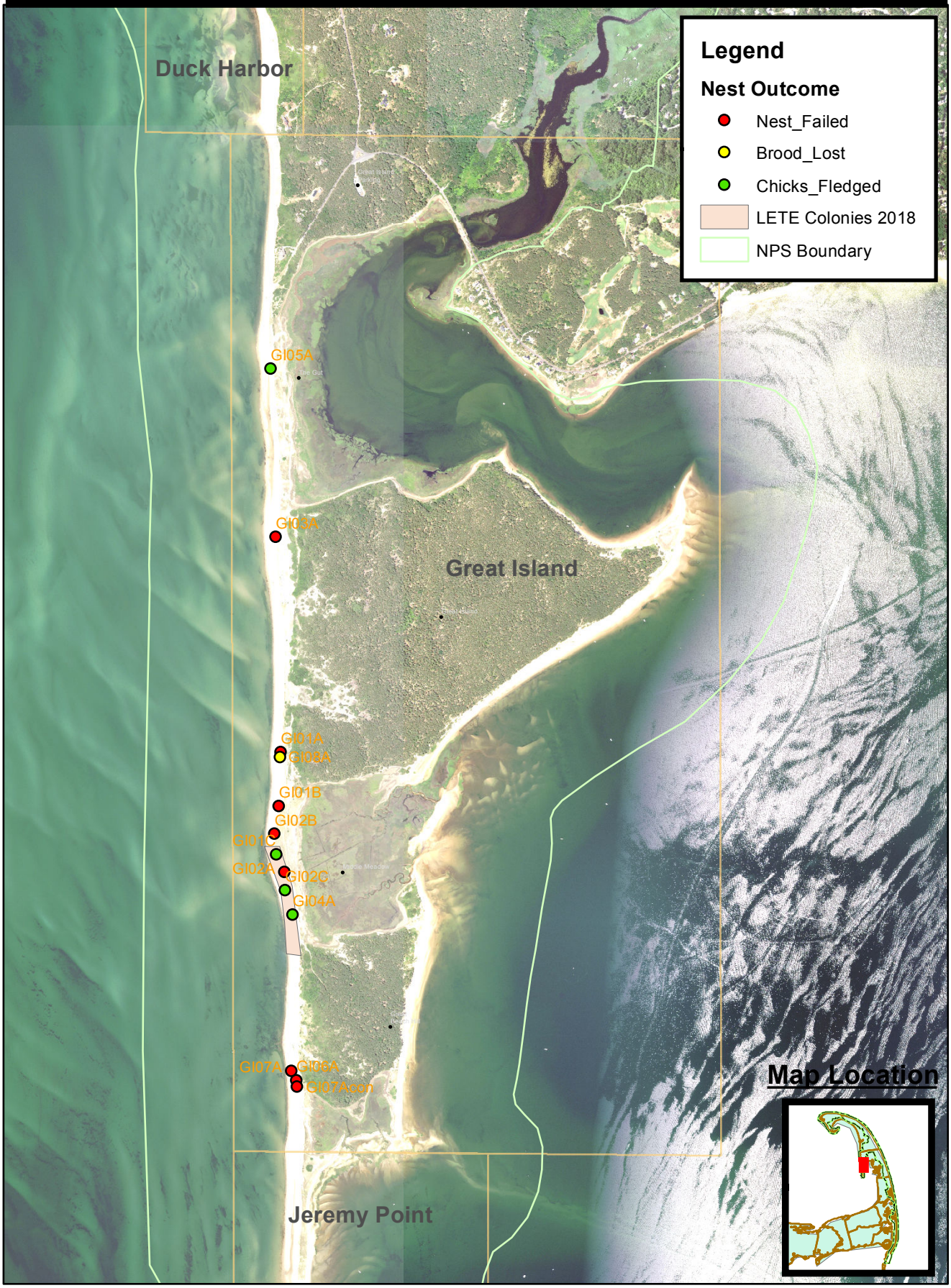
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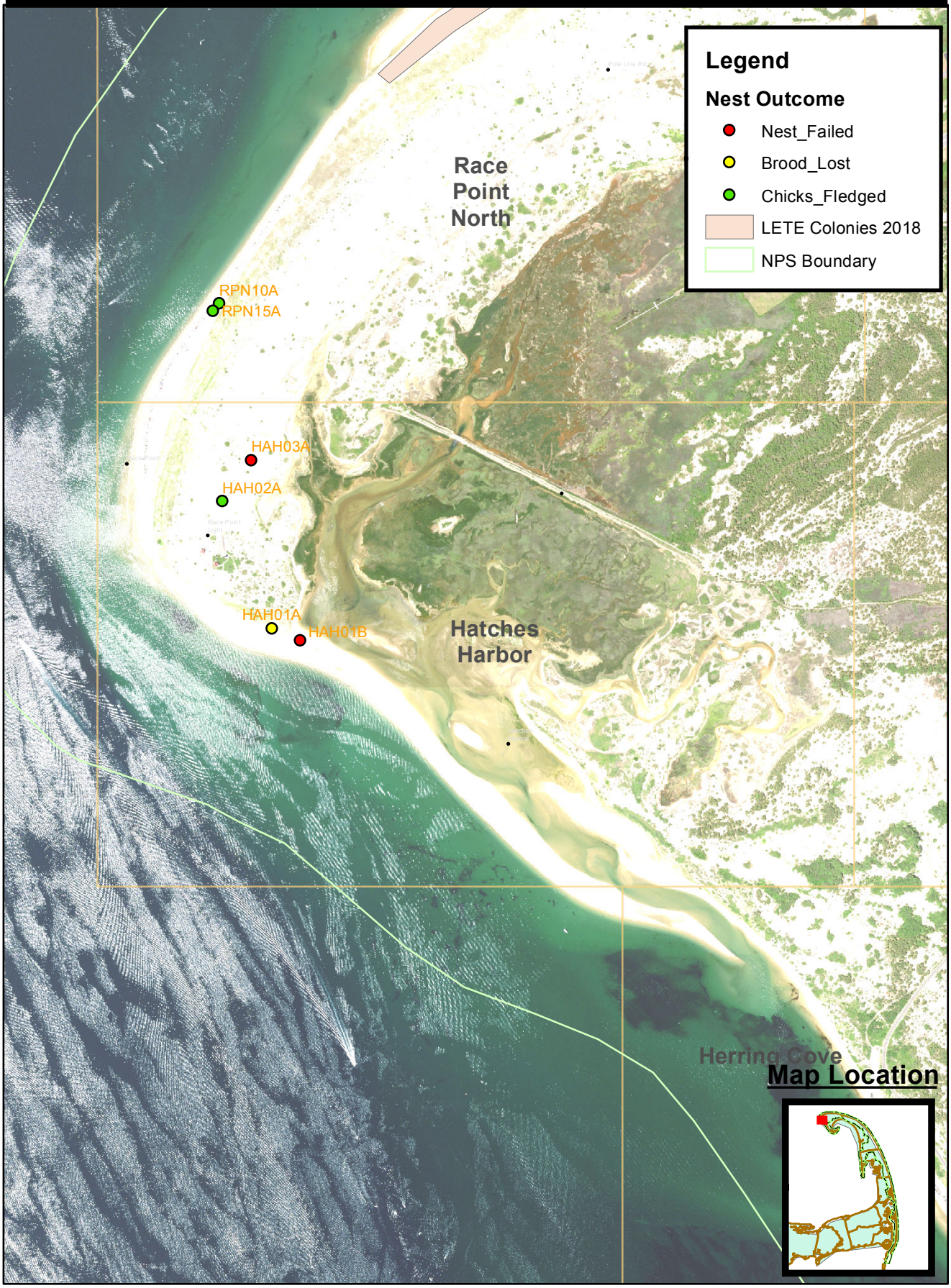
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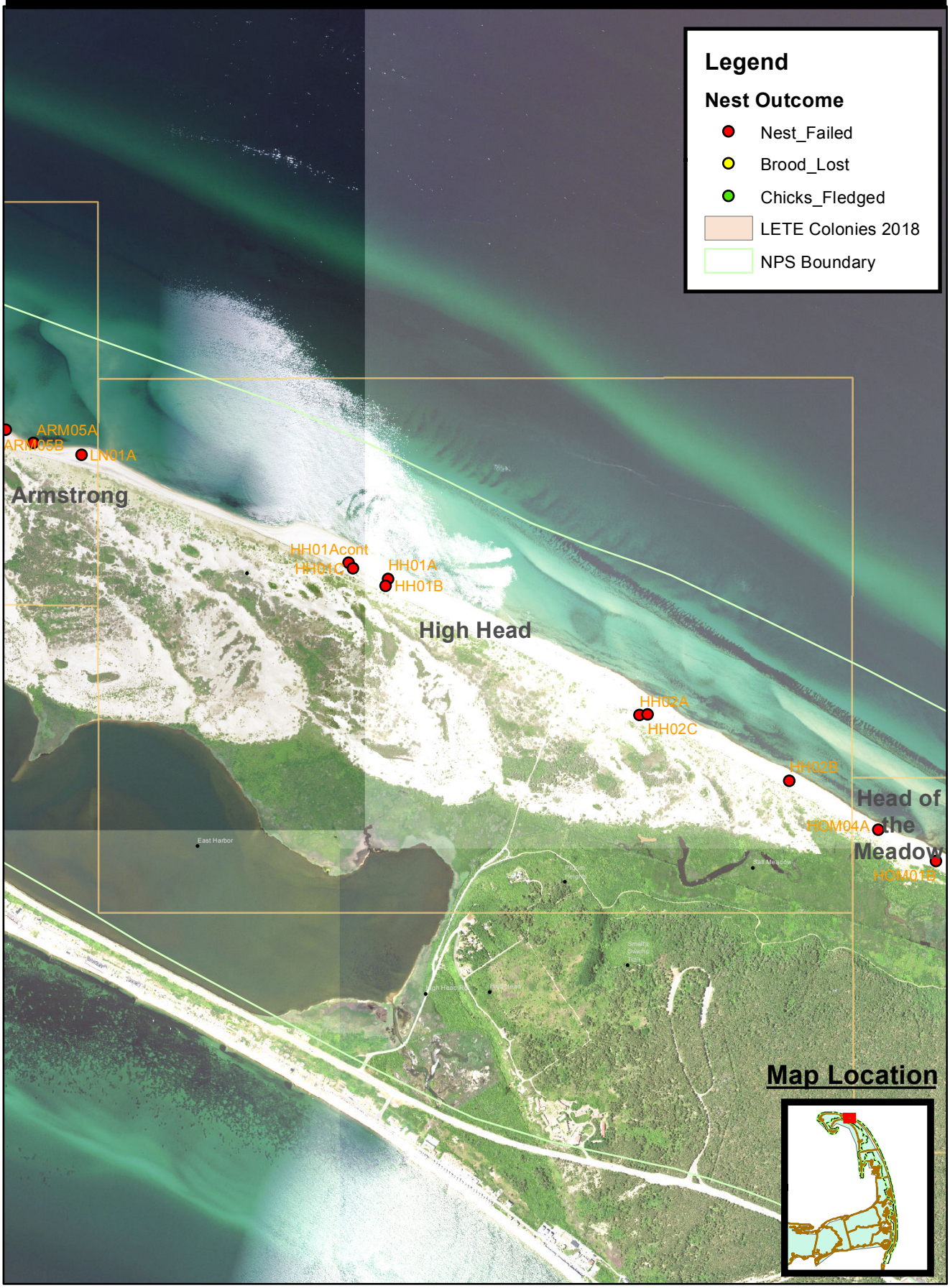
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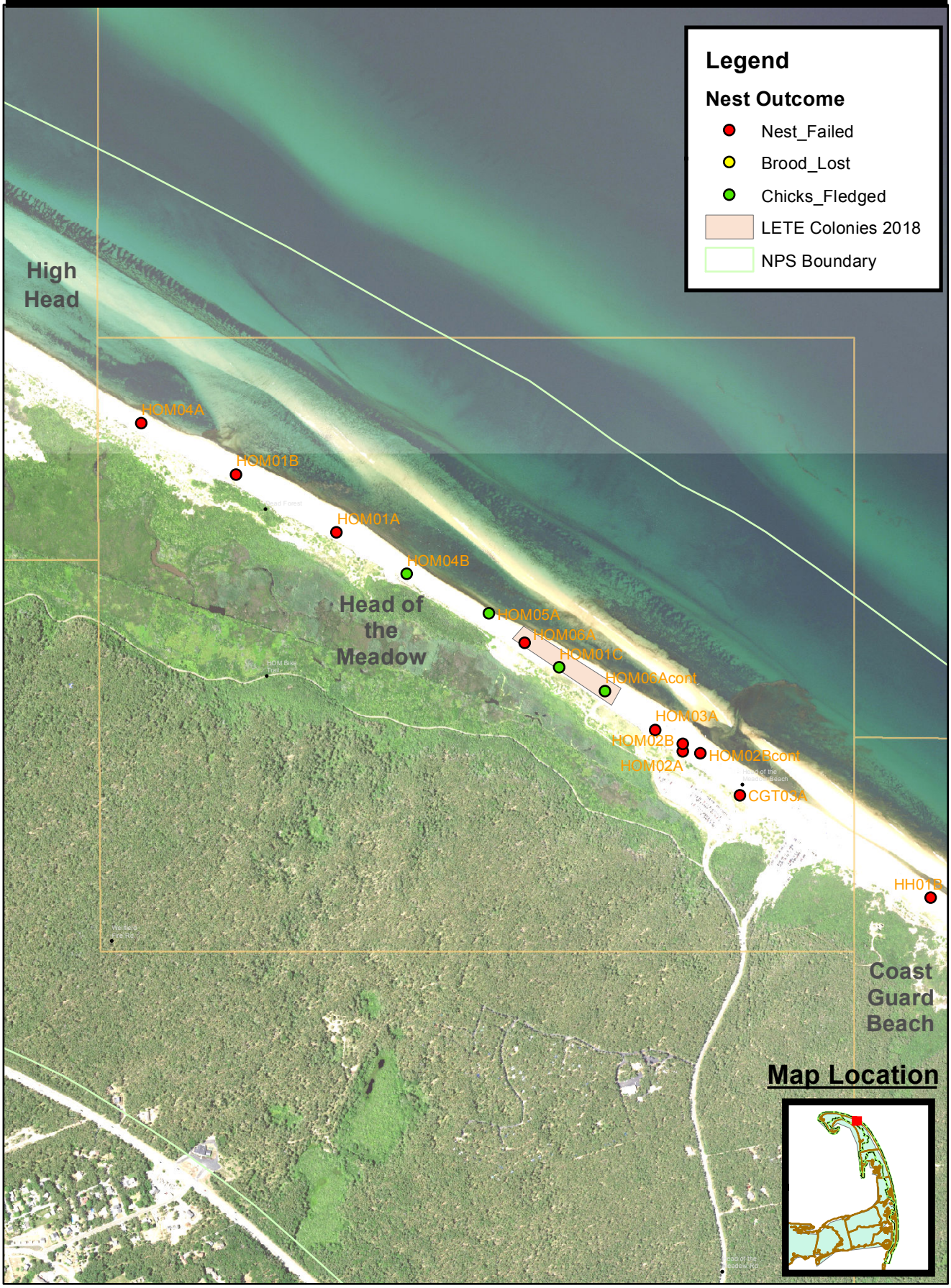
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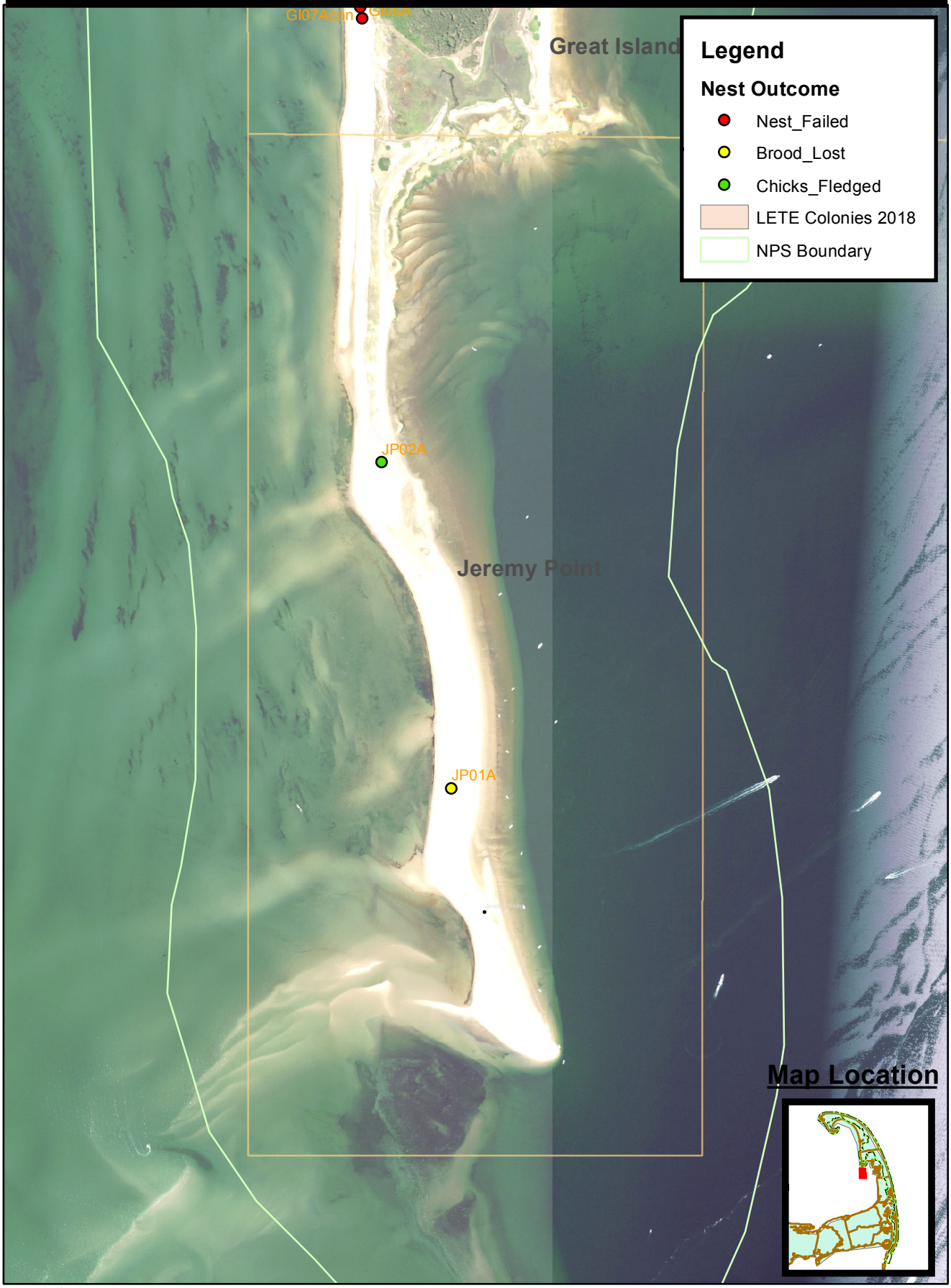
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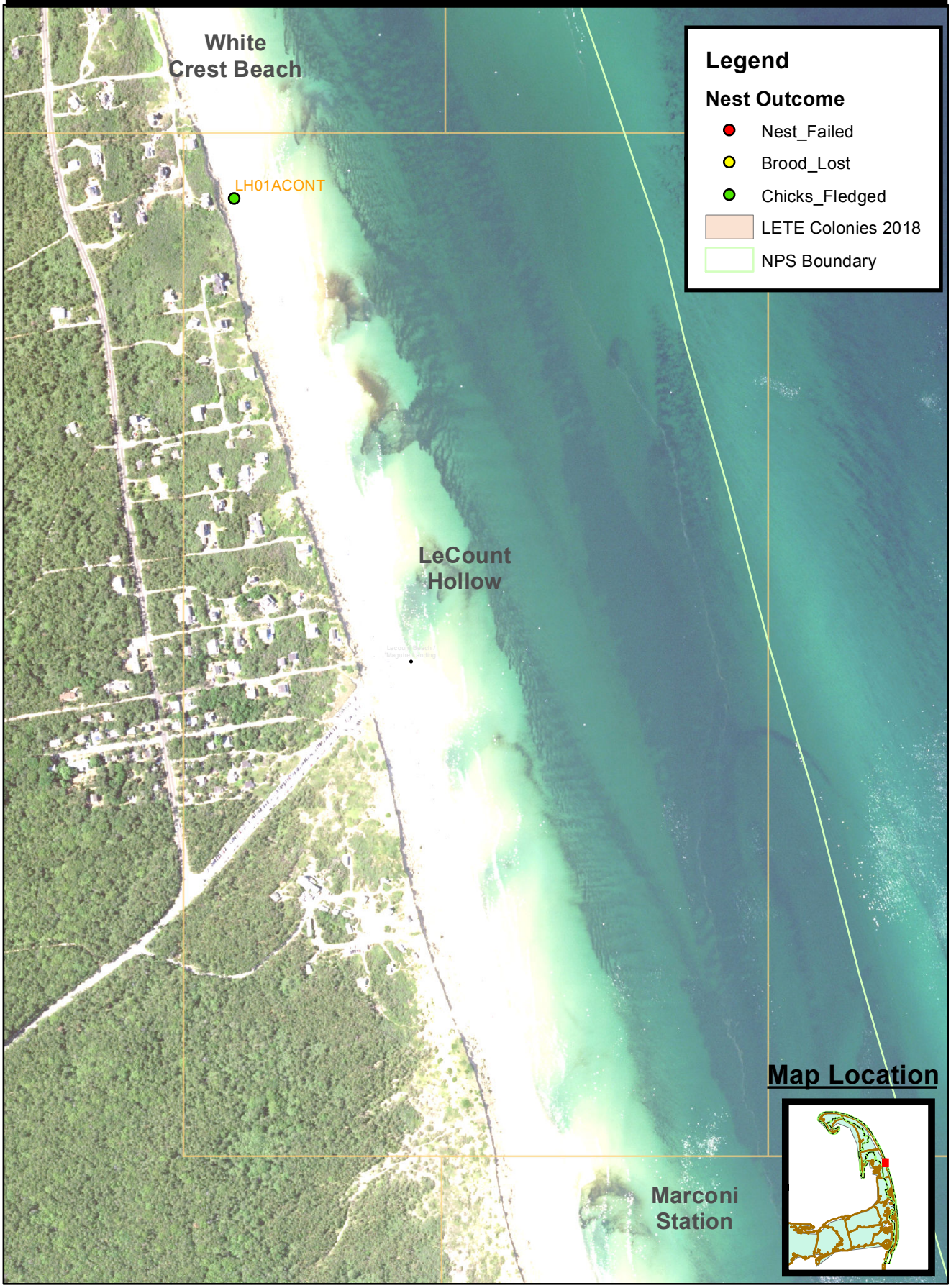
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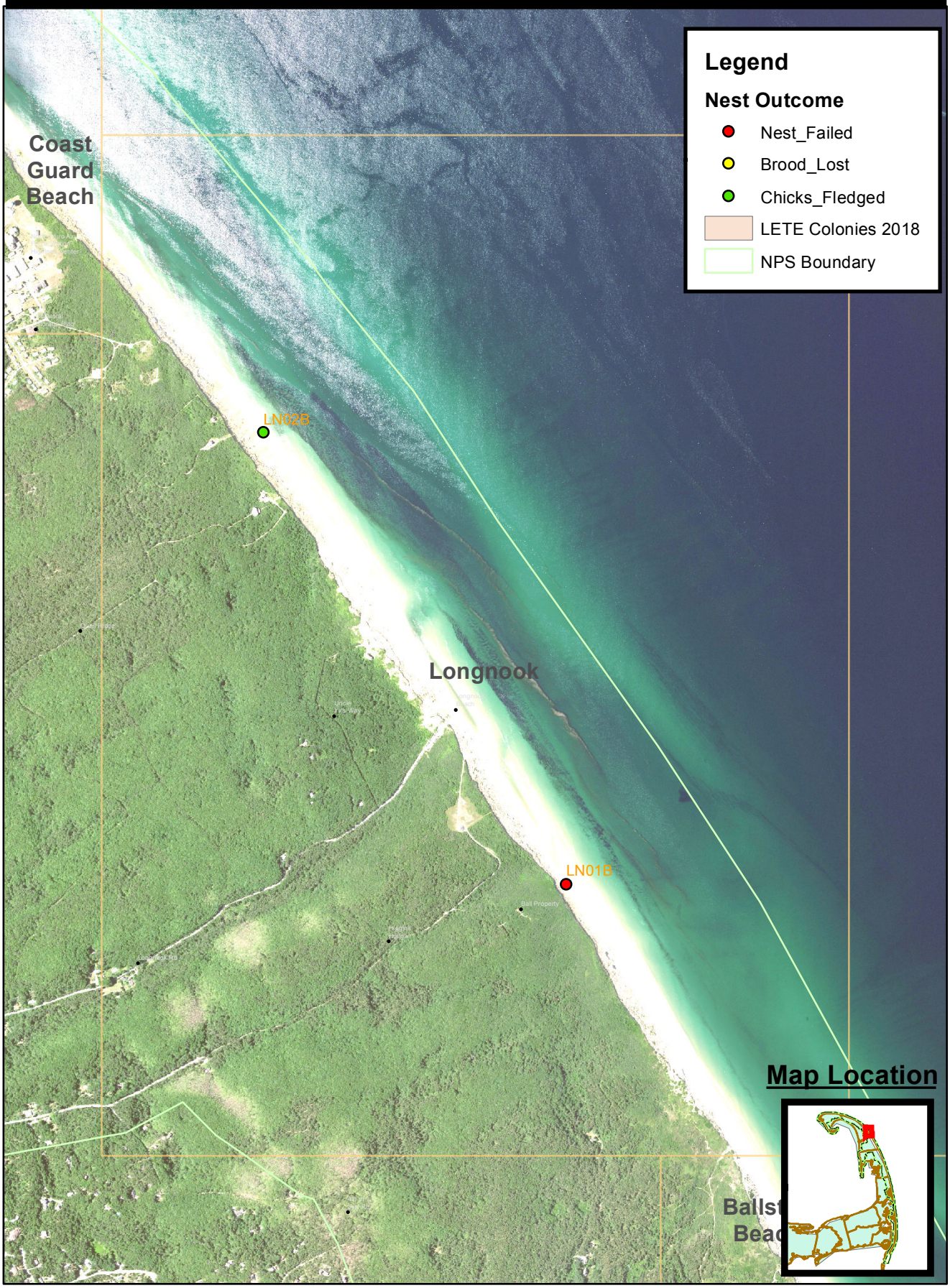
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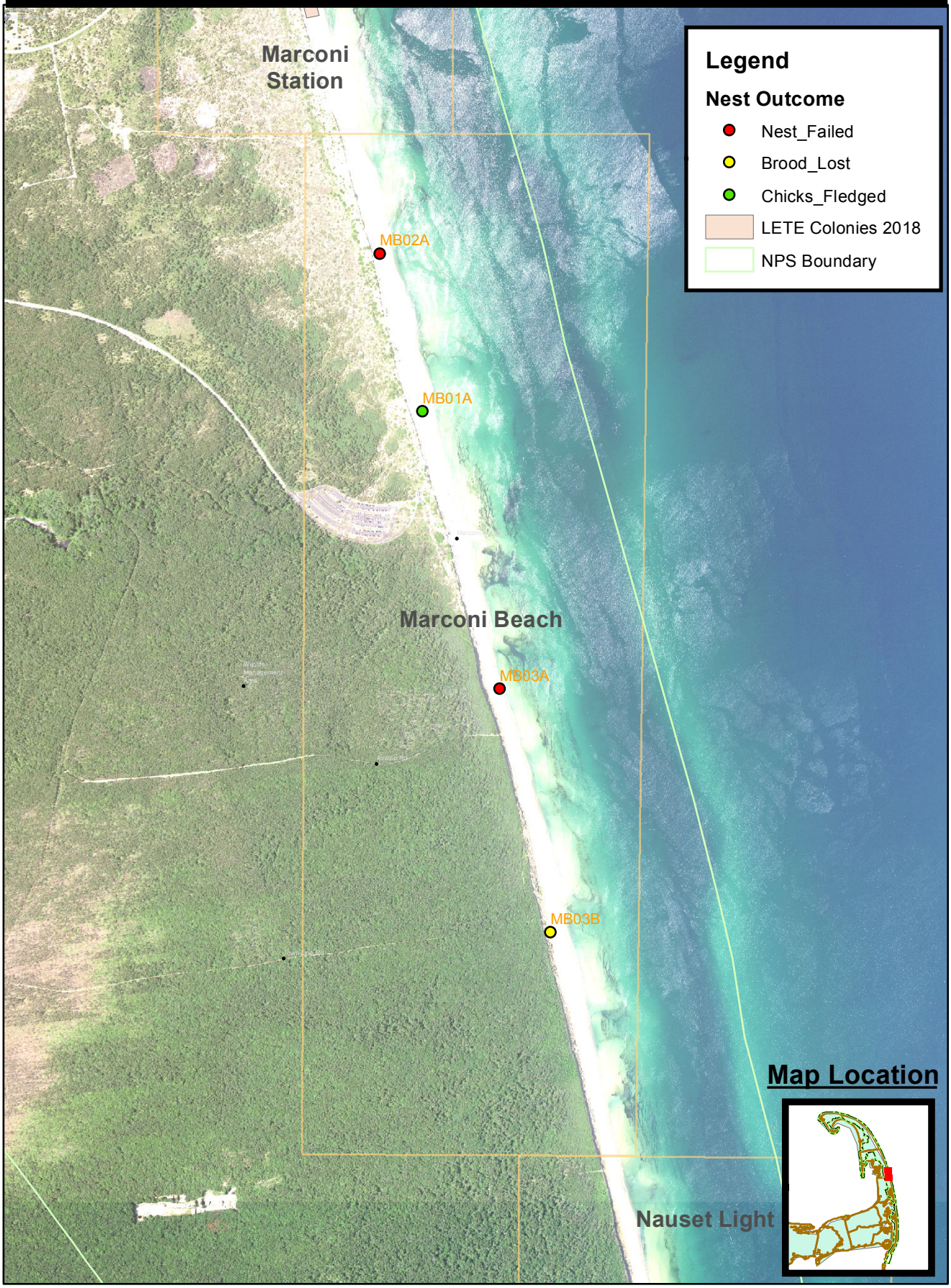
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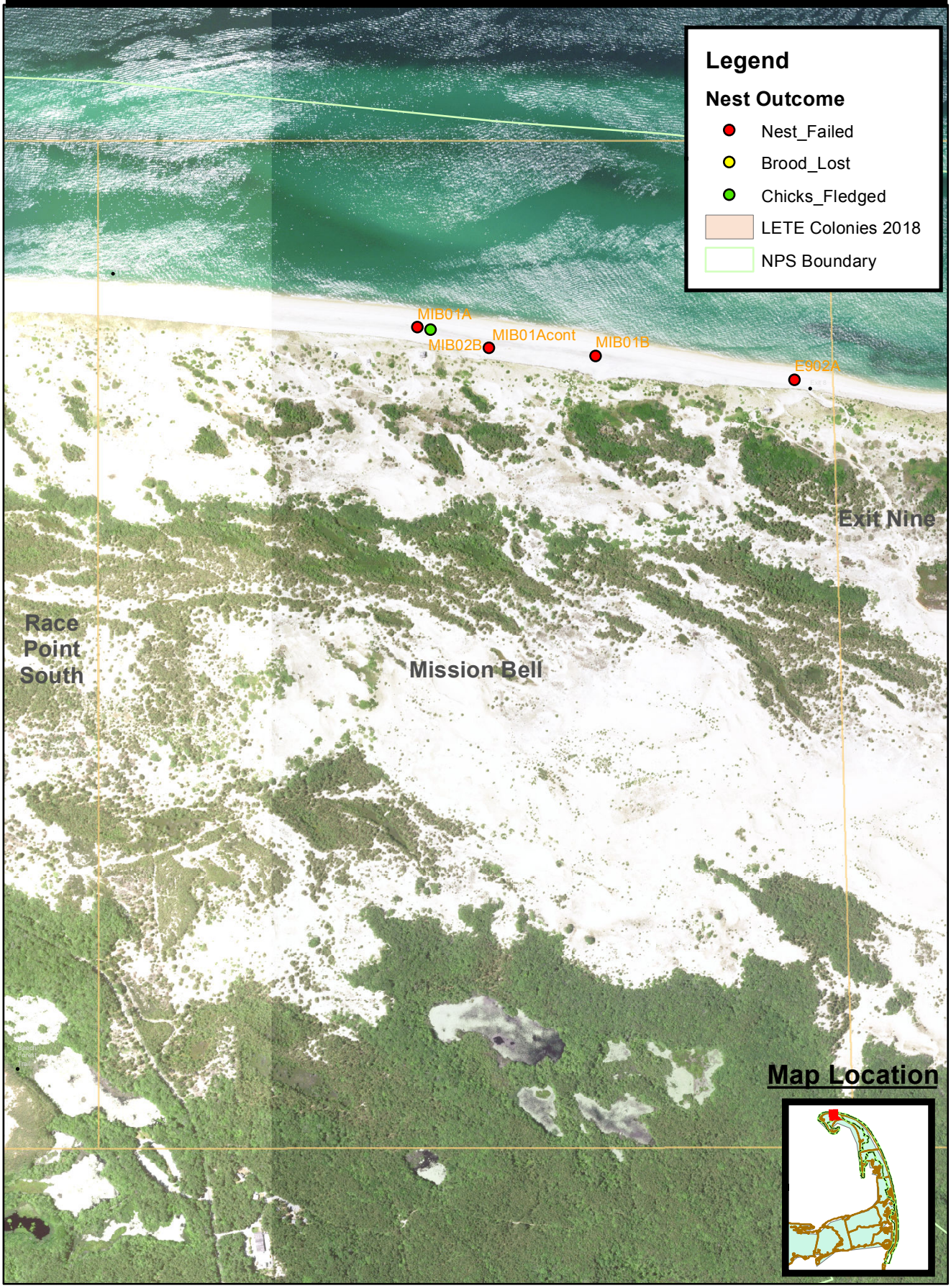
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Units: Meter

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Date: 10/19/2018

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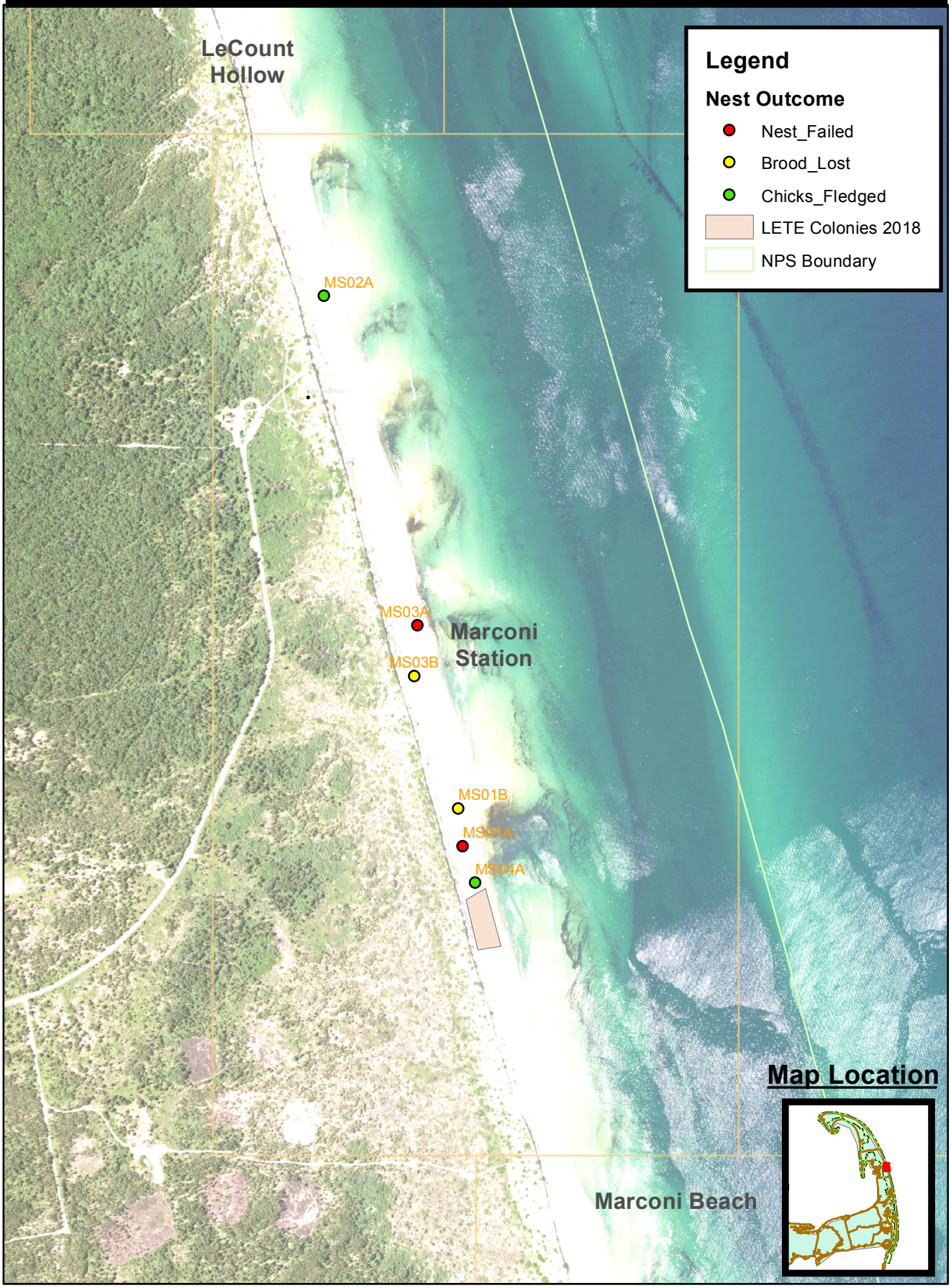
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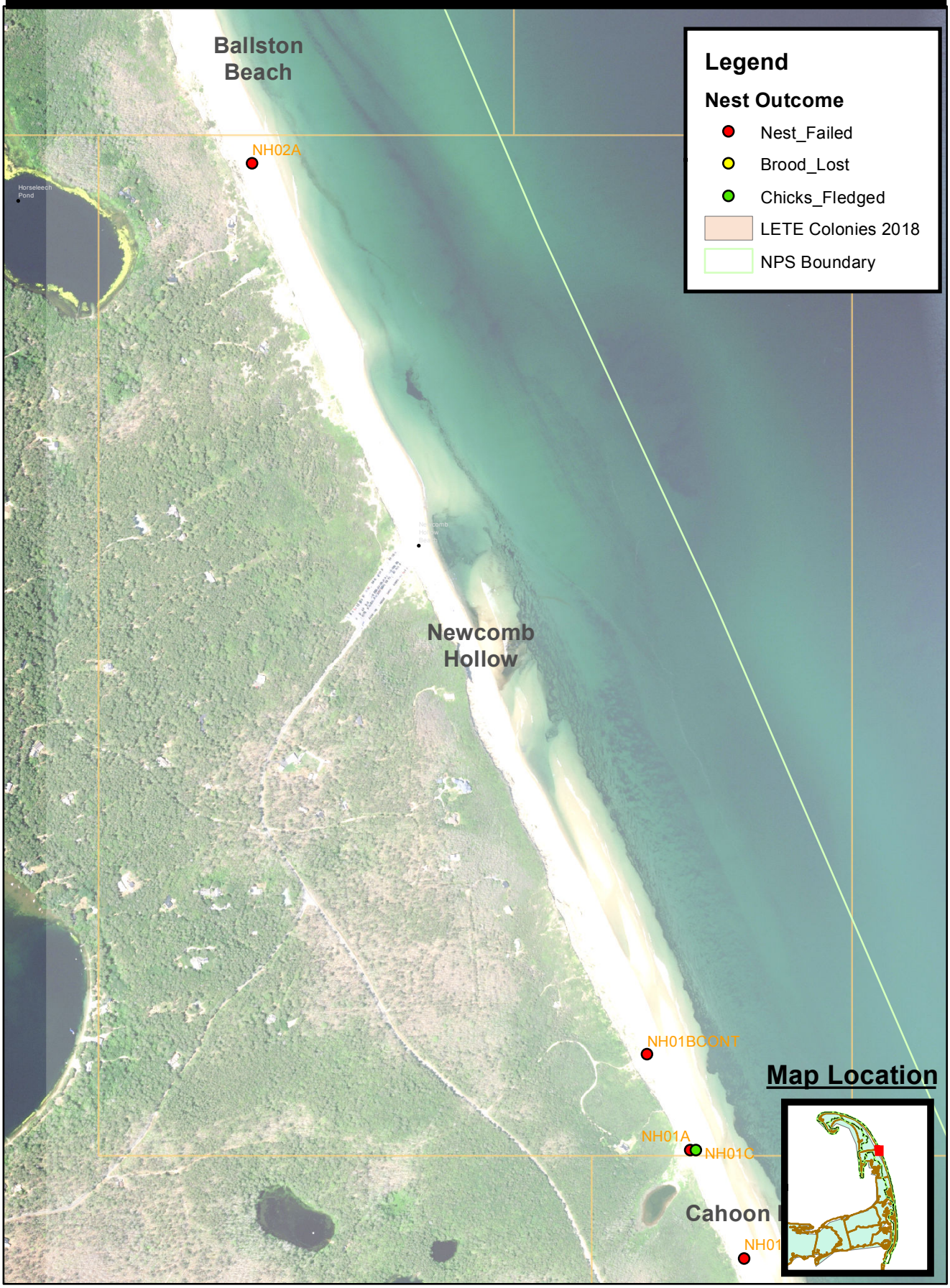
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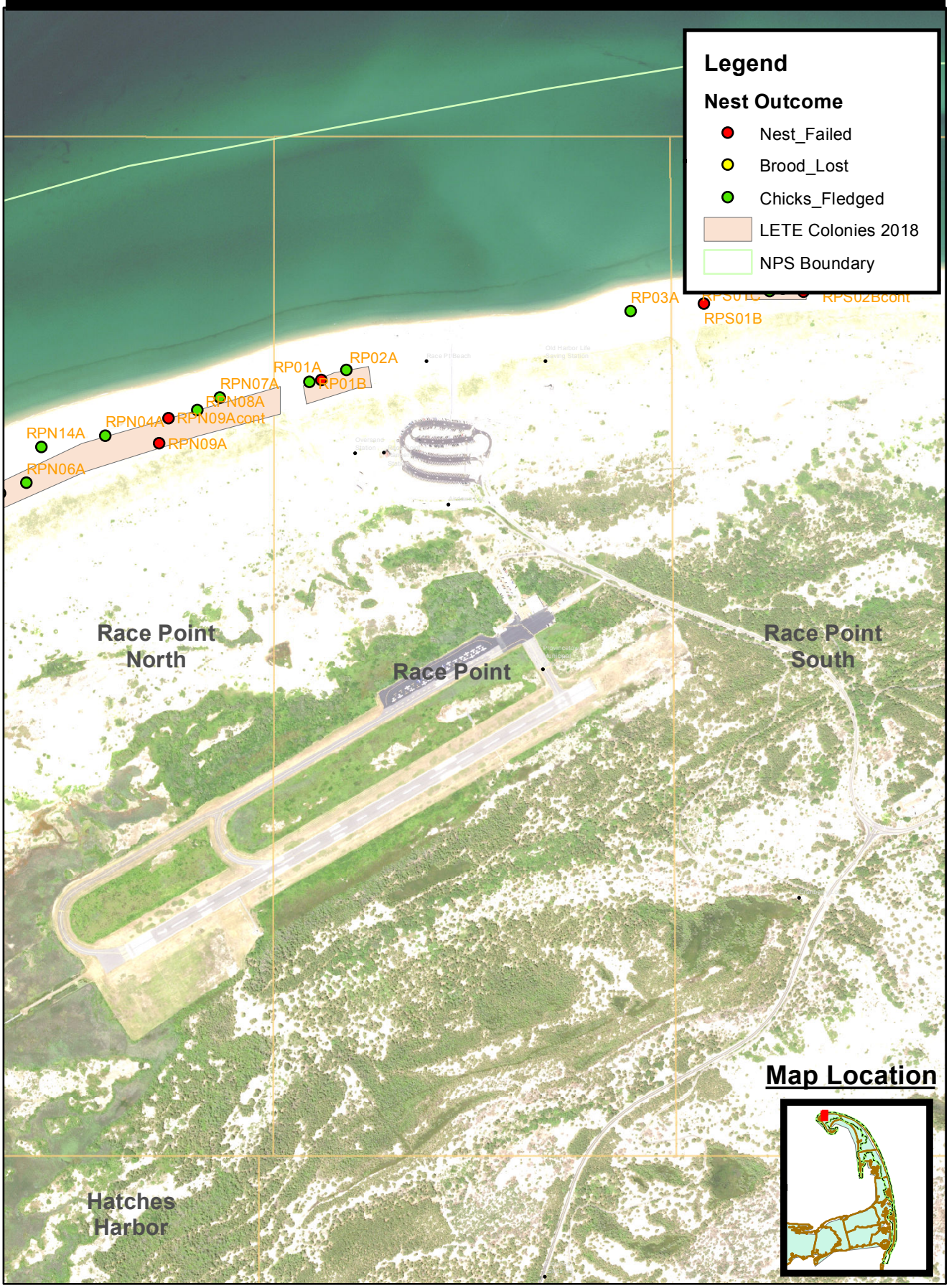
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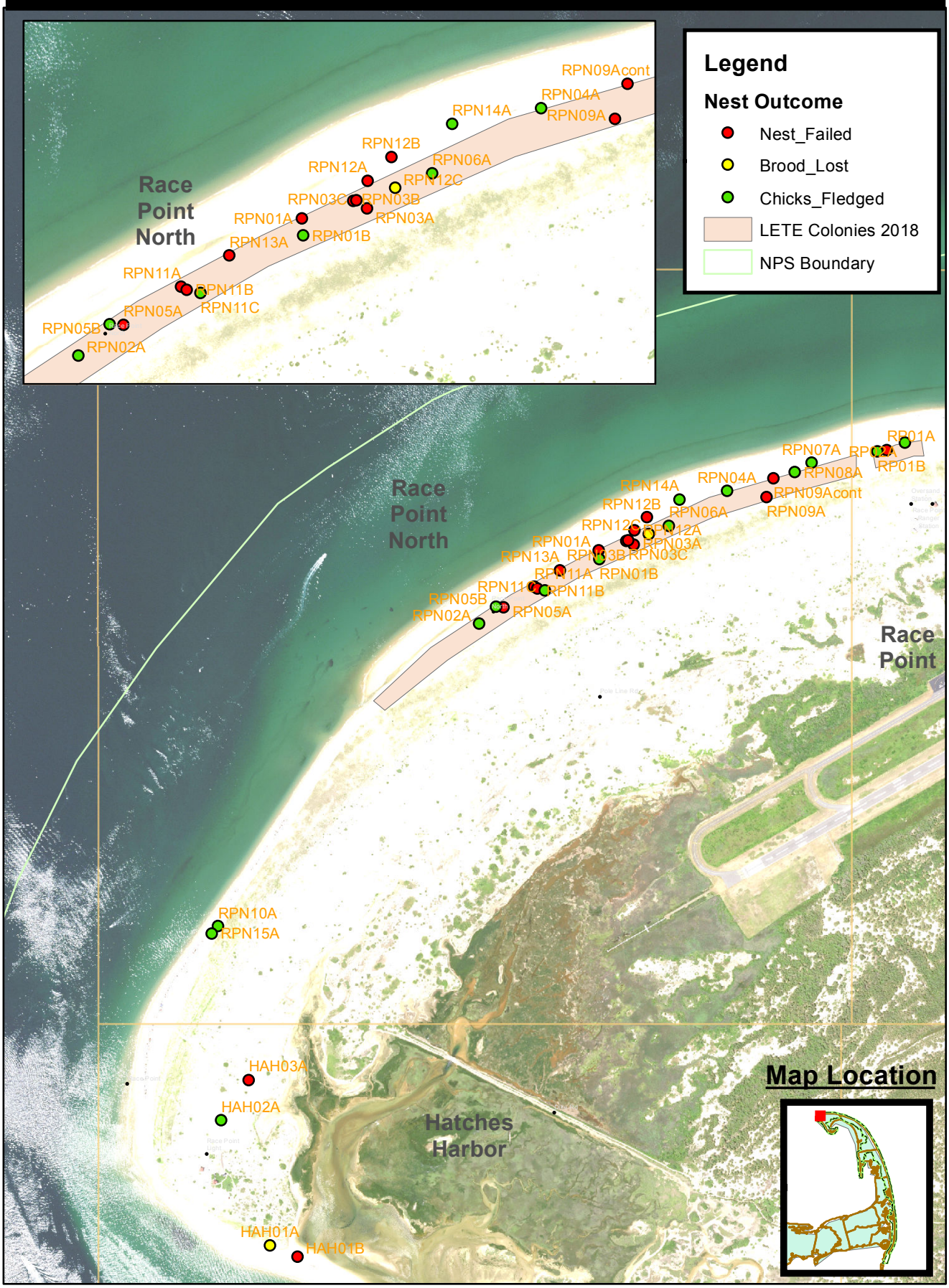
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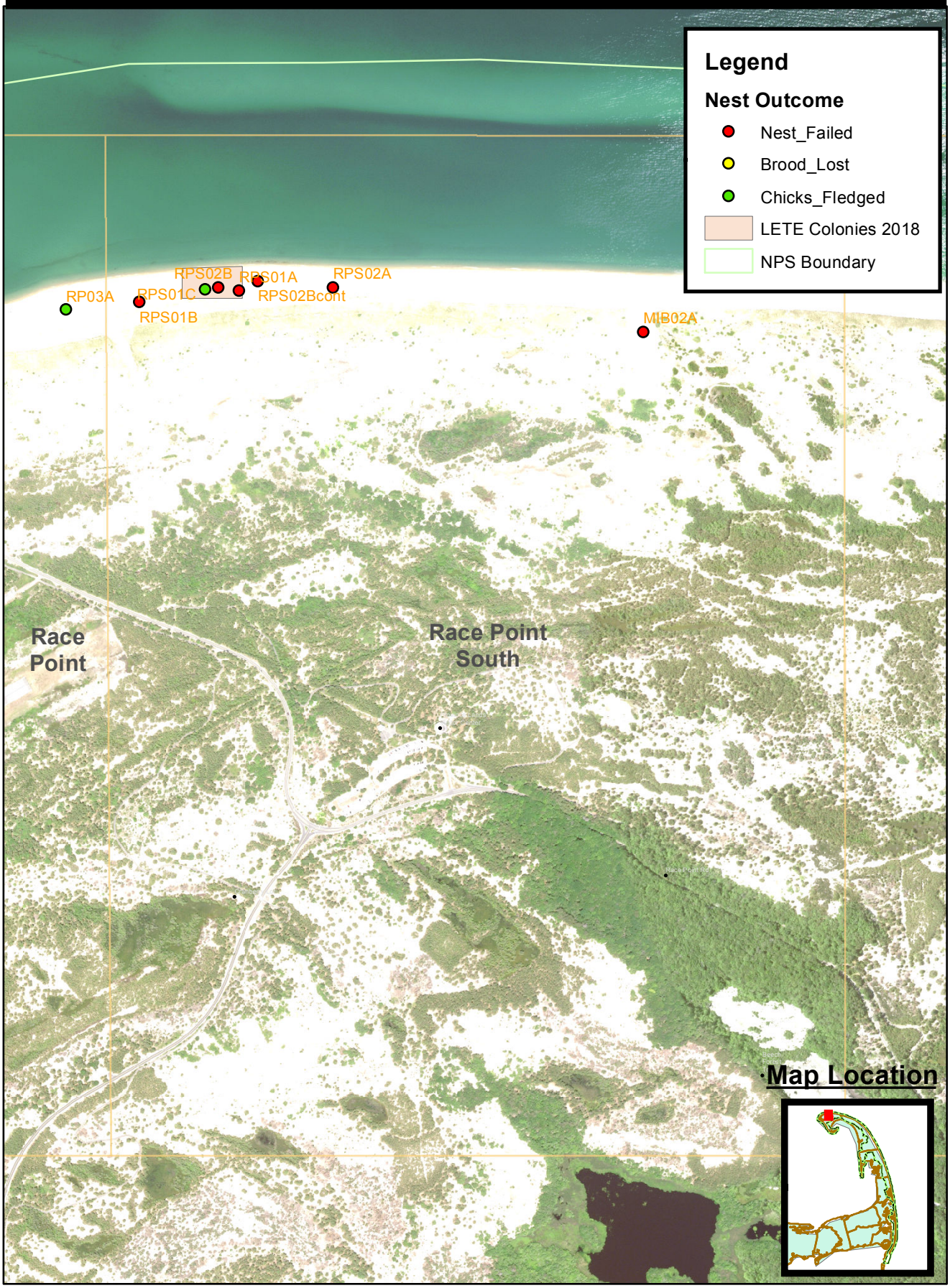
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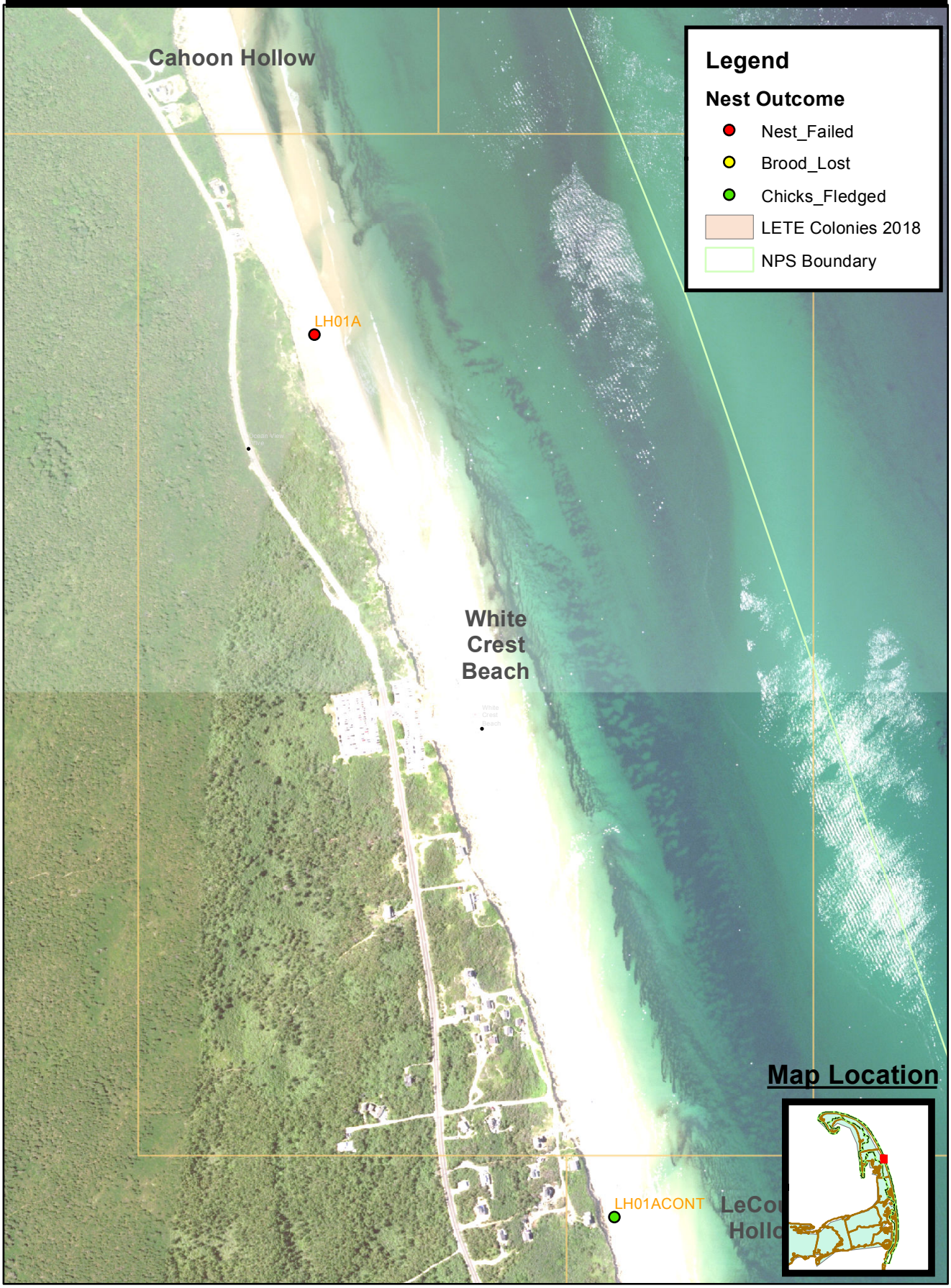
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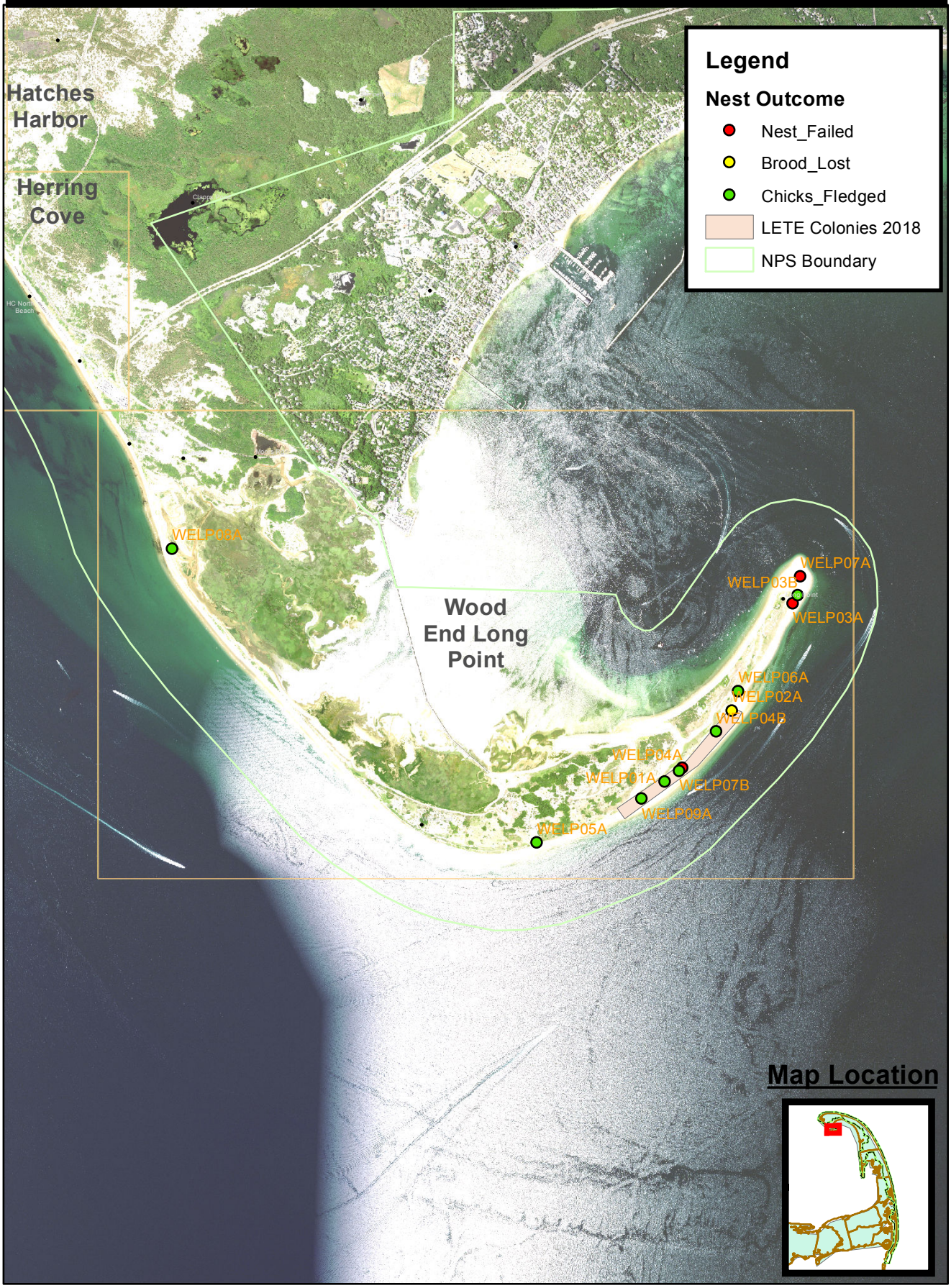
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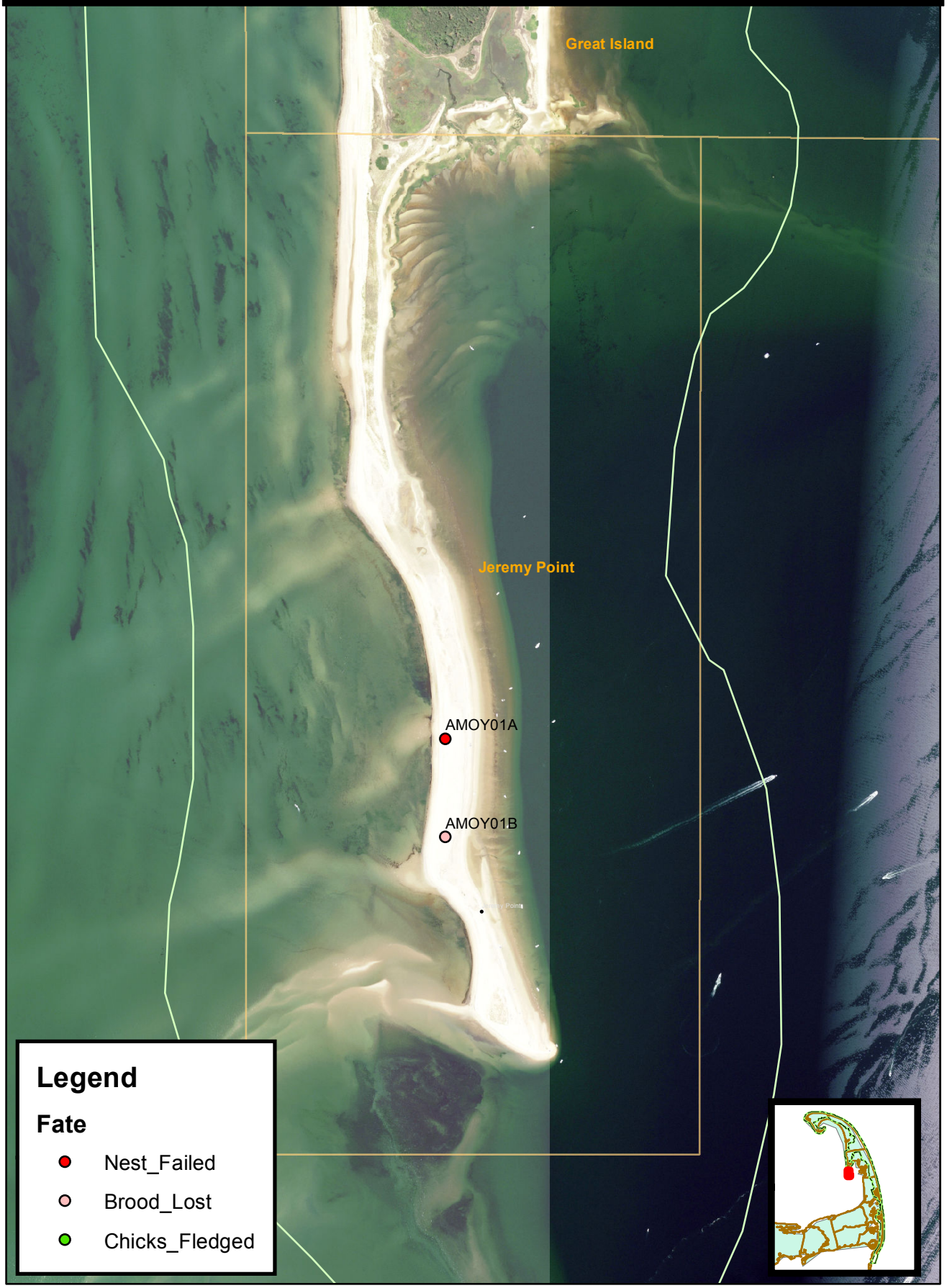
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## Legend

### Fate

- Nest_Failed
- Brood_Lost
- Chicks_Fledged



N

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## Map Location

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Date: 10/4/2018

## c. Appendix C: Final Productivity Outcome per pair 2018

| Site ID | Pair Number | Final Outcome | # of Attempts | Site ID | Pair Number | Final Outcome | # of Attempts |
|---|---|---|---|---|---|---|---|
| ARM | 1 | Fledged | 4 | CGE | 1 | Fledged | 2 |
| ARM | 2 | Fledged | 3 | CGE | 2 | Fledged | 1 |
| ARM | 3 | Fledged | 4 | CGE | 3 | Fledged | 1 |
| E9 | 1 | Fledged | 1 | CGE | 4 | Fledged | 1 |
| E9 | 2 | Fledged | 2 | CGE | 5 | Fledged | 1 |
| HAH | 2 | Fledged | 1 | CGE | 6 | Fledged | 1 |
| HOM | 1 | Fledged | 3 | CGE | 7 | Fledged | 1 |
| HOM | 4 | Fledged | 2 | DH | 2 | Fledged | 2 |
| HOM | 5 | Fledged | 1 | DH | 4 | Fledged | 2 |
| HOM | 6 | Fledged | 2 | GI | 1 | Fledged | 3 |
| LN | 2 | Fledged | 2 | GI | 2 | Fledged | 3 |
| MIB | 2 | Fledged | 2 | GI | 4 | Fledged | 1 |
| RP | 1 | Fledged | 2 | GI | 5 | Fledged | 1 |
| RP | 2 | Fledged | 1 | JP | 2 | Fledged | 1 |
| RP | 3 | Fledged | 1 | LH | 1 | Fledged | 2 |
| RPN | 1 | Fledged | 2 | MB | 1 | Fledged | 1 |
| RPN | 2 | Fledged | 1 | MS | 2 | Fledged | 1 |
| RPN | 4 | Fledged | 1 | MS | 4 | Fledged | 1 |
| RPN | 5 | Fledged | 2 | NH | 1 | Fledged | 4 |
| RPN | 6 | Fledged | 1 | | | | |
| RPN | 7 | Fledged | 1 | | | | |
| RPN | 8 | Fledged | 1 | | | | |
| RPN | 10 | Fledged | 1 | | | | |
| RPN | 11 | Fledged | 3 | | | | |
| RPN | 14 | Fledged | 1 | | | | |
| RPN | 15 | Fledged | 1 | | | | |
| RPS | 1 | Fledged | 3 | | | | |
| WELP | 1 | Fledged | 1 | | | | |
| WELP | 3 | Fledged | 2 | | | | |
| WELP | 4 | Fledged | 2 | | | | |
| WELP | 5 | Fledged | 1 | | | | |
| WELP | 6 | Fledged | 1 | | | | |
| WELP | 7 | Fledged | 2 | | | | |
| WELP | 8 | Fledged | 1 | | | | |
| WELP | 9 | Fledged | 1 | | | | |

| Site ID | Pair Number | Final Outcome | # of Attempts | Site ID | Pair Number | Final Outcome | # of Attempts |
|---|---|---|---|---|---|---|---|
| ARM | 4 | Failure to Hatch | 3 | HAH | 1 | Full Brood Loss | 2 |
| ARM | 5 | Failure to Hatch | 2 | RPN | 12 | Full Brood Loss | 3 |
| ARM | 6 | Failure to Hatch | 5 | WELP | 2 | Full Brood Loss | 1 |
| ARM | 7 | Failure to Hatch | 1 | CGE | 10 | Full Brood Loss | 1 |
| ARM | 8 | Failure to Hatch | 3 | CGE | 11 | Full Brood Loss | 1 |
| ARM | 9 | Failure to Hatch | 4 | CGE | 13 | Full Brood Loss | 1 |
| CGT | 1 | Failure to Hatch | 4 | CGE | 8 | Full Brood Loss | 1 |
| CGT | 2 | Failure to Hatch | 3 | GI | 8 | Full Brood Loss | 1 |
| CGT | 3 | Failure to Hatch | 2 | JP | 1 | Full Brood Loss | 1 |
| HAH | 3 | Failure to Hatch | 1 | MB | 3 | Full Brood Loss | 2 |
| HH | 1 | Failure to Hatch | 5 | MS | 1 | Full Brood Loss | 2 |
| HH | 2 | Failure to Hatch | 3 | MS | 3 | Full Brood Loss | 2 |
| HOM | 2 | Failure to Hatch | 3 | | | | |
| HOM | 3 | Failure to Hatch | 1 | | | | |
| LN | 1 | Failure to Hatch | 2 | | | | |
| MIB | 1 | Failure to Hatch | 3 | | | | |
| RPN | 3 | Failure to Hatch | 3 | | | | |
| RPN | 9 | Failure to Hatch | 2 | | | | |
| RPN | 13 | Failure to Hatch | 1 | | | | |
| RPS | 2 | Failure to Hatch | 3 | | | | |
| BAB | 2 | Failure to Hatch | 2 | | | | |
| BB | 1 | Failure to Hatch | 2 | | | | |
| BB | 2 | Failure to Hatch | 2 | | | | |
| CGE | 12 | Failure to Hatch | 1 | | | | |
| CGE | 9 | Failure to Hatch | 1 | | | | |
| DH | 1 | Failure to Hatch | 1 | | | | |
| DH | 3 | Failure to Hatch | 2 | | | | |
| GI | 3 | Failure to Hatch | 1 | | | | |
| GI | 6 | Failure to Hatch | 1 | | | | |
| GI | 7 | Failure to Hatch | 2 | | | | |
| MB | 2 | Failure to Hatch | 1 | | | | |
| NH | 2 | Failure to Hatch | 1 | | | | |

### d. Appendix D. Agreement between the Town of Wellfleet and the National Park Service (NPS), Cape Cod National Seashore for shorebird management support.

- Beaches are monitored 4- 7 days/week during the shorebird nesting season (April – end of August).

- In early April, informational signs and symbolic fencing are installed at Duck Harbor around historic plover nesting habitat (north of pedestrian access). Additional symbolic fencing and signs will be installed around all areas where shorebirds are observed exhibiting courtship behavior and/or where active scrapes and nests are present.

- Efforts will be made to allow pedestrian access past nesting shorebirds. But, where beaches are narrow, it is not always possible to provide a sufficient buffer to prevent disturbance between the incubating birds and pedestrians. These sections of beach may need to be temporarily closed to pedestrians or during times of high tide. If possible, a detour will be established around nest(s). These areas would re-open to pedestrian access no later than 1-3 days after the chicks hatch. (Note: this scenario has not yet occurred on any Wellfleet town beach).

- Predator exclosures will be installed around most piping plover nests. Nests will not be exclosed when they are: (1) located in thick vegetation, (2) located on the side of a dune or cliff that precluded us from installing an exclosure due to slope or nest location; or (3) when a group of exclosed nests were abandoned on a single day at a particular site and there were concerns regarding adult plover mortality associated with exclosure use. Exclosures will be removed or not installed if field observations suggest predators are keying into the exclosure. Both exclosed and unexclosed nests are checked 5-7 days/week.

- GPS Waypoints will be taken at all nests locations.

- All chicks are generally monitored daily until fledged, noting their movements, location and number in each brood.

- Pet closures extending down into the intertidal zone will occur when nests, unfledged chicks or staging shorebirds are present. Area will re-open to pets when chicks fledged.

- Hand-held kites and kites used in kite surfing/boarding are prohibited within 200 meters of posted shorebird nesting areas.

- CACO will submit annual census reports on breeding piping plovers on Wellfleet town land to the Massachusetts Natural Heritage Program. The Atlantic Coast piping plover census will be performed June 1-9 and findings reported to the U.S Fish and Wildlife Service.

- All shorebird nests found on town land will be reported to Wellfleet Natural Resource Health and Conservation agents. NPS will work closely with the town to provide regular updates throughout the nesting season.

- Wellfleet will purchase town signs to be posted for shorebird areas on town lands.

- Lifeguards will not drive ATVs on beaches with unfledged shorebird chicks unless responding to a life-threatening emergency.

### e. Appendix E. Agreement between the Town of Truro and the National Park Service (NPS), Cape Cod National Seashore for shorebird management support.

**Ballston Beach** – As a part of their agreement with the Town of Truro to manage shorebirds on Town property at Ballston Beach, Massachusetts Audubon Society (MAS) will install and maintain symbolic fencing around suitable shorebird habitat, monitor for bird activity (i.e., checking for piping plover tracks, courtship and territorial displays, scrapes/nests), install regulatory and informational signage (e.g., temporary pet/kite restrictions) and silt fencing, if needed, and install and maintain symbolic fencing around active shorebird nests on National Seashore managed property. Specific areas of NPS property will include the new sand overwash area (adjacent to the Town parking lot) and the front ocean beach. The MAS will take the lead role in monitoring day to day shorebird nesting activity throughout the season and provide updates to the CCNS on a regular basis.

**Head of the Meadow** – The Town of Truro will be responsible for decisions about the use and physical installation of shorebird fencing on Town property at Head of the Meadow Beach. It is anticipated that, when necessary, the MAS will be installing and maintaining symbolic fencing around suitable shorebird habitat and nests and installing regulatory and informational signage and silt fencing, if needed. The CCNS will take the lead role in day to day monitoring (i.e., checking for piping plover tracks, courtship and territorial displays, scrapes/nests) of shorebird activity on this town-owned section of beach and provide updates to the MAS/Truro on a regular basis.

**Other Atlantic–side Town-owned beaches in Truro** – The CCNS will assist the Town of Truro with shorebird management and protection on Atlantic-side beaches, including Coast Guard Beach and Longnook. For these beaches, the CCNS will extend its shorebird management activities to install and maintain symbolic fencing around suitable shorebird habitat, monitor for bird activity (i.e., checking for piping plover tracks, courtship and territorial displays, scrapes/nests), install regulatory and informational signage (e.g., temporary pet/kite restrictions) and install and maintain symbolic fencing around active shorebird nests on Town of Truro property, where needed. The CCNS will take the lead role in day to day monitoring of these town-owned sections of beach and provide updates to the MAS/Truro on a regular basis.

CCNS shorebird management support for the town of Truro will include:

- Monitoring shorebird activity 4- 7 days/week from April – end of August.
- The possible installation of predator exclosures around piping plover nests. Nests will not be exclosed when, for example: (1) they are located in thick vegetation, (2) they are located on the side of a dune or cliff that precluded us from installing an exclosure due to slope or nest location; (3) a group of exclosed nests were abandoned on a single day at a particular site and there were concerns regarding adult plover mortality associated with exclosure use; or (4) expert opinion has determined that an exclosure is inappropriate for a given place or time. Exclosures will be removed or not installed if field observations suggest predators are keying into the exclosure. Both exclosed and un-exclosed nests are checked 5-7 days/week.
- The landowners will be asked to contribute signage and supplies (i.e., posts/string).
- All nest locations will be collected with a global positioning system.
- All chicks will generally be monitored daily until fledged, noting their movements, location, and number in each brood.

- Pet closures extending down into the intertidal zone will occur when nests and unfledged chicks are present. Areas will re-open to pets when chicks have fledged.

- Hand-held kites and kites used in kite surfing/boarding will be prohibited within 200 meters of posted shorebird nesting areas.

- Lifeguards will not drive ATVs on beaches with unfledged shorebird chicks unless responding to a life-threatening emergency.

- The CCNS will assist the MAS in the Atlantic Coast piping plover census performed June 1-9 and the MAS will be responsible to report finding to the U.S Fish and Wildlife Service.

- All shorebird nests found on town land will be reported to the MAS and Truro Natural Resource Health and Conservation agent. The CCNS will work closely with these agencies and provide regular updates throughout the nesting season.

- At the end of the nesting season, the CCNS will provide Mark Faherty, MAS shorebird project leader, all shorebird data collected by CCNS shorebird staff on Truro beaches. The MAS will be responsible to submit annual census reports on breeding piping plovers on Truro town land to the Massachusetts Natural Heritage Program.

May 08, 2013

## f. Appendix F: Race Point Lighthouse Essential Vehicle Management Plan

A. Participating Organizations with Regulatory Interest or Compliance Responsibility

1. American Lighthouse Foundation (ALF) – DBA New England Lighthouse Foundation (NELF)
2. U.S. Coast Guard (USCG)
3. National Park Service Cape Cod National Sea Shore (NPS)
4. U.S. Fish & Wildlife Service (FWS)
5. Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program (MADFW)

B. Why Is This Plan Needed?

1. Plovers

(a) Piping plovers are listed as "Threatened" under the Federal Endangered Species Act and are similarly protected by Massachusetts State Law implemented by the MA DEP Division of Fisheries and Wildlife.

(b) The intent of this plan is to avoid adverse effects on these listed threatened species. Adverse effects on endangered or threatened species are defined as any action that will alter the normal behavior of the protected species. They include, but are not limited to: kill, harm, harass, interfere with feeding, obstruct access to protection, etc. Section B.1. (c) below provides additional detail in this regard.

(c) Between April 1 and September 1 each year, piping plovers may nest or seek shelter along the Pole Line Route that leads to the Race Point lighthouse complex. When nests or chicks are present in the vicinity of this route, the passage of vehicles may result in mortality by crushing eggs or chicks, and may significantly degrade piping plover habitat or disrupt normal behavior patterns. Vehicles may harm or harass plovers by crushing wrack into the sand thereby making it unavailable as cover or foraging substrate, by creating ruts that may trap or impede movements of chicks, and by preventing plovers from using habitat that is otherwise suitable. Mortality or disruption of normal behavior patterns may constitute a violation of the Endangered Species Act and the Massachusetts Endangered Species Act and Wetlands Protection Act. As a result, unless special procedures are implemented, it will be necessary to suspend vehicular traffic at these locations until the chicks fledge or vacate the area on their own volition.

2. People

The Pole Line Route is the only reliable pathway to transport visitors to the Race Point Light location. The only other alternate means of access is via the outer beach route. However, at times due to tidal conditions this route is impassable. In addition, the outer beach route is often closed to vehicular traffic during critical plover nesting periods. The Race Point Light managers depend on guest fees to generate funds needed to maintain this historic property as mandated by the National Historic Preservation Act. Such maintenance is also required by the Coast Guard license under which the lighthouse is managed by ALF/NELF.

C. Elements of the "Essential Vehicle Management Plan"

1. NPS will monitor the piping plover activity (nests and/or unfledged broods) in the vicinity of the Race Point Light complex as a component of the overall piping plover management conducted on the Cape Cod National Sea Shore. NPS staff will inform ALF/NELF and the lighthouse attendant when closure of the Pole Line Route to non-essential ORV use is warranted in accordance with the plover management guidelines in Appendix G of the USFWS Piping Plover Recovery Plan.

2. Guests at the lighthouse facility will be advised by the ALF/lighthouse staff about the "Essential Vehicle Management Plan" requirements and implementation status at the time they make reservations and when they arrive to stay at the lighthouse property. Guests already at the lighthouse will be informed by the lighthouse attendant when NPS advises that closure of the Pole Line Route to non-essential off road vehicle (ORV) use is warranted, leading to implementation of the essential vehicle plan.

3. The following procedures shall be implemented when the Pole Line Route is closed to non-essential vehicles in order to avoid take of listed threatened piping plovers:

   (a) One round trip per day with a maximum of two Race Point lighthouse registered vehicles per trip will be allowed. This round trip must be conducted only during daylight hours. (Daylight hours are defined as the daytime period between one hour after sunrise and one hour before sunset.) The "one round trip" per day means one trip with up to the two vehicles traveling to the lighthouse property via the Pole Line Route and one trip back from the lighthouse property via the same route; or vice versa.

   (b) The once daily vehicle round trip will take place only after the plover brood locations are identified by a qualified monitor and the vehicles are led by a qualified escort. Although NPS personnel regularly monitor the piping plover activity within the National Seashore area, there is no guarantee that the most recent NPS check in the area of the Pole Line Route will be proximate enough to provide real-time information for the lighthouse essential vehicle movements. Broods need to be located again if more than three (3) hours pass after monitoring is conducted. Therefore, in order to conduct vehicle movements when desired, the American Lighthouse Foundation (ALF) will need to provide both monitoring and escort functions during each lighthouse vehicle transit. <u>If a properly trained and experienced person is retained by ALF and there are no more than three broods in the area it may be possible for one person to serve as both monitor and escort for the lighthouse essential vehicle transits.</u> {See Section D. 1. and 2. below for monitor/escort qualifications and Section D.3. and 4. for a discussion on monitor and escort sources.}

   (c) The plover escort may be on foot (preferred), or on a slow moving vehicle (5 mph in plover habitat areas) having unrestricted visibility in all directions from the operator's position (*i.e.* all-terrain vehicle - ATV). The vehicle(s) shall be halted, and/or trip initiation delayed, when it is determined by the monitor or the escort that proceeding will risk take of piping plovers, and remain halted or delayed until such risk of take passes. The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct".

   (d) During their stay, any guests that desire to travel from the lighthouse property (e.g. the Keeper's Dwelling or Whistle House) to Provincetown or other points on the National Seashore while the "Essential Vehicle Management Plan" is implemented may walk to

the permitted area entry point to access, or obtain off-site transportation to their private vehicles. Otherwise, they will be required to wait for the next available outbound lighthouse vehicle. The same two options are available for the return back to the lighthouse. Only vehicles registered for the lighthouse operation may utilize the Pole Line Route when the "Essential Vehicle Management Plan" is implemented.

(e) If the date for implementation of the "Essential Vehicle Management Plan" is determined after a private vehicle has been driven to the lighthouse, the private vehicle must exit via the Pole Line Route at least two days in advance of that implementation date. If, due to unforeseen circumstances, the private vehicle is unable to be moved off the lighthouse site before the implementation date, then the guest vehicle could depart only with one of the lighthouse registered vehicles on the next scheduled once daily round trip. This private vehicle may not return to the lighthouse until such time that the Pole Line Route is no longer closed to non-essential vehicles.

(f) On a weekly basis, a report shall be provided to the NPS and FWS summarizing the escort activity and the number of plover broods/nests in the area. [See "Communications Plan" in Section 4. (b), page 4 for further detail.]

D. Communications Plan

(a) The NPS will:

(i) Share plover monitoring reports with ALF or their local representative throughout the season on a weekly or more frequent basis as practicable. These reports will include any projected closure of the Pole Line Route in as much advance as possible. Generally, implementation of the "Essential Vehicle Management Plan" can be expected approximately 26 days after the first plover egg is discovered within the area of affect from the Pole Line Route. If nests are placed within close proximity to the Route, the plan may need to be implemented sooner so as not to interfere with egg incubation activities. The NPS will provide monitoring reports via e-mail to persons involved in this plan who have access to a computer or other e-mail receiving device.

(ii) Notify ALF, USCG, USFWS, and MDFW upon closure of the Pole Line Route to non-essential ORV traffic – thereby indicating the need to implement the "Essential Vehicle Management Plan". Notification will be via phone and e-mail by the North District Ranger or his/her designee.

(iii) Maintain daily communication with ALF monitors to share information regarding plover activity, nest, and brood status in the vicinity of the Pole Line Route. Field communications will be coordinated by the NPS.

(iv) The National Parks Service will provide the names and contact information of key NPS staff to ALF, USFWS, and the USCG at the beginning of each piping plover season.

(v) Send weekly reports to:
Email: Susi_vonOettingen@fws.gov
or
USFWS

Attn: Susi von Oettingen;
70 Commercial Street, Suite 300;
Concord, NH 03301.

(b) ALF will:

(i) Prior to May 23, 2008 (and by March 15 in subsequent years) provide the NPS with the names, phone numbers, and e-mails of the points of contact for the communications described above, including the name(s) of the plover monitor/escort.

(ii) Inform all guests about the "Essential Vehicle Management Plan" at the time reservations are made, and upon arriving on the Outer Cape.

(iii) Provide weekly report to NPS and FWS on implementation of the management plan, including dates/times of escorts, number of broods in the area, any problems encountered, and recommendations for future years. Report format shall be specified by the NPS.

(iv) Immediately report to the USCG, USFWS, and NPS any incidence of potential or actual harm, harassment, or other forms of inadvertent take related to the escorted vehicle movements.

(c) The USCG will:

(i) Review the Coast Guard License agreement environmental protection requirements section with ALF/NELF.
(ii) Participate in resolution of problems with implementation of the "Essential Vehicle Management Plan" as well as discussion of any necessary procedural changes.
(iii) Prepare Section 7 (ESA) consultation letter(s) relating to the "Essential Vehicle Management Plan" at Race Point Light as required

E. Other Pertinent Issues

1. A monitor/escort shall have at least one of the following qualifications that can be verified by the NPS and/or FWS:

(a) Training in piping plover identification and management provided by the NPS, the Massachusetts Audubon Society or another agency currently managing piping plovers; or
(b) Piping plover monitoring experience of at least one full season (provide recommendations from supervisors of past work of this nature).
(c) A qualified person should also have experience using binoculars, filling out field observation data sheets and other bird watching skills.

2. The selected monitor/escort must receive local NPS training pertinent to the Cape Cod National Seashore prior to beginning these services. Training may include shadow detail with NPS staff.

3. The manager of the Race Point lighthouse (ALF/CCC) will arrange for plover monitors and escorts (or one combined individual as noted above) in order to implement the "Essential Vehicle Management Plan". Such monitors/escorts would be required to meet the qualifications under paragraph D. 1. and 2. above and must be available whenever needed to fulfill the requirements of this plan. One such source for qualified persons is the Massachusetts Audubon Society. The point of contact is Ms. Becky Harris at (508) 362-7475, Ext 9351.

4. Alternatively, these services may be obtainable through pre-season negotiated compensatory agreement between ALF and the NPS Cape Cod National Sea Shore Administration.

5. Emergency Access to the lighthouse. In situations involving loss of property (e.g. fire) or where human life or limb is at risk, emergency responders are not held to comply with this vehicle management plan except to the extent feasible consistent with the nature of the emergency.

6. Changes to this Plan. If any of the involved parties deem it necessary that this Plan be changed for its successful implementation, they shall notify the other involved parties as soon as practicable and shall obtain approval from the pertinent regulatory agencies and acceptance by the Coast Guard prior to implementation.

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