GREAT GULL ISLAND ANNUAL REPORT: 2025

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Introduction

Great Gull Island (GGI), NY is the second largest nesting colony of federally endangered Roseate Terns (approx. 37% of the endangered population) and is one of the largest Common Tern colonies in the world. With only three large nesting colonies of Roseate Terns in the US, protecting this site is critical to recovering Roseate Terns. GGI is also the only large colony with sufficient elevation to be resistant to sea level rise.

GGI is a 17-acre former US Army fort, was transformed from a coastal island into a completely built environment during the US Army's tenure from the early 1900's until 1949. In 1949 the American Museum of Natural History won an auction to purchase the island and restore the tern colony that was removed during the active military period.

The restoration has been successful. The terns nest on the cobble beach, on and in the Army legacy structures, and inland. But coastal erosion, storm surges, sea level rise, and increasing storm intensity are causing a breakdown of the natural bluffs and beaches on the island, causing nesting habitat loss, and threatening the sustainability of the colony. The revetment ringing the island is also degrading, and in areas of high wave energy has failed, resulting in erosion that threatens the integrity of the island.

This report summarizes research and monitoring methods and results, and infrastructure repairs, conducted on Great Gull Island, NY from late April – mid-September 2025. The infrastructure team is typically a crew of 2-3 people and is active in April and September. The tern monitoring and research is handled by a rotating crew of seven from May through August. Additional support for large-scale projects was completed with the help of state, federal, and regional e-NGO partners.

Summary of Monitoring

In 2025 Great Gull Island represented the 2nd largest Common Tern colony in the NW Atlantic (only the colony at Monomoy NWR, MA is larger) and the 2nd largest Roseate Tern colony in the NW Atlantic. Common Terns occupy much of the island except areas with steeper terrain that tend to be covered in Asiatic Bittersweet where the vegetation is too dense for terns to nest. Roseate Terns nest around the perimeter of the island in the revetment, under dense vegetation, in nest boxes or debris (e.g. logs, pipes), although some individuals nest in the open in locations very similar to those used by Common Terns.

Current census numbers for 2025 indicated that approximately 27,000 adult terns were breeding on Great Gull in early June 2025. This does not account for all the non-breeding individuals on the island at that time, so there could be 30,000 adult terns on Great Gull in early June. After hatching it is likely that GGI hosts upwards of 40,000 adult and hatchling Common and Roseate Terns.

Overall, the 2025 season logged excellent productivity for Roseate Terns and lower productivity for Common Terns. Note that Common Tern had a lower productivity per nest despite a higher average clutch size per nest. This lower performance by Common Terns has been noted in previous years and is cause for concern.

After fledging Common Tern fledglings were noted returning to their natal sites for weeks, and there was a notable die-off of fledglings noted in August. Roseate Terns were not observed returning to their natal sites, and very few dead Roseate fledglings were found.

We expect the composition of the prey to vary from year-to-year, and in 2025 we recorded Roseates and Commons using Sand Lance (*Ammodytes* sp) and Bay Anchovy (*Anchoa mitchilli*) as the primary fishes for provisioning young. We do not typically see Bay Anchovy in high numbers in the chick diets, and 2025 demonstrated that the terns are able to switch provisioning prey to unexpected sources.

Other highlights are listed below and detailed in the text.

Highlights of 2025

During 2025 we:

- Published the first Conservation Plan for GGI with support from the Long Island Sound Futures Fund. Download the report at www.greatgull.org.
- Inventoried the materials (e.g., data on paper, photos) in the GGI Office to ensure that 50 years of work by Helen Hays and her army are secured.
- Built two new sleeping cabins and renovated another historic space.
- Counted a record high of 2,331 during the Roseate Tern census nests - this is the highest number of Roseate Tern nests detected on GGI since fieldwork was initiated in 1949.
- Completed the biennial Common Tern census with 28 colleagues from collaborating agencies and non-profit groups. We counted about 11,200 nests - a stable number over the last few years.

- Used funding from the Long Island Sound Futures Fund, and support from the Quebec Labrador Foundation to remove and suppress invasive plants, experimented with new plantings on hillsides that were at risk of severe erosion, restored seaside goldenrod to nesting areas, and started mapping invasive plants to track our progress.
- Completed vegetation survey that showed that hand-control efforts have reduced the invasive black swallowwort population to a single individual plant, down from thousands of plants that required herbicide applications in the fall for the past 5 years.
- Piloted transplantation of 70 native seaside goldenrod plants from elsewhere on GGI a barren area east of The Boat, suggesting a cost-effective way to restore nesting areas with native, island-adapted plants.
- Completed an all-island vegetation survey to identify all plants on GGI (surprise…Asparagus?)
- Observers logged 431 hours in blinds and detected a total of 1,394 adult Roseate Tern banded in previous years, which included individuals from Connecticut to Nova Scotia.
- Worked with Juliet Lamb of The Nature Conservancy and monitored 20 Common Terns and 24 Roseate Terns fitted with satellite radios. The resulting movement data will help to identify key feeding and roosting areas during the breeding and post-breeding season.
- The tagged Common and Roseate terns were regularly detected foraging 16 miles south of GGI off Montauk Point, 8 miles north by the Thames River near New London, and over 25 miles east in coastal salt ponds in Rhode Island.
- Launched a new Doctor! Jessica Espinosa completed her Ph.D. at UConn, which focused on Roseate Tern nest box preferences and productivity, and projected nest site losses from sea level rise.
- Began a collaboration with Johanna Harvey, a wildlife disease specialist at the University of Rhode Island, to lead our team’s preparation and response to disease.
- Mentored Emily Winslow, a UConn undergrad, as she studied if productivity plot fences deflected hunting Black-crowned Night Herons; her analysis will be completed in Spring 2026.
- Were awarded a $737,000 grant from Long Island Sound Futures Fund to act on threats to the terns on GGI. The funding supports developing and implementing a biosecurity plan, “renovating” the Roseate nest boxes to provide improved conditions for nesting and restoring safer nesting habitat to the “Little Argentina” section of GGI.

Infrastructure

The Dock

In the early 2000’s the dock was replaced twice - once due to age, then due to Superstorm Sandy. The structure has not received maintenance since installation and should be inspected. Additionally, GGI uses several different boats for island shuttles, and each boat has different specifications for bumpering the dock to avoid damage to the boats during docking. New bumpers need to be purchased and installed in 2026.

Living Quarters and Storage Areas

In 2025, there were living spaces (Fig. 1) for 7 biologists on GGI, including 3 cabins, 2 tent platforms, and 2 legacy buildings. The southernmost legacy building was renovated in the Spring 2025, and walls, roofing, windows, and the door were replaced. Construction began in Fall 2025 to convert another tent platform into a cabin, which will be ready for the 2026 field season. The former legacy military buildings (e.g., Death Trap and the Middle Building) previously used for housing volunteers are now only suitable for storage and are rapidly becoming insecure.

Fig. 1. Active facilities on GGI in 2025 included 7 sleeping quarters (yellow polygons, C = cabins, T = tent platforms, no label = legacy building). The SE platform was converted to a cabin during fall 2025. Death Trap and the Middle Building were used for storage only. The Carpenter Shop housed the kitchen, office, workshop, and dry storage. We also had 2 outhouses (red squares).

The roofs of both Middle Building and Death Trap have been leaking for at least 6 years, but part of the roof of Death Trap was blown off by an 80 mph "microburst" during a major thunderstorm in July. Flying plywood panels and shingles killed some Common Tern chicks; luckily, none of the crew were injured. There is now several large section of the roof of Death Trap and Middle Building open to the weather, which will lead to further degradation of the building and an increased hazard in future high winds.

The Carpenter Shop is going into its third year with a temporary roof membrane and is still watertight. Replacement should be a priority. In all three cases, building maintenance is lacking both a plan and funding, and those are critical next steps.

Electricity

In recent years we have been adding solar panels to charge Ecoflow portable battery systems as our primary energy source. The July microburst destroyed one of our larger solar panels, and it was replaced, but installing stronger, ground-mounts for the solar panels is a priority. We have three Honda gasoline powered generators as a back-up energy source.

Refrigeration

The Carpenter Shop has 2 propane refrigerators for storing food for people. In 2024 we added a propane chest freezer specifically for preserving specimens and samples for testing for High Pathogenicity Avian Influenza (HPAI, See *Disease Studies*), and other diseases.

Water

In late 2024, Gerry Hauser installed an outdoor tankless propane-powered water heating system for dishwashing and shower water, a huge improvement that made Gerry *very* popular with the 2025 crew. Thanks to Douglass Marine, from Orient, NT, we also have a 275-gallon water storage tank located at the southern end of the dock. Douglass Marine transports water from Orient Point on their boat and pumps water to our tank once every 3-4 weeks depending on demand. We sanitize the water, then fill our 5-gallon stackable jerrycans from the tank to store in the kitchen. Thus, the longstanding GGI practice of laboriously filling jerrycans on the mainland, shuttling them on the boat, and then loading them onto the dock is at an end.

Blinds

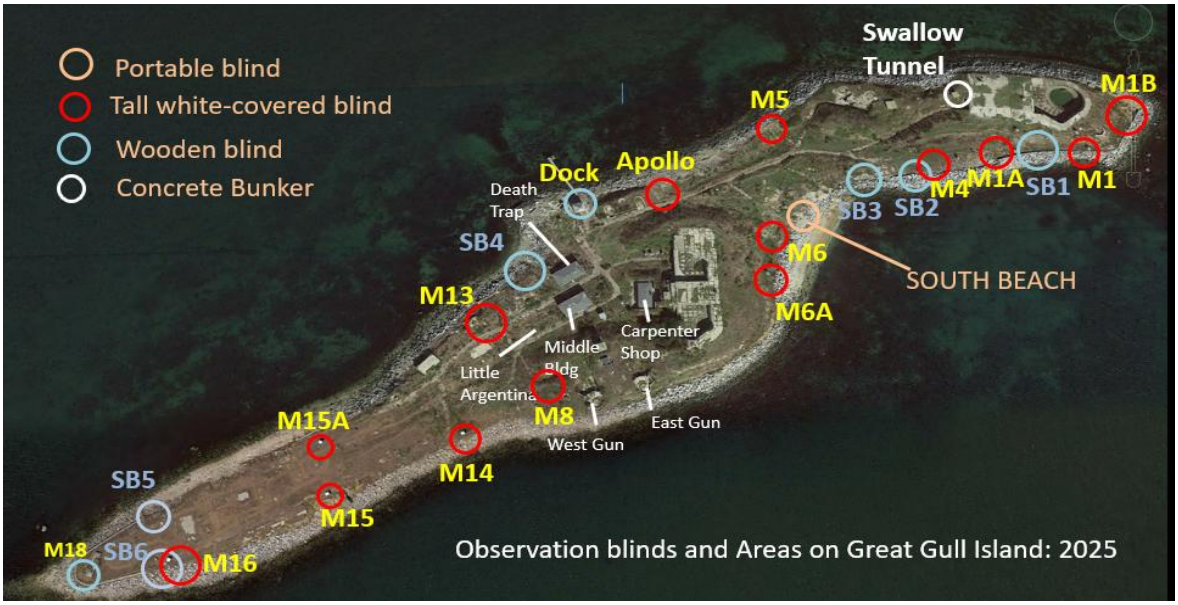

Fig. 2. Locations of 24 blinds used on Great Gull Island in 2025. All were used for resighting adults and fledged chicks, and 8 were used during productivity and provisioning watches.

We used 24 blinds to conduct resighting and observations in 2025 (Fig. 2). These included 6 wooden, sentry boxes (SB), 14 larger blinds with white waterproof vinyl blind covers, 1 portable blind on a wooden platform, 1 observation post in a concrete bunker, and the large Dock blind. In July, the microburst blew the M8 blind into the rocks, and it was too damaged to retrieve. This storm also damaged the M4 blind; its guy lines held, but the wind distorted the frame, making the blind unsafe for use. Rebuilding and securing several blinds is anticipated in 2026.

Fencing Surrounding Gun Emplacements

There are seven legacy gun emplacements on GGI that terns use for nesting that have a significant fall risk for chicks. These areas have rebar embedded in the concrete, and the rebar acts as a support for Tennex plastic fencing with 1-inch square mesh, secured with zip ties. Each spring the fencing, about 0.5km long in total, is inspected and replaced or repaired.

Kabota Tractor

While more than 25 years old, the Kabota continues to be serviceable for vegetation management and moving large items. But despite best efforts at maintenance, a marine environment can wreak havoc on mechanical equipment. We expect the tractor will need a full rebuild, or replacement, within 5 years.

Vegetation Management

In 2025 we continued to pursue a strategy combining herbicide applications and physical control for reducing invasive plants, along with planting native plants, to restore native plants better suited for tern nesting in their breeding areas.

Physical Control/Hand Weeding

In early April, nesting areas are cleared of standing dead tops of the previous year's vegetation using the Kabota tractor with a rake attachment. Preliminary attempts to flatten the dead vegetation with the tractor's bucket to create a mulch layer that would smother wild radish *(Raphanus raphanistrum)* seedlings, was not successful; the dead top material of the seaside goldenrod *(Solidago sempervirens)* plants was too sparse to bury seedlings effectively. Work parties of students from URI hand-weeded around the island edges and the nest box terraces to clear the Roseate Tern nest box entrances of dead vegetation. These preparations cleared the ground so that the herbicide sprays (See *Herbicide Application*) could penetrate the radish seed layer on the ground.

Beginning on May13 and continuing through July 21, technicians hand-weeded invasive plants on a short list of target species (i.e., bindweed *(Calystegia sepium)*, thistle (*Cirsium spp*.), Virginia creeper (*Parthenocissus quinquefolia)*, dewberry (*Rubus flagellaris)*, wild radish (*Raphanus raphanistrum)*, cocklebur (*Xanthium strumarium)*, black swallowwort (*Vincetoxicum nigrum*)) from nesting areas. If possible, plants were pulled or dug out by the roots.

To minimize disturbance or nest displacement once egg laying began, technicians timed and limited weeding sessions to 15 minutes in any one location and left standing vegetation that could not be removed without risk to nests. However, all swallowwort was removed by digging up the root crown, if there was no risk to harming an adjacent tern nest. Removed plants were solarized in heavy duty plastic garbage bags, before being taken off the island for disposal. On average, technicians weeded an hour per day, with breaks for time-sensitive work that required the whole crew (e.g., the multi-day Roseate Tern nest count). Attention was paid to locating and digging up black swallowwort plants before they could flower and set seed.

Focused attention and consistent effort by the technicians on suppressing black swallowwort over the last 5 years has begun to pay off; formerly it was necessary to herbicide swallowwort in the fall, by which time many had already set and spread seed. Now plants are fewer and weaker, and during the Fall 2025 herbicide application it was unnecessary to spray for swallowwort; all but one plant had already been removed.

Mapping and Plant Inventory

Starting in May, technicians did monthly surveys of the thirty, 1-m^2, long-term plant plots established by Peter Paton in 2022 to document the progress of habitat conversion from invasive to native plants.

For the first time in 2025, we also instituted a program of mapping all locations of all invasive plants; from August 8-10, a crew of 4 lined up approximately 2 m apart (i.e., 1 arm-length apart for each observer) and all team members walked simultaneously in a line over the entire island. They used a Survey123 app on their phones to record the species, GPS locations, and size of every patch of invasive plants on the island (Fig. 3). Our goal is to repeat the mapping annually, to provide detailed maps that can be used to target and track the herbicide work more precisely, and to track the effect of herbicide applications over time.

Also, for the first time, in 2025 Bryan Connolly of Eastern Ct. State College visited the island on May 1, and August 10 & 11, and used a random walk technique to produce an inventory of all plant species on the island (Appendix 1), with particular attention to identifying invasive plant species. Bryan, as an expert on the native and invasive plants of New England, has the experience to quickly and correctly identify every plant on the island. His inventory will also be repeated annually and will help ensure that new introductions of invasive plants are recognized early when we can prevent them from spreading and establishing.

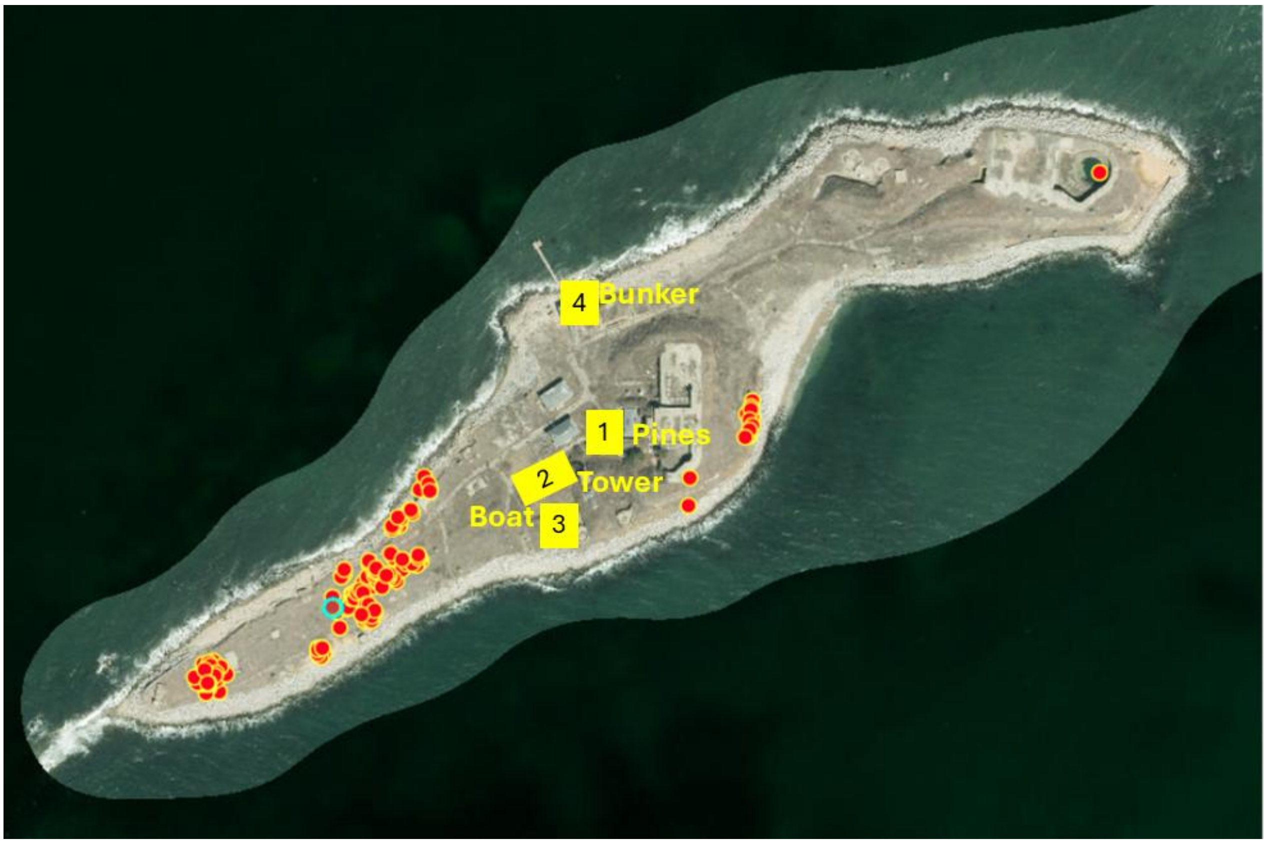

Fig. 3. GPS locations (red dots) of all common reed (*Phragmite australis*) on the island in August 2025. The size of the red spots corresponds to the size of the patch; in this case, all patches represent single plants. The four yellow polygons correspond to key areas with new plantings, or focused herbicide work on poison ivy.

Herbicide Application

David Roach and a crew from All Habitat, Inc. visited the island to conduct herbicide applications to suppress invasive plants twice in 2025. On April 18, the crew applied an herbicide mix formulated to suppress germination of annual plants (e.g., wild radish) over all nesting areas. They also used an herbicide targeted at Asiatic bittersweet (*Celastrus orbiculatus)* vines covering the berm to the south of the Carpenter shop, from the Tower to the east end of the Pines area, and anywhere at the foot of berms where bittersweet vines were encroaching onto nesting areas (Fig. 3, Area 1). The westward end of that berm (to the west of the Tower) had been cleared of bittersweet using the same herbicide in 2024 (See *Planting*)(Fig. 3, Area 2). The crew returned to the island on September 22, and using maps of invasive plant locations (see *Mapping*) applied herbicides to patches of common reed, regenerating patches of bittersweet on the hillsides targeted in the spring, and the poison ivy (*Toxicodendron radicans)* on the sides and top of the bunker just east of the dock (Fig. 3, Area 4). The crew was prepared to herbicide any black swallowwort they located, but only a single, weak plant was detected under a board and was dug up instead.

Planting Native Vegetation

We began planting native plants into areas cleared of invasive plants in Fall 2024, when the All Habitat crew planted 500 little bluestem (*Schizachyrium scoparium*) plugs into the cleared berm west of the Tower. This grass was chosen because it is known to stabilize soil, has a clumping growth habit and is relatively short, thus could still allow terns to nest among the plants. During a visit on May 1, it appeared that those plants had not been successfully established. On May 13 we therefore planted 350 beach grass (*Ammophila brevigulata);* also known to be an excellent soil stabilizer, plugs in among the original plantings on that berm (Fig. 3, Area 2), along with 150 bearberry (*Arctostaphylos uva-ursi*) plugs on the cleared banks of the Boat platform (Fig. 3, Area 3). The goal of all these plantings was to stabilize the soil on slopes where erosion has been severe; until we can reliably stabilize cleared hillsides, we cannot proceed further with removal of bittersweet vines. By August, it was clear that little bluestem plants *had* established on the north face of the berm, but not on the south face of the berm; conversely, the beachgrass established successfully on the south face of the berm, but not the north face.

We will continue to investigate methods and native plants best suited to soil stabilization; we hope to find a single method that works on all hillsides. Nonetheless, clearing the berm of bittersweet opened habitat; in June and July of 2025, many Common Tern chicks were observed running up the slope of the berm to hide in the grasses every time the crew was passing by.

On the May 1 visit to the island, we also conducted a pilot transplantation of seaside goldenrod plants. The team dug up and split large, established (but just emerging) rosettes of seaside goldenrod, split them into 80 separate plants, and transplanted them 2 feet apart in the nesting area east of the Boat (Fig. 3, Area 3), where no vegetation had regenerated since it was cleared of invasive mustard with herbicides 5 years earlier. All plants survived and at least doubled in size; Common Terns established nests at the base of one-third of them. The success of this pilot demonstrates that establishment of goldenrod can be accelerated in areas with no cover for the Common Terns through splitting and transplanting established *plants*. Common Tern Breeding Biology

Common Tern All-island Census

Methods

On 2 June 2025, 28 biologists conducted a census of Common Tern nests on Great Gull. The goal was to count all Common Tern nests during the peak of the nesting season just prior to when eggs started to hatch.

To conduct the census, we had one boat bring over 20 observers from New London (Aubrey Joy, 48' charter boat captained by Seth Megargle) and another boat from Orient Point bring 4 observers (Redfish, Douglass Marine, Adam and Peter Douglass captains). Both boats arrived about 8 AM and after a brief orientation, the biologists were divided into 5 teams of 5-6 observers who surveyed 8 areas on the island (Fig. 4). Each team was led by a biologist with years of experience on Great Gull, and all observers had experience in a tern colony.

Each team lined up approximately 2 m apart (i.e., 1 arm-length apart for each observer) and all team members walked simultaneously in a line searching for nests. The team leader's role was to ensure that all team members remained in this line throughout the survey. When a Common Tern nest was detected, the closest observer used the Survey123 App on their phone to record two variables: nest location and clutch size. Observers then placed an unmarked popsicle stick in the ground ~15cm away from the nest on the opposite side of the observer. Teams searched systematically along transects through their sections.

Observers were instructed to only record the locations of known Common Tern nests. If observers were unsure if a nest was a Common or Roseate Tern nest, they left the nest unmarked. During the subsequent Roseate Tern All-Island census from 3-6 June, the Roseate Tern crew determined the status of unmarked nests. We had the Common Tern observers assume that all nests in nest boxes, under rocks, or under thick vegetation were Roseate Tern nests unless it was clear the nest was a Common Tern nest due to clutch size, egg characteristics, or the presence of incubating Common Terns.

Fig. 4. Eight census areas searched for Common Tern nests on 2 June 2025 by 5 teams of biologists. The census took 28 biologists from approx. 9 AM to 3:30 PM including a lunch break.

A total of **11,190** nests were detected, with an average clutch size of 2.17 (SD = 0.61) (Table 1, Fig 5).

Table 1. Clutch size of Common Tern nests during the all-island census on 2 June 2025

Clutch size	Number of nests	% of nests
1	1,240	11.08
2	6,838	61.11
3	3,088	27.6
4	22	0.2
5	2	0.02
Total	11,190	

Fig. 5. GPS locations of 11,190 Common Tern nests detected on GGI during the all-island census on 2 June 2025. Map by Alison Kocek, USFWS Coastal Program

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Biologists celebrate the end of the Common Tern All-Island Census. J Walsh.

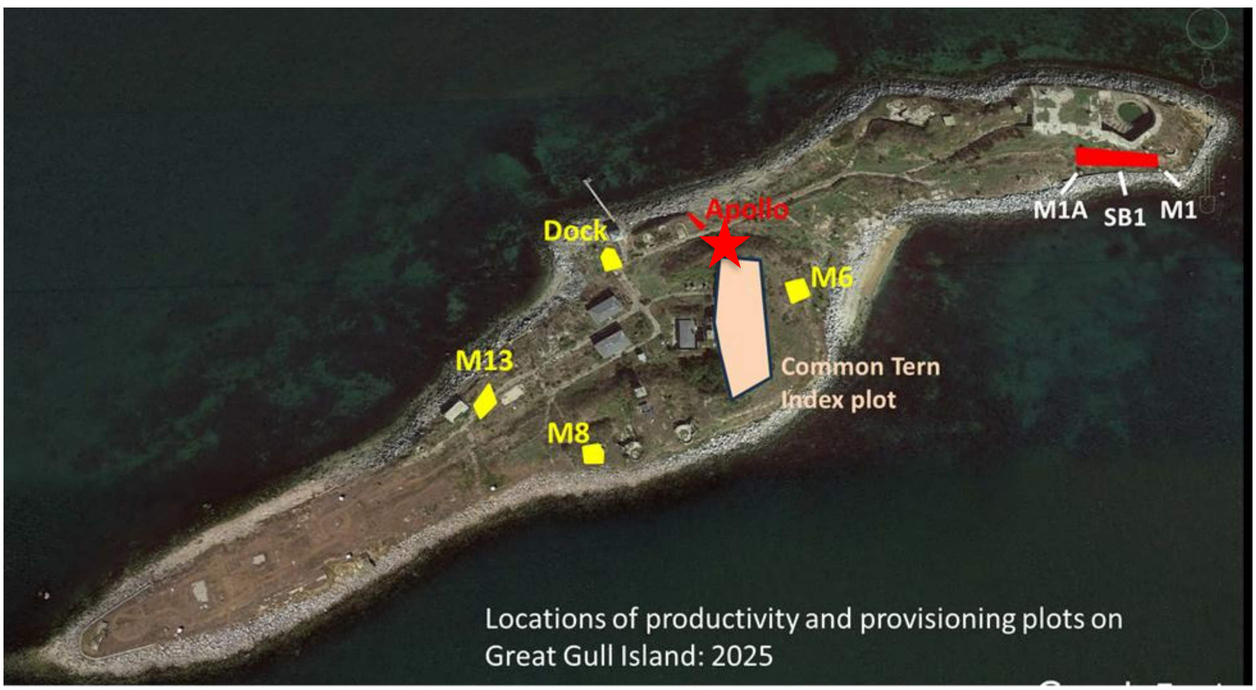


Fig. 6. Location of Productivity Plots and Common Tern Index Plot in 2025 on Great Gull Island. Common Terns (yellow) were monitored at Dock, M13, M8 and M6, while Roseate Terns (red) were monitored from blinds at Apollo the southeast corner of the island (M1A, M1, and SB1). Also shown is the Index Plot used to census Common Terns annually. The Pathtrack base station (red star) was downloaded at ~two-week intervals.

Common Tern Index Plot

Since we do not conduct an annual all-island census for nesting Common Terns on Great Gull, we do have an "Index Plot" on the concrete pad "upstairs" (Fig. 6) where we count all Common Tern nests annually to assess annual variation in the number of terns nesting on the island. In 2025, we counted 551 Common Terns in the Index Plot compared to 492 in 2024. Common Tern clutch size in 2025 was smaller than in 2024: average clutch size in 2025 on the Index Plot was 2.15 (SD = 0.61) eggs per clutch, compared to 2.42 (SD =0.61) in 2024 (Fig. 7).

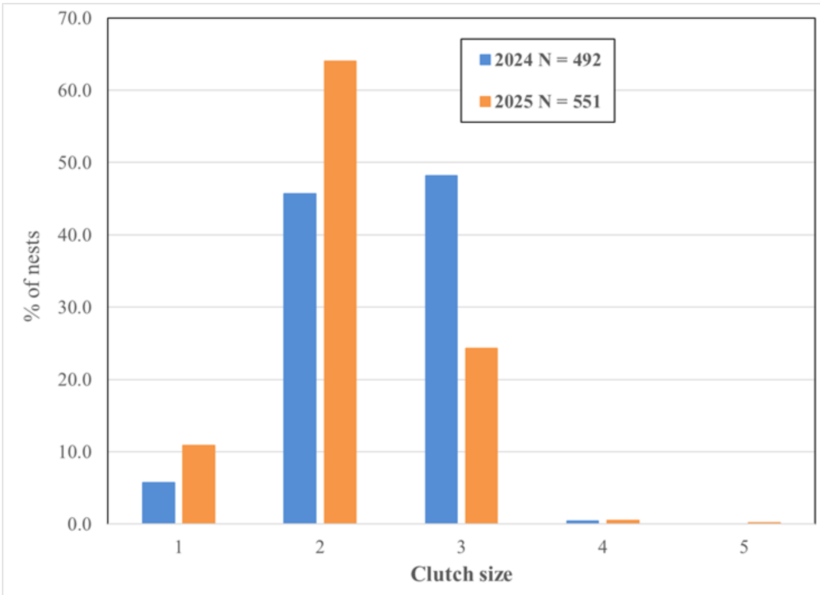


Fig. 7. Annual variation in clutch size at Common Tern nests located in the Index Plot between 2024 and 2025.

Common Tern Productivity Plots

Fig. 8. A section of the M6 Common Tern Productivity Plot. Nests are marked with brightly painted markers, including the nest number and number of eggs in the clutch. The tall yellow marker with the orange tent stake is a marker for the permanent vegetation plots. J. Walsh.

Methods

In 2025, we monitored productivity plots every other day from 15 May to 7 July. We monitored 4 Common Terns productivity plots: Dock, M8, M13, and M6) in 2025 (Fig. 6). Common Tern productivity plots were generally surrounded by Tennex 18" tall green plastic 1" mesh garden fence, held in place with 3' tall rebar, and the perimeters were ~30-45m (Fig. 8). The Dock was an exception and used solid wooden borders. Once all Common Tern chicks were banded within each plot, fencing was removed to allow chicks to roam.

We assessed the productivity of Common Terns on 4 plots on Great Gull in 2025: 1) SW of the Dock blind (12 pairs with no transmittered adult, 7 pairs with 1 transmittered adult), 2) W of the M6 blind (10 pairs with no transmittered adult, 5 pairs with a transmitter adult), 3) S of M8 blind (14 pairs with no transmittered adult), and 4) SE of M13 blind (11 pairs with no transmittered adult, 8 pairs with a transmittered adult). At all 67 nests, we banded all chicks at nests we followed. Nests with no telemetered parents are control nests, and nests with telemetered parents are treatment nests.

Egg laying, survival, and hatching was monitored by checking every marked nest in the plot every other day; once chicks were banded, their survival was monitored by resighting them from blinds every other day. After the M8 blind was destroyed in July, chick survival was monitored with a spotting scope from the deck of the room behind the Tower (Fi. 3).

During nest initiation and incubation, we walked each plot with 1-2 observers recording new nests (which were marked with a uniquely numbered tongue depressor, and a large easy-to-read nest marker, Fig. 8), changes in clutch size, and when eggs hatched. At hatching, we banded all chicks with a USGS band, a unique Plastic Field Readable (PFR) band, and weighed each chick on a digital scale; we did not take any other measurements of chicks. During banding, we typically had one designated bander, one recorder, and one person searching for chicks to band.

Chronology

Within these 4 plots, control Common Terns nests were initiated on average on 22 May (SD = 3.5 days), range = 15 May to 1 June for nests we monitored (Fig. 9). There were some nests in the plot initiated after 1 June, but we did not monitor those later nests. Eggs hatched on average on 13 June (SD = 3.5; range from 6 June to 25 June), and chicks fledged on average on 8 July (SD = 3.1 days); range = 3 to 15 July.

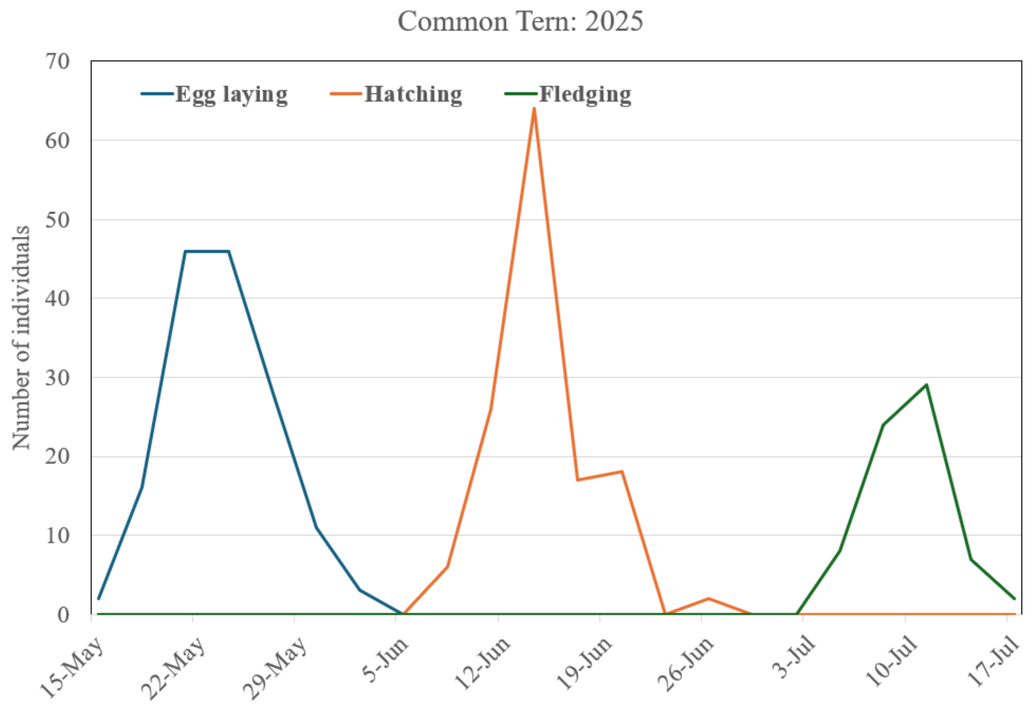


Fig. 9. Breeding chronology of Common Terns on GGI productivity plots in 2025.

In 2025, we banded 124 Common Tern chicks in 63 nests on the 4 productivity plots. (Table 2). Average weight of these chicks at banding was 17.6 g (SD = 4.3, N = 123). Banding occurred between 7- 20 June, with 83% of chicks banded between 10 – 18 June. We did have one Common Tern chick die for unknown causes during banding – otherwise Common Tern chick banding went well in 2025.

Table 2. Total number of Common Terns chicks banded on Great Gull in 2025.

Plot	Number of nests	A-chick	B-chick	C-chick	Total
Dock	16	15	13	4	32
M13	19	19	14	2	35
M6	15	15	12	2	29
M8	13	13	13	2	28
Total	63	62	52	10	124

Productivity Estimates

In 2025, average Common Tern clutch size on all plots was 2.26 eggs/nest (SD =0.44) for nests where neither parent had a transmitter. On average, 1.91 eggs hatched per nest and 1.09 chicks fledged per nest (Table 3). There was some variation among plots in fledging rates for nests where neither parent had a transmitter, ranging from a low of 1.0 fledglings per nest at the Dock plot and M8 plot to 1.27 fledglings per nest at the M13 plot (Tables 4-7). We define fledging here as the observation of sustained flight or observing the banded chicks alive 26 days after hatching.

Table 3. Overall productivity metrics for Common Terns nesting on all 4 productivity plots on GGI in 2025.

	Clutch size		Eggs hatched per nest		Chicks fledged per nest	
	Not tagged	Tagged	Not tagged	Tagged	Not tagged	Tagged
Average	2.26	2.40	1.91	2.10	1.09	0.95
SD	0.44	0.60	0.69	0.85	0.58	0.60
Number of nests	47	20	47	20	47	20
Total number of eggs/chicks	106	48	90	42	51	19

Table 4. Productivity metrics for Common Terns nesting at the Dock plot on GGI in 2025.

	Clutch size		Eggs hatched per nest		Chicks fledged per nest	
	Not tagged	Tagged	Not tagged	Tagged	Not tagged	Tagged
Average	2.25	2.43	1.89	2.29	1.00	1.14
SD	0.45	0.53	0.90	0.49	0.74	0.69
Number of nests	12	7	12	7	12	7
Total number of eggs/chicks	27	17	19	16	12	8

Table 5. Productivity metrics for Common Terns nesting at the M6 plot on GGI in 2025.

	Clutch size		Eggs hatched per nest		Chicks fledged per nest	
	Not tagged	Tagged	Not tagged	Tagged	Not tagged	Tagged
Average	2.40	2.40	2.20	2.00	1.10	1.00
SD	0.52	0.55	0.63	1.00	0.57	0.71
Number of nests	10	5	10	5	10	5
Total number of eggs/chicks	24	12	22	10	11	5

Table 6. Productivity metrics for Common Terns nesting at the M8 plot on GGI in 2025.

	Clutch size		Eggs hatched per nest		Chicks fledged per nest	
	Not tagged	Tagged	Not tagged	Tagged	Not tagged	Tagged
Average	2.21		2.14		1.00	
SD	0.58		0.53		0.55	
Number of nests	14		14		14	
Total number of eggs/chicks	31		30		14	

Table 7. Productivity metrics for Common Terns nesting at the M13 plot on GGI in 2025.

	Clutch size		Eggs hatched per nest		Chicks fledged per nest	
	Not tagged	Tagged	Not tagged	Tagged	Not tagged	Tagged
Average	2.00	2.38	1.82	2.00	1.27	0.75
SD	0.00	0.74	0.40	1.07	0.47	0.46
Number of nests	11	8	11	8	11	8
Total number of eggs/chicks	22	19	20	16	14	6

Roseate Tern Breeding Biology

Roseate Tern All-Island Census

From 3 to 5 June 2025, 5 biologists (Margaret Rubega, Cindy Barreto, Jessica Espinosa, Catherine McGrath, and Ava DiMauro) surveyed GGI for Roseate Tern nests, compared to 5 to 7 June in 2024. This team censused a total of 2,331 Roseate Tern nests during peak count, which represented a record high number of nests detected on GGI since 1977 (Fig. 10). In 2025, the average clutch size was 1.68 eggs per clutch (SD = 0.48), maximum = 3 eggs. This is compared to an average clutch size of 1.75 eggs per clutch (SD = 0.48), maximum = 4 eggs during the 2024 census.

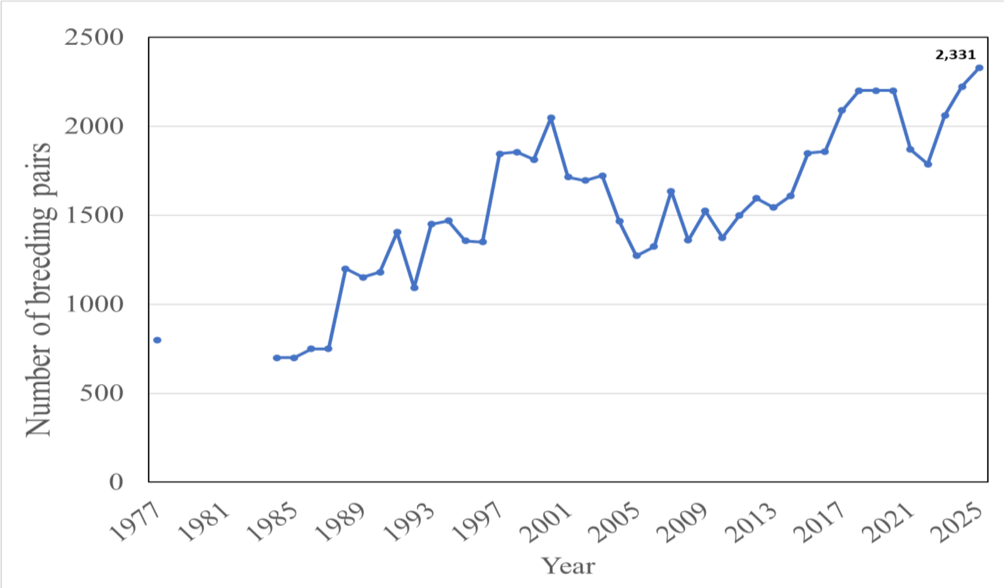


Fig. 10. Annual variation in the number of breeding pairs of Roseate Terns censused on Great Gull Island during the peak count from 3-5 June 2025. There was a record high number of breeding terns on Great Gull in 2025.

In 2025, as in previous years, Roseate Terns nested around the perimeter of Great Gull (Fig. 11). For the first time, nest boxes exceeded rocks as the primary microhabitat used by Roseate Terns, accounting for ~38% of all nests in Great Gull. This represented an increase of 151 nests in nest boxes from 2024 (Table 8). There appeared to be shifts in nest microhabitat selection between 2024 and 2025. The number of nests detected in the rocks declined by 149 nests, accounting for ~23% of nests on the island. The number of nests in the open increased by 158 nests and accounted for 24% of all nests.

Fig. 11. Locations of 2,331 Roseate Tern nests in nest boxes and other microhabitats detected during the all-island census from 3-5 June 2025. Map created by Alison Kocek, USFWS Coastal Program

Table 8. Nesting microhabitats used by Roseate Terns on the peak count census in 2024 and 2025.

	Number of nests		% of nests	
Nest habitat	2024	2025	2024	2025
Cement	126	79	5.7	3.4
Debris	99	56	4.5	2.4
Log	41	44	1.8	1.9
Nest Box	728	879	32.7	37.7
Not recorded	5		0.2	0.0
Open	391	549	17.6	23.6
Pipe	12	5	0.5	0.2
Rocks	681	532	30.6	22.8
Vegetation	140	187	6.3	8.0
Grand Total	2223	2331		

The current recovery plan for the Roseate Tern has a management goal of establishing a total of 6 colonies with over 200 pairs. There are only three Roseate Tern colonies in the NW Atlantic with over 200 nesting pairs – GGI, and Bird and Ram Islands in Buzzard's Bay, MA. Over the past two decades, Great Gull had more breeding pairs of Roseate Terns than any other colony in the region (Fig. 12). Great Gull accounted for 35-50% of the NW Atlantic population of breeding Roseate Terns from 2004-2024; the GGI population accounted for ~36% of the overall population in 2024. Major restoration efforts on Bird Island, MA resulted in a large increase in the number of breeding pairs over the past 5 years, suggesting restoration efforts can increase the size of the colonies.

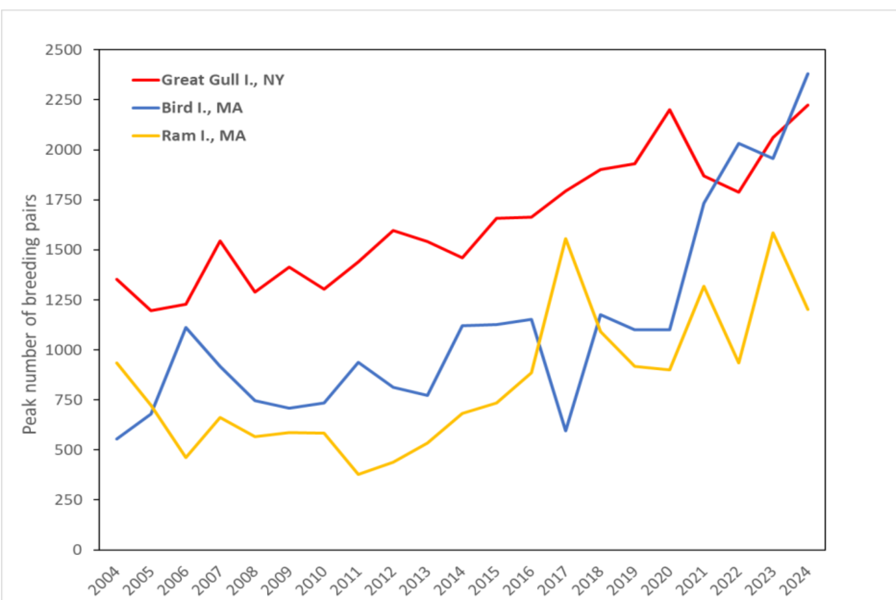


Fig. 12. Annual variation in the number of breeding pairs of Roseate Tern in the three major colonies in the NW Atlantic from 2004-2024. Data for 2025 for other colonies were not available when this report was prepared.

Roseate Tern Productivity

Methods

Roseate Tern chick in a nest in the revetment

Roseate Tern productivity plots, all on nest box terraces, were not fenced; otherwise, monitoring was conducted in the same manner as Common Terns. In 2025, we monitored 72 Roseate Tern nests on 2 productivity plots on Great Gull, one plot W of the Apollo blind, and one plot N of the M1A, SB1, and M1 blinds. We only monitored nests where both the A- and B-chick were banded, or where the single A-chick was banded. A total of 56 nests we monitored had parents with no transmitters, while 16 nests had at least one parent with a transmitter. At all monitored Roseate Tern nests, we banded the entire clutch once hatched and monitored each nest every other day

In 2025, we banded 131 Roseate Tern chicks in their nests between 8-16 June (114 were banded between 13-16 June); average weight at banding was 20.6 g (SD = 5.9, N = 131). Most (73%) chicks were banded in the SE nest box terraces near the M1A, SB1, and M1 blinds, with 19% banded in terrace by the Apollo blind (Fig. 3, Table 9). We banded primarily A-chicks (71% of chicks banded) and were permitted by the USFWS Endangered Species office to band 200 chicks in 2025. However, two newly hatched chicks (17 g and 14.1 g on 15 and 16 June, respectively) died while being banded, so we ceased all banding of Roseate Tern chicks after 16 June. Both chicks that died appeared healthy but started to gasp for air while being processed.

Table 9. Total number of Roseate Terns chicks banded on GGI in 2025.

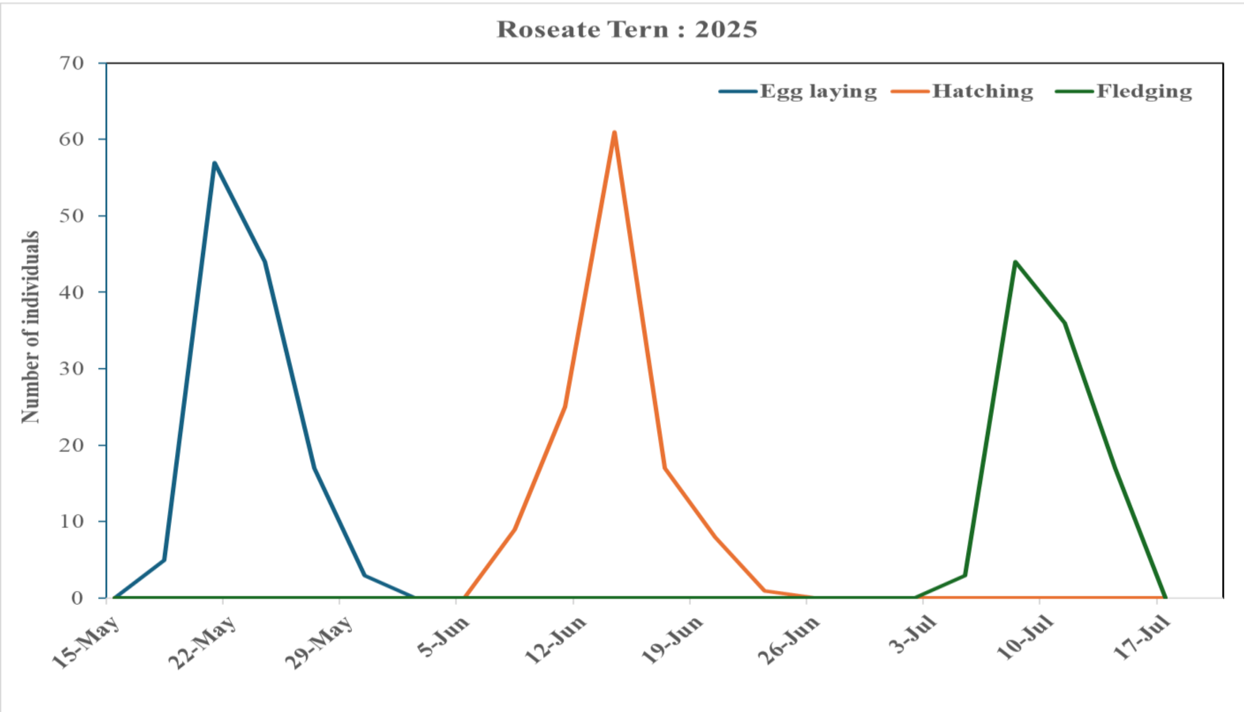
Blind	A-chicks	B-chicks	Total
Apollo	18	7	25
SE Terraces	68	28	96
M5	7	3	10
Total	93	38	131

Chronology

The average egg laying date for Roseate Tern nests on productivity plots was 17 May (SD = 2.5 days, range = 17 to 30 May (Fig. 13). Eggs hatched on average on 12 June (SD = 2.8 days; range = 6 to 21 June), and chicks fledged on average on 8 July (SD = 2.2 days; range = 3 to 13 July)

Fig. 13. Breeding chronology of Roseate Terns on 2 productivity plots on GGI in 2025.

Productivity Estimates



In 2025, average clutch size for Roseate Terns in productivity plots was 1.8 eggs/clutch (SD = 0.43) for nests where neither parent had a transmitter. An average of 1.7 eggs hatched per nest, and 1.45 chicks fledged per nest (Table 10). Roseate Terns tended to have slightly smaller clutches by the Apollo blind (Table 11) than nests at the SE corner of the island by the M1A, M1, SB1 blinds (Table 12).

Table 10. Overall productivity metrics for Roseate Terns nesting on 2 productivity plots on GGI in 2025.

	Clutch size		Eggs hatched per nest		Chicks fledged per nest	
	Not tagged	Tagged	Not tagged	Tagged	Not tagged	Tagged
Average	1.77	1.69	1.70	1.63	1.45	1.19
SD	0.43	0.48	0.46	0.50	0.50	0.54
Number of nests	56	16	56	16	56	16
Total number of eggs/chicks	99	27	95	26	81	19

Table 11. Productivity metrics for Roseate Terns nesting at the Apollo plot on Great Gull Island in 2025.

	Clutch size		Eggs hatched per nest		Chicks fledged per nest	
	Not tagged	Tagged	Not tagged	Tagged	Not tagged	Tagged
Average	1.67	1.67	1.58	1.50	1.33	1.17
SD	0.49	0.52	0.51	0.55	0.49	0.41
Number of nests	12	6	12	6	12	6
Total number of eggs/chicks	20	10	19	9	16	7

Table 12. Productivity metrics for Roseate Terns nesting at the SE Terrace plot by M1A, SB1, and M1 blinds on GGI in 2025.

	Clutch size		Eggs hatched per nest		Chicks fledged per nest	
	Not tagged	Tagged	Not tagged	Tagged	Not tagged	Tagged
Average	1.80	1.70	1.73	1.70	1.48	1.20
SD	0.41	0.48	0.45	0.48	0.51	0.63
Number of nests	44	10	44	10	44	10
Total number of eggs/chicks	79	17	76	17	65	12

Provisioning

Introduction

There are many biotic and abiotic factors that can affect productivity in the GGI colony. Adult condition, disease, or hypothermia during multi-day rain events are just a few of the factors that can drive chick mortality. Successful fledging of tern chicks requires a significant food resource for both the adults and young, and at GGI we monitor the number and type of prey items brought by the parents to feed the chicks at our focal productivity nests.

Methods

In 2025, we had 13 observers conducting provisioning observations from blinds to assess prey delivery rates and the species of fish being fed chicks. Blind stints occurred between 8 June and 7 July 2025. Observers conducted provisioning watches from blinds for 60 min observation periods. In 2025, data were recorded on paper data sheets and entered in a database that afternoon or evening. Observers generally watched up to 3 randomly selected nests during their 60 observations, although a few observers watched up to 5 nests simultaneously. Observers tried to watch nests without and without a parent who had a GPS transmitter during the same session to help assess potential impacts of transmitters on provisioning rates. All nest watched had PFR bands on chicks.

Observers recorded start and stop times of observation, species, nest number, known number of chicks in the nest, prey species and size (length relative to bill size) when possible, whether the chick or parent ate the prey or prey was stolen buy another adults, and the identity of the chick that ate the prey and the identity of the parent that delivered the prey when possible.

Results

Effort

Observers spent a total of 221.5 hrs in 8 blinds in 2025 quantifying provisioning rates of Common and Roseate Terns (Table 13). In 2025, observers monitored Common Terns feeding rates from blinds at the Dock, M8, M13, and M6 for a total of 132.5 hrs (Tables 13 and 14). Roseate Terns were monitored at blinds at Apollo, and the southeastern side of Great Gull from blinds at M1A, M1and SB1 for a total of 86.1 hrs. When provisioning observations occurred, there were an average of 4.5 observers (SD = 1.8, maximum = 8) per day conducting observations, with an average of 7.6 (SD = 3.6) observation hours per day (Fig. 14).

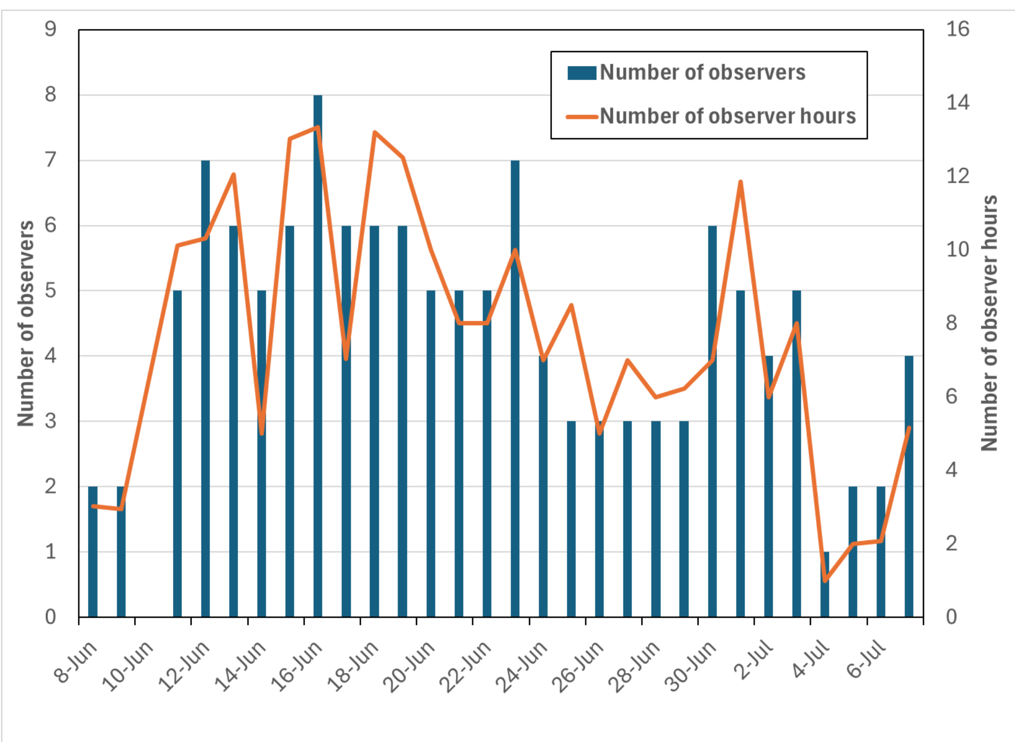


Fig. 14. Daily variation in the number of observers (blue bars) and observation hours (orange line) assessing provisioning rates of Common and Roseate terns on Great Gull Island in 2025.

Table 13. Summary of number of hours that observers monitored provisioning rates of terns on Great Gull in 2025.

ROST observations		COTE observations	
Blind	Hours	Blind	Hours
Apollo	35.2	Dock	47.2
M1A	23.0	M8	29.6
M1	11.0	M13	27.4
SB1	17.0	M6	28.3
Total	86.2		132.5

Common Tern Provisioning Rates

Observers monitored prey delivery rates (prey per hour per nest) at Common Tern nests from 8 June to 7 July 2025, where they conducted 333 1-hr observations of nests. The average prey delivery rate was 1.63 (SE = 0.08) prey per hr. per nest (Fig. 15). Although this rate fluctuated, it appeared to remain relatively constant throughout the 2025 field season. Sand lance and bay anchovies were the two most common prey items for Common Terns in 2025 based on these observations (Table 14).

Common Tern feeding chicks. Megan Gray.

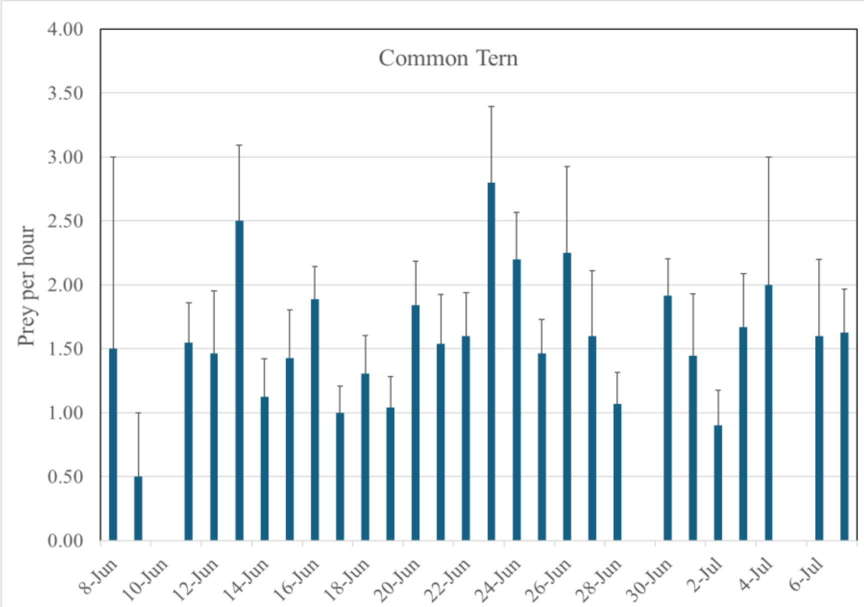


Fig. 15. Daily variation in prey delivery rates (prey per hour per nest) at Common Tern nests on Great Gull Island in 2025. This graph was not corrected for the number of chicks in each nest.

In 2025, observers collected provisioning data at 61 different Common Tern nests, with an overall average of 5.5 (SD = 4.0) 1-hour observation stints at each nest over the course of the field season (Table 14). There was considerable variation in the number of 1-hour observation stints conducted at individual nests, with some just visited once while one nest had 19 1-hour observation stints. The Dock blind had considerably more observation stints than other plots, with almost twice as many observation stints as M6 for example (Table 14).

Table 14. Summary of observer effort to monitor provisioning rates by Common Terns at 4 productivity plots on GGI in 2025.

Category	Dock	M13	M6	M8	Overall
Number of nests observed	17	16	14	14	61
Average number of 1-hr stints per nest	7.2	4.4	4.6	5.4	5.5
SD number of 1-hr stints per nest	4.0	3.6	3.0	2.8	4.0
Max number of stints at a nest	19	13	9	12	19
Total number of 1-hr stints	123	70	65	75	333

There were no differences in the provisioning rates of Common Terns in the different plots on Great Gull in 2025 (Kruskal-Wallis ANOVA, H = 0.48, df =3, P = 0.924) (Fig. 16). Sand lance and bay anchovy were the primary prey items delivered to Common Tern chicks in 2025 (Table 15).

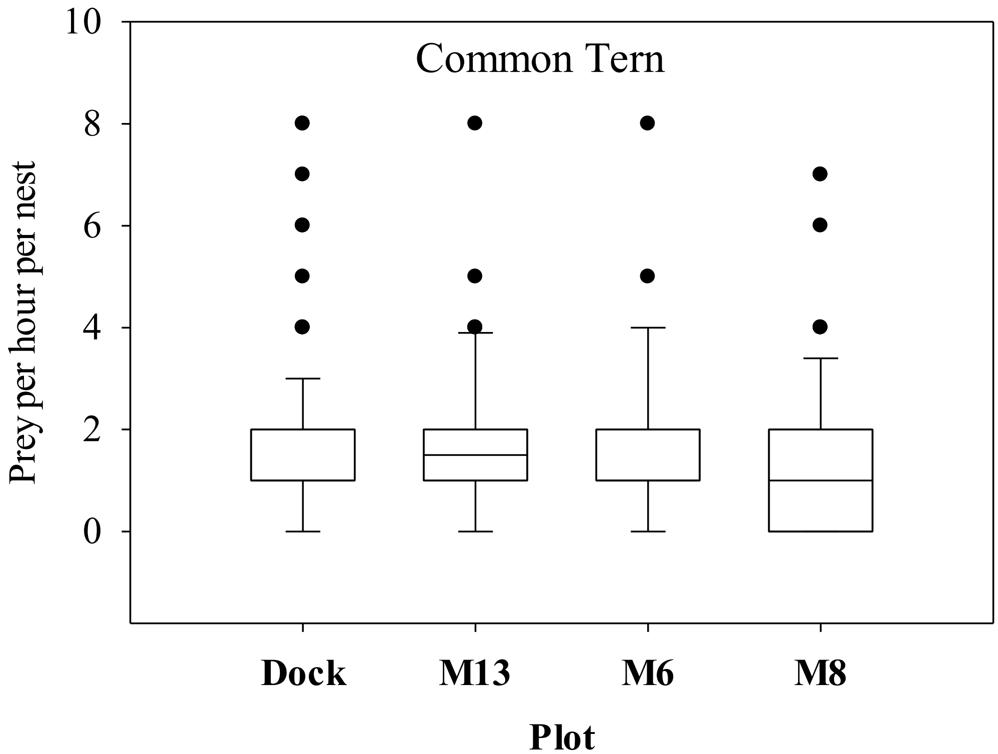


Fig. 16. Differences in the provisioning rates of Common Terns on 4 productivity plots on Great Gull Island in 2025. Shown are the median (75th and 90th percentiles) of the number of prey delivered per hour per nest during observations conducted from 8 June to 7 July 2025 (see Table 15 for sample sizes).

Table 15. Total number and percentages of different prey species delivered to Common Tern (COTE) and Roseate Tern (ROST) nests in 2025.

Prey	COTE	ROST	COTE %	ROST %
Sand Lance	285	169	54.9	70.4
Bay Anchovy	76	23	14.6	9.6
Butterfish	15		2.9	0.0
Atlantic Herring	10	4	1.9	1.7
Atlantic Mackerel	24		4.6	0.0
Insect	1		0.2	0.0
Unknown	108	44	20.8	18.3
Grand Total	519	240		

Roseate Tern Provisioning Rates

From 8 June to 7 July 2025, observers collected 227 1-hr. observations at 66 different Roseate Tern nests. The overall average prey delivery rate was 1.08 (SD = 0.99) prey per hr. per nest. Prey delivery rates tended to be relatively constant over the course of the field season (Fig. 17).

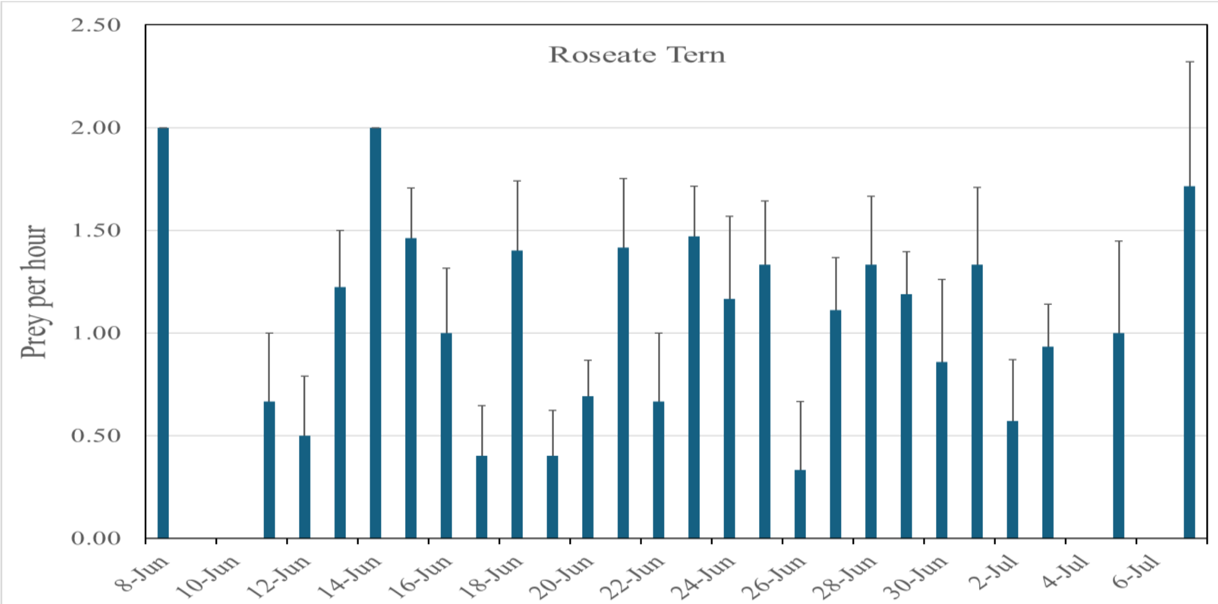


Fig. 17. Daily variation in prey delivery rates (prey per hour per nest) at Roseate Tern nests on Great Gull Island in 2025. This graph was not corrected for the number of chicks in each nest.

In 2025, observers monitored provisioning rates at 74 Roseate Tern nests, with 22 on the terraces near the Apollo blind and 52 nests near the SE Terraces (from blinds at M1, SB1, and M1A) (Table 16). Individual nests were monitored an average of 2.99 (SD = 2.6) times over the field season, with one nest sampled 13 times, while many were surveyed only once.

Table 16. Summary of observer effort to monitor provisioning rates by Roseate Terns from 4 blinds at 2 productivity plots on GGI in 2025. The SE terraces took 3 blinds (M1A, M1, and SB1) to monitor.

Category	Apollo	M1A	M1	SB1	SE terraces	Overall
Number of nests	22	25	12	15	52	74
Average number of 1-hr stints per nest	4.46	2.36	2.17	2.8	2.8	2.99
SD number of 1-hr stints per nest	3.44	1.91	1.59	2.43	2.4	2.64
Max number of stints at a nest	13	7	4	8	8	13
Total number of 1-hr stints	98	59	26	42	127	225

There was no difference in prey delivery rates (prey per hour per blind) among the 3 blinds by the SE terraces (Kruskal-Wallis Rank ANOVA, $H = 0.37$, $df = 2$, $P = 0.83$) (Fig.). When the prey delivery rates were compared between Apollo and the SE terrace, they failed the normality test ($P < 0.050$), therefore a Mann-Whitney Rank Sum test was used to compare these two plots. There was a difference in prey delivery rates between Apollo and the SE Terraces ($T = 12156$, $P = 0.019$) in 2025.

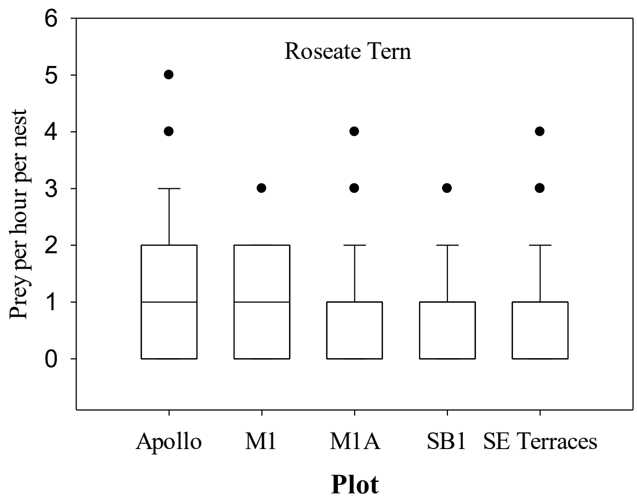


Fig. 18. Differences in the provisioning rates of Roseate Tern at 4 blinds on GGI in 2025. The SE Terraces represent data pooled from 3 blinds (M1, M1a, and SB1). Shown are the median (75^{th} and 90^{th} percentiles) of the number of prey delivered per hour per nest during observations conducted from 8 June to 7 July 2025 (see Table 18 for sample sizes).

Fecal DNA Sampling

Introduction

Provisioning gives an estimate of the diet of the chicks, but there is error in that estimate. Fish identification is difficult given the fast pace of the feeding events, and many provisioning events are recorded as a fish, but an unknown species. Fish DNA survives gut passage for both young and adult birds and collecting fecal material from terns is straightforward.

Methods

Fecal material is collected from adult terns by walking through the colony wearing new outerwear (e.g., surgical gowns, plastic hat covers, or Tyvek suits), and collecting feces deposited on the clean material.

For chicks, the young are held over a clean surface of aluminum foil and given 1 minute to defecate. Fecal material is collected from the aluminum foil. After the fecal material is collected, the foil is replaced, or, in the case of plastic outerwear, the stained area is cleaned with 70% ethanol to reduce contamination with subsequent samples.

Technicians wear clean gloves to collect each sample, and gloves are changed between samples. The technician uses a new wooden coffee stirrer to remove solids from the sample, and the solids are deposited in a tube with Zyno Bashing Bead buffering solution, and marked with species, age, sample date, and sample number.

Samples are stored at room temperature until they are returned to the mainland for DNA amplification and extraction.

Results

A total of 37 samples were collected from Common Terns and 24 samples from Roseate Terns in 2024 (Table 17). The 2024 and 2025 sample results are not available at the time of the report and will be updated in an addendum.

Table 17. Summary of the total number of fecal DNA samples collected by species and age class during 2024 and 2025.

Species - age	2024	2025
Common Tern		
Adult	70	36
Chick	27	11
Roseate Tern		
Adult	31	5
Chick	24	20

Mortality estimates

Methods

In 2025, as in previous years, we monitored relative mortality rates by conducting a systematic walking transect to the east and west ends of Great Gull (Fig. 19). Our transects ran along the major open pathways. Virtually all carcasses are Common Tern chicks of various age classes. Many direct observations at nests show that Common Terns will pick up a dead, dying, or trespassing chick, fly away, and drop it elsewhere, thus we treat these transects an index to island-wide mortality. The lack of Roseate Tern mortalities on the transects could either reflect lower mortality rates than among Common Terns, Roseate Terns do not move dead chicks away from nests in the same manner, or dead Roseate Terns might be being disposed of somewhere less detectable. On the latter point: on 21 June 2025, Becca

Kusa observed a Roseate Tern attack a chick near its box nest on the M1A terrace, then pick it up, fly it out over the ocean, and drop it. This suggests that our existing transects likely do not provide an index to Roseate Tern chick mortality, unless mortality rates in Common and Roseate terns are about equal.

Transects were walked in the late afternoon hours, every other day, from 19 June to 20 July. When a carcass was found, the observer recorded the estimated age of the individual, as well as the decay status of the carcass, in a Survey123 app on their phone. Carcasses were then buried nearby in the soil adjacent to the transect where they were found.

Results

We detected an average of 32.8 (SD = 23.7, total number of carcasses = 1,130) carcasses per survey in 2025 All carcasses were Common Terns and most found in June 2025 were chicks that were <3 days old. Starting in July, carcasses tended to consist of older chicks and by mid-July many dead fledglings started to be detected (Fig, 20). In addition, an anecdotal transect survey on August 7 and a search of the Sahara and an area the same size in the revetment West of the M1A blind on 10 August detected an additional 130 and 147 carcasses, respectively (Fig. 20). By early August, virtually all the carcasses were fledglings that presumably starved due to the lack of fish being brought to the island starting in mid-July.

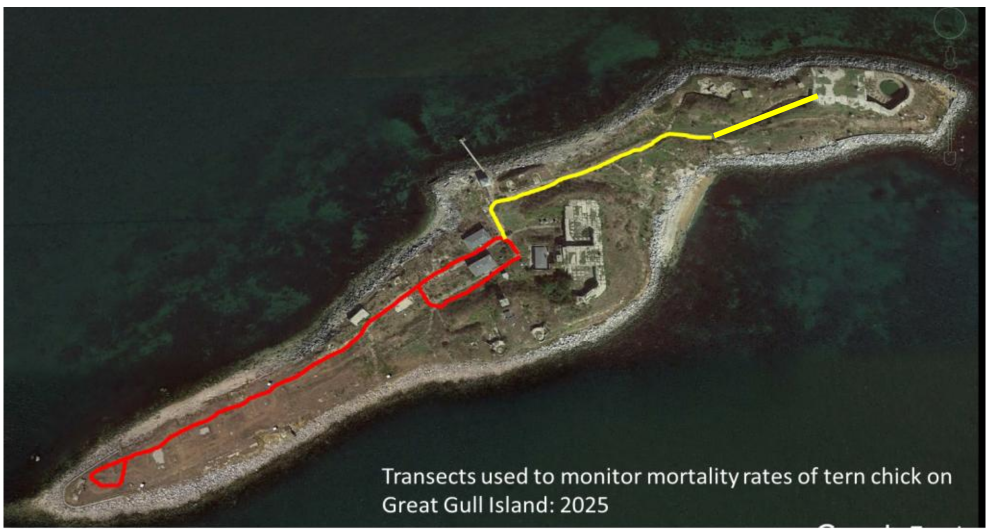


Fig. 19. Locations of two transects (west - read; east - yellow) used to search for dead terns in 2025.

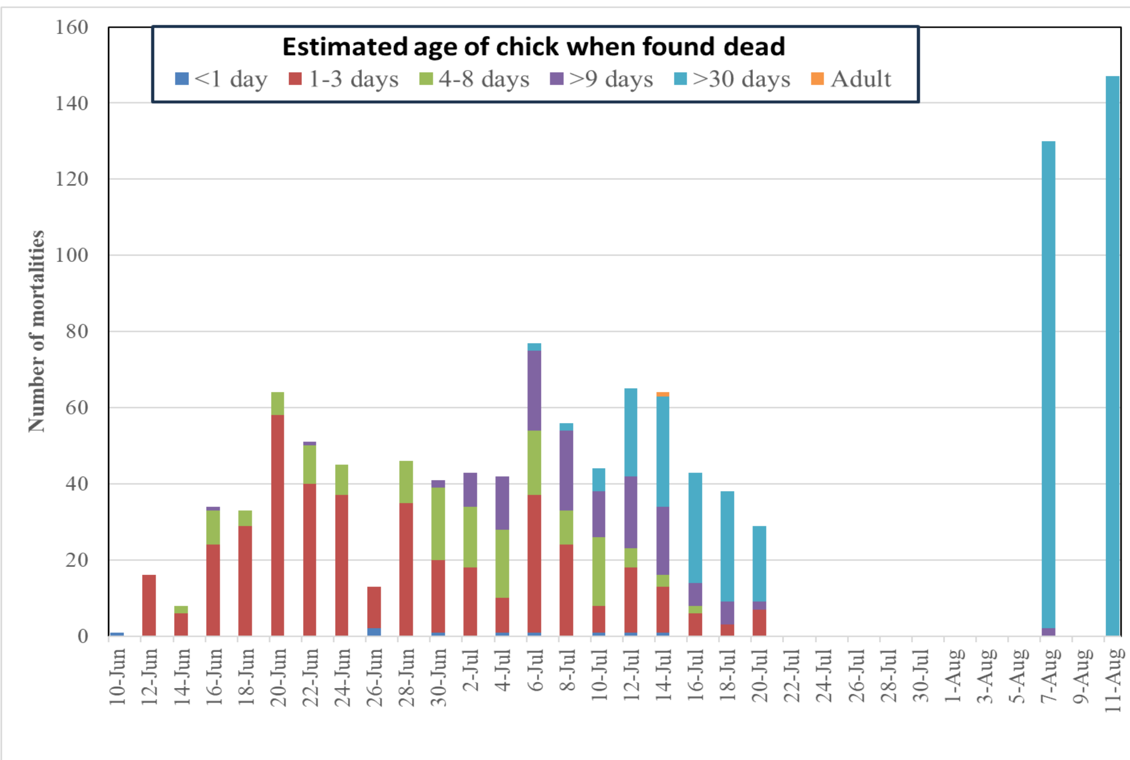


Fig. 20. Daily variation in the age structure of dead Common Terns chicks detected during mortality surveys on the east and west transects on GGI in 2025.

The mortality rate we detected in 2024 was much different than 2025. In 2024, we detected a total of 265 carcasses for an average of 11.5 (SD = 9.9) over 23 days of surveys from 4 June to 18 July (Fig. 21). In addition, the age structure of carcasses in 2024 was much different than 2025 (Fig.22). Overall, in 2024 79% of carcasses were chicks <3 days old and only 4.5% of carcasses were fledglings >30 days old. In contrast ~38% of carcasses were <3 days old and 37% were fledglings >30 days old in 2025 (Fig. 37).

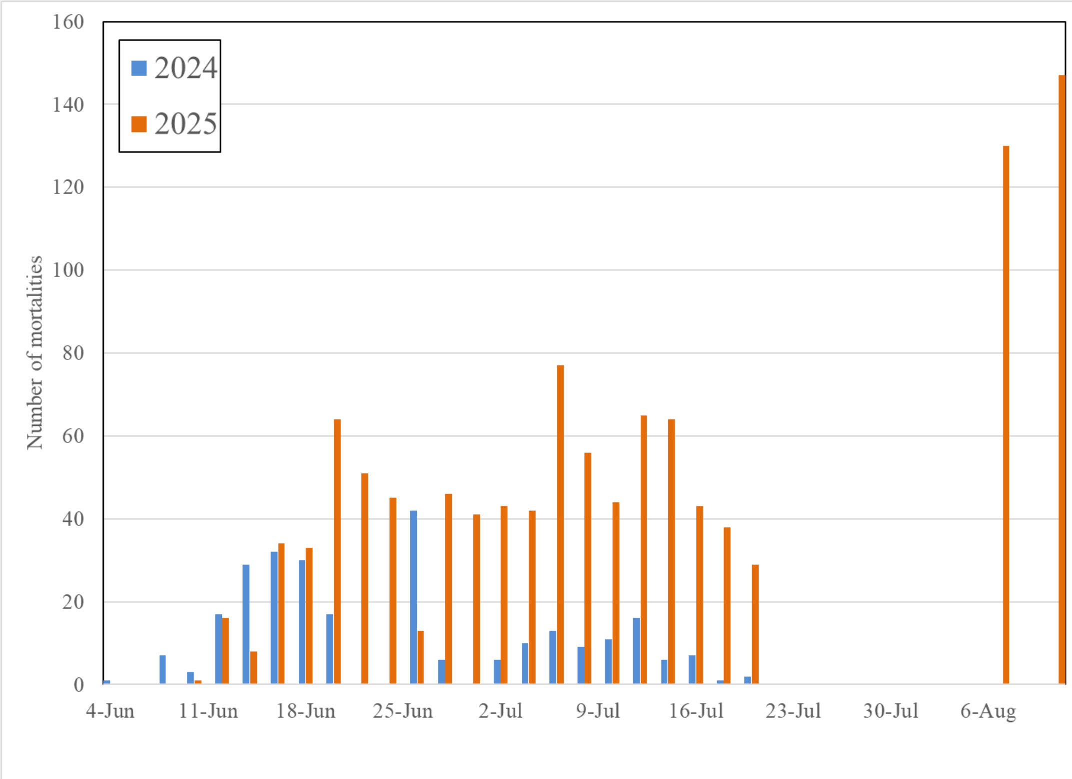


Fig. 21. Interannual variation in the number of dead chicks detected at 2-day intervals along two transects on Great Gull in 2024 and 2025

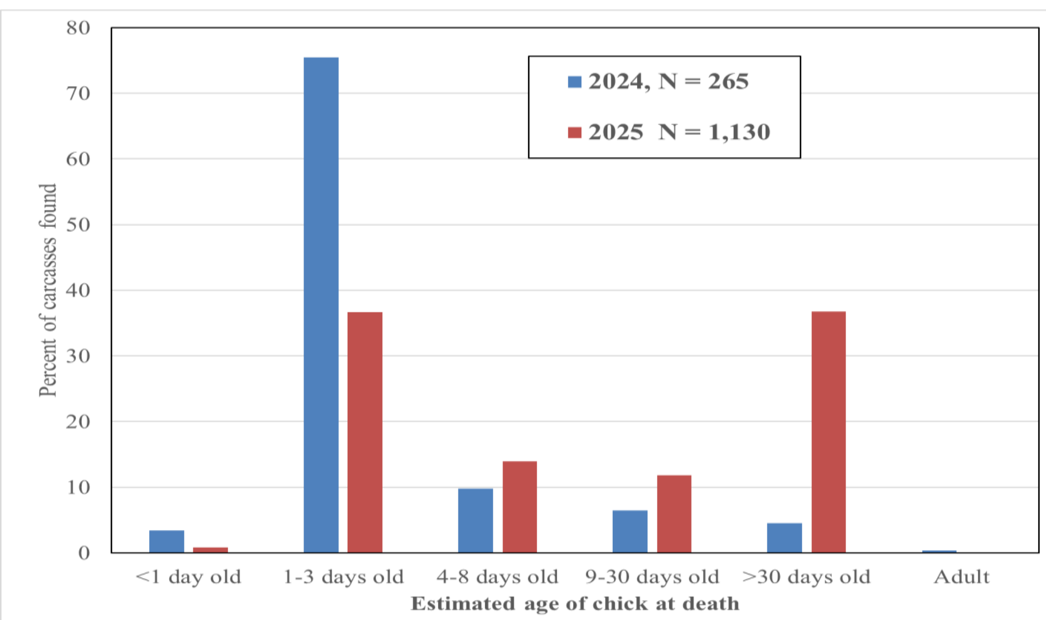


Fig. 22 Age structure of Common Tern carcasses detected on two transects on Great Gull Island in 2024 and 2025.

Banded Roseate Tern preening. LY6 blue was banded on GGI as a chick on 17 June 2018. Megan Gray.

Resighting Observations

Introduction

Resighting banded birds can be used to estimate apparent survival within and between years for marked individuals. On GGI we use resighting for two specific monitoring programs:

1. to confirm survival of banded chicks to day 26 post-hatching, our indicator of successful fledging (see Productivity), and,
2. to estimate apparent annual survival between years for marked birds.

From 2006 to 2012, Grace Cormon and colleagues banded 7,320 Roseate Terns on Great Gull with Metal Field Readable bands, and another 6,494 individuals with Plastic Field Readable (PFR) bands from 2013 to 2019 (13,814 total banded). The easy-to-read PFRs were primarily used on Roseate Terns. Beginning in 2022 we began marking both Common and Roseate Tern young with PFRs, which allowed us to estimate productivity for both species. Still, there are very few adult Common Terns with PFR bands, and the adult resighting is heavily weighted toward resighting Roseate Terns.

There were no terns banded on Great Gull in 2020 or 2021 due to the COVID 19 pandemic, which caused research to be halted for those two years.

Methods

Eighteen observers conducted observations from blinds to detect banded adult Common and Roseate Terns from 26 April to 23 July in 2025 (Fig. 14). All observations were recorded on cell phones using the mobile Survey123 app. Observers used 20-60 zoom eyepieces on Swarovski 80 mm spotting scopes. Observers typically spent 60 minutes each blind stint searching for banded terns, although some stints were only 30 minutes long when fewer observers were available. Observations included start and stop time, blind, observer, species, age (adult or chick), band type (Metal field Readable (MFR), Plastic Field

Readable (PFR), USGS BBL band, Brazil or Argentina federal band), band combination (3 alphanumeric codes), and PFR color.

Results

Daily Variation in Effort

We had an average of 3.1 (SD = 2.0) observers per day searching for banded terns (maximum = 8), although during peak periods in mid- May and during much of July we had 6 observers resighting banded terns (Fig. 23). Cumulative daily observer hours averaged 6.4 (SD = 5.9) observer hours per day (maximum = 23.1 observer hours). Observers spent a total of 430.6 observation hrs. in blinds in 2025 conducting resights compared to 802.2 hrs. in 2024 (Fig. 24). The number of observations hours in May was similar between 2024 (203.1 hrs.) compared to 2025 (210.2 hrs.). However, we had fewer observers on the island in July 2025 which resulted in fewer observation hrs. (173.1 observation hrs. in 2025 compared to 516.3 observation hrs. in July in 2024).

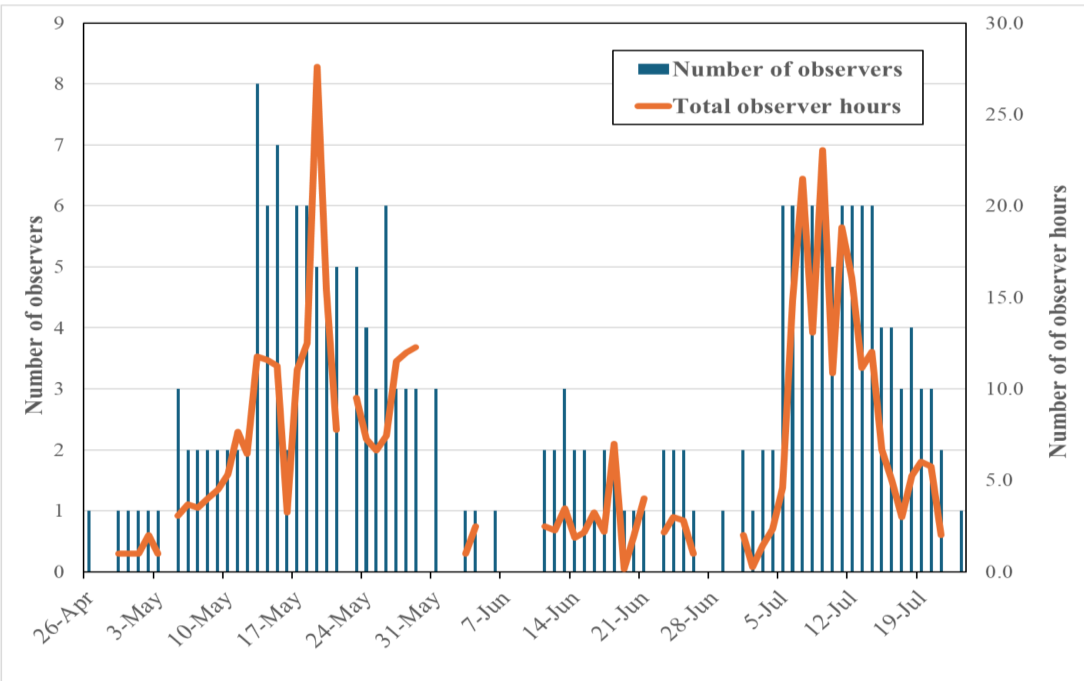


Fig. 23. Daily variation in the number of observers (blue bars) and observer hours when biologists were conducting resights for banded Common and Roseate Terns on Great Gull in 2025.

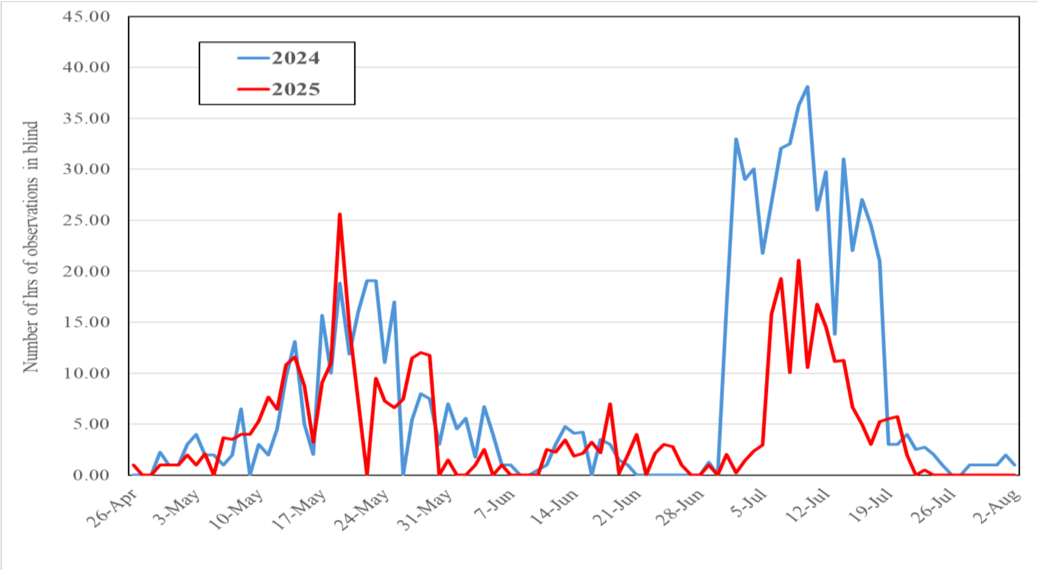


Fig. 24. Daily variation in observer hours in blinds searching for terns in 2024 and 2025.

Effort Between Years

Biologists conducted resight observations from 24 blinds in 2025 compared to 25 blinds in 2024 because the Sahara temporary blind was not used in 2025 (Table 18). The Dock blind had more observer hours (~23% of total observer hrs.) than other blinds in 2025, which was similar in 2024 (14% of observer hrs.). The blinds at M1 (8% of observer hrs.) and M1A (~15%) also had heavy usage in 2025, mainly due to the large number of Roseate Tern chicks that were projected to fledge from nest boxes on SE terraces.

Table 18. Summary of the total number hours (and % of total hours) that observers spent in 25 blinds on Great Gull Island systematically searching for banded terns in 2024 and 2025.

Blind	2024 Hours	2024 % of Hours	2025 Hours	2025 % of Hours
M1B	8.8	1.1	5.9	1.4
SB1	6.9	0.9	4.4	1.0
M1	37.7	4.7	34.9	8.1
M1A	69.5	8.7	63.4	14.7
Swallow Tunnel	21.4	2.7	11.0	2.5
M4	39.8	5.0	12.2	2.8
SB2	1.0	0.1	4.5	1.0
SB3	50.9	6.3	5.5	1.3
South Beach temp	28.5	3.5	6.8	1.6
M5	35.9	4.5	15.1	3.5
Sahara temp	23.0	2.9	0.0	0.0
M6	41.8	5.2	12.8	3.0
M6A	26.7	3.3	13.9	3.2
Apollo	38.2	4.8	41.1	9.5
Dock	111.2	13.9	98.3	22.8
M8	23.8	3.0	5.8	1.4
SB4	14.9	1.9	4.5	1.0

M13	27.2	3.4	15.8	3.6
M14	36.1	4.5	13.1	3.0
M15	16.1	2.0	7.0	1.6
M15A	45.7	5.7	11.3	2.6
M16	32.8	4.1	9.1	2.1
SB6	15.1	1.9	14.8	3.4
SB5	41.4	5.2	17.2	4.0
M18	8.0	1.0	3.3	0.8
Total	802.2		431.6	

Roseate Tern Adult Resighting

Observers detected a total of 1,394 individuals from 5,123 observations of adult Roseate Terns in 2025, compared to 2,010 individuals from 11,581 observations in 2024 (Table 19). However, given that there were over 800 observer hrs. in blinds in 2024 compared to 431 in 2025, the decrease in overall detections in 2025 was expected. When daily detection rates were standardized (number of individuals detected per day per observer hours in blinds), then the detection rate in 2025 (~7 individuals detected per day per observer hour) was identical to 2024 (~7 individuals/day/observer hr.).

Most individuals had a Plastic Field Readable (PFR) bands (1,158 total or 83%) in 2025 (Table 19). Individuals with blue or yellow PFRs were typically banded on Great Gull, while birds with red PFR were originally banded on Falkner Island CT or colonies in Maine and Canada.

Table 19. Total number of individually banded adult Roseate Terns detected in 2024 and 2025 on Great Gull Island.

Type of band	**2024**	**2025**
Metal Field Readable (MFR)	376	229
Plastic Field Readable (PFR)		
Blue with white letters	1,216	845
Red with white letters	38	32
Yellow with black letters	342	281
Bird Banding Lab band	38	7
Total	2,010	1,294
Total Observation hours	802.2	430.6
Average (SD) daily detections per observation hour	6.9 ± 5.8	6.8 ± 7.8

In 2025, an average of 37.6 ± 48.9 (SD) banded adult Roseate Terns were detected per day (maximum = 215) compared to an average of 78.2 ± 103.1 (maximum = 316) in 2024 (Fig. 25). Detection rates were greater in May (average = 83.0 ± 55.5), than July (average = 28.5 ± 35.2) in 2025, which was a different pattern from 2024 (May = 99.2 ± 95.7, July = 140.0 ± 122.7) (Fig. 25).

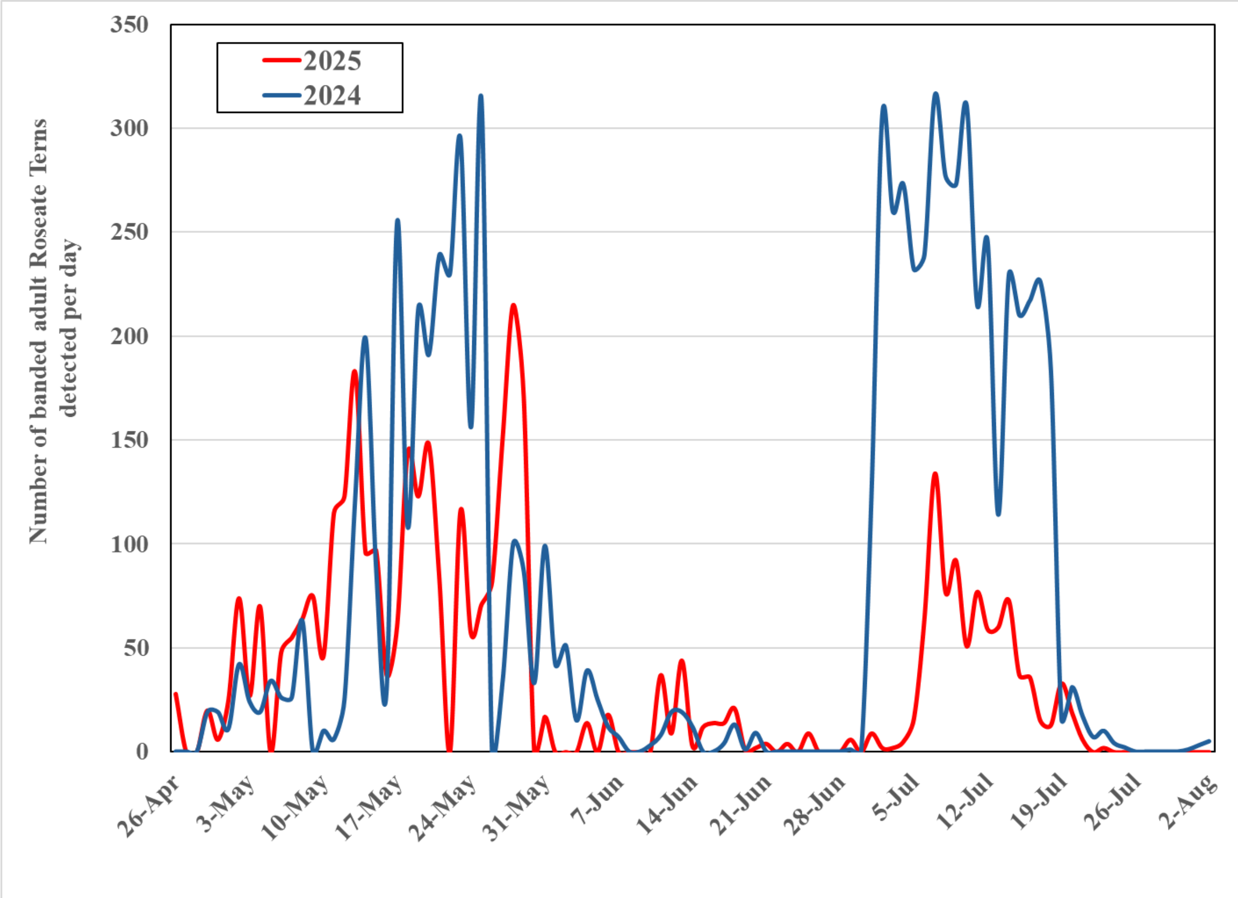


Fig. 25. Daily variation in the total number of banded adult Roseate Terns detected by all observers from blinds on Great Gull Island in 2024 and 2025.

Many of the differences in detection rates (individual banded terns detected per hour) between 2024 and 2025 were due to the decrease in observer hours in blinds between years. When detection rates were standardized based on the number of observer hours, detection rates were similar between 2024 and 2025 (Fig. 26). Daily detection rates (the number of banded adult Roseate Terns detected per day per observer hour) in 2025 averaged 6.9 ± 5.8 (SD) compared to 6.8 ± 7.8 in 2024. In addition, detection rates in May were similar between 2025 (13.6 ± 8.6) and 2024 (11.7 ± 5.6), but lower in July in 2025 (3.4 ± 2.7) than in 2024 (6.1 ± 3.7).

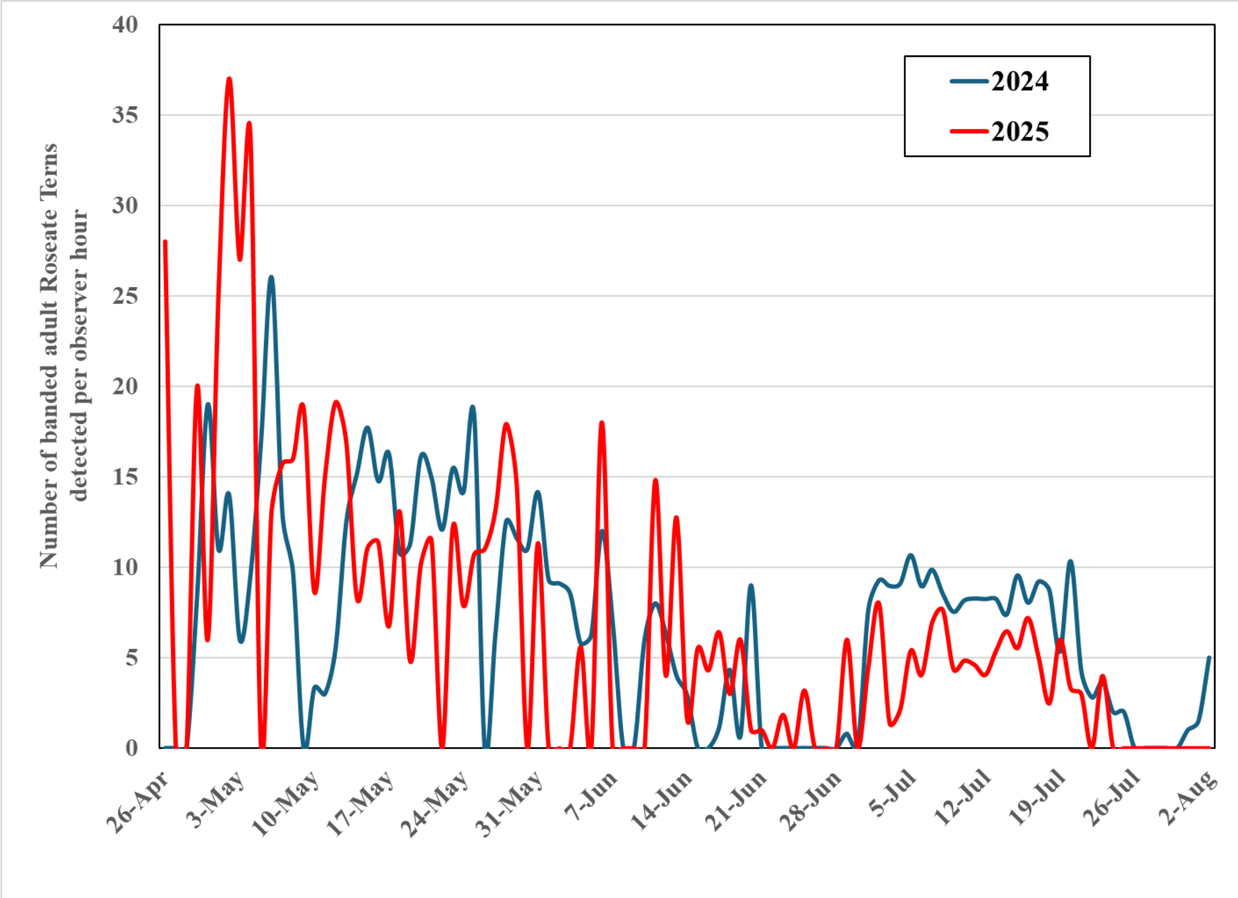


Fig. 26. Daily variation in the standardized detection rates (number of banded birds detected per day per observer hour) of banded adult Roseate Terns from blinds on Great Gull Island in 2024 and 2025.

Detection Rate of MFR vs PFR Bands

We also investigated interannual differences in detection rates of adult Roseate Terns with Metal Field Readable (MFR) and Plastic Field Readable (PFR) bands. We assumed that since there were also twice as many observer hours in blinds in 2024 (802 hrs.) compared to 2025 (430 hrs.) that individuals with MFRs would be seen less often in 2025. However, this was not the case, as detection rates of adults with MFRs were very similar between years, with 52% of birds with MFRs detected on only one day in both 2024 and 2025 (Fig. 27).

There was a difference in the detection rates of adults with PFRs, as only 34% of adults in 2024 were detected on only one day, compared to 43% in 2025.

Based on this preliminary analysis, this suggests that ~500 observer hours spread over May and July will adequately sample the banded adult Roseate Terns visiting and breeding on the island to obtain a robust idea of the number of adults visiting Great Gull in any given year. Further analysis assessing the importance of visiting all the blinds on the island is planned to determine detection rates on different parts of the island.

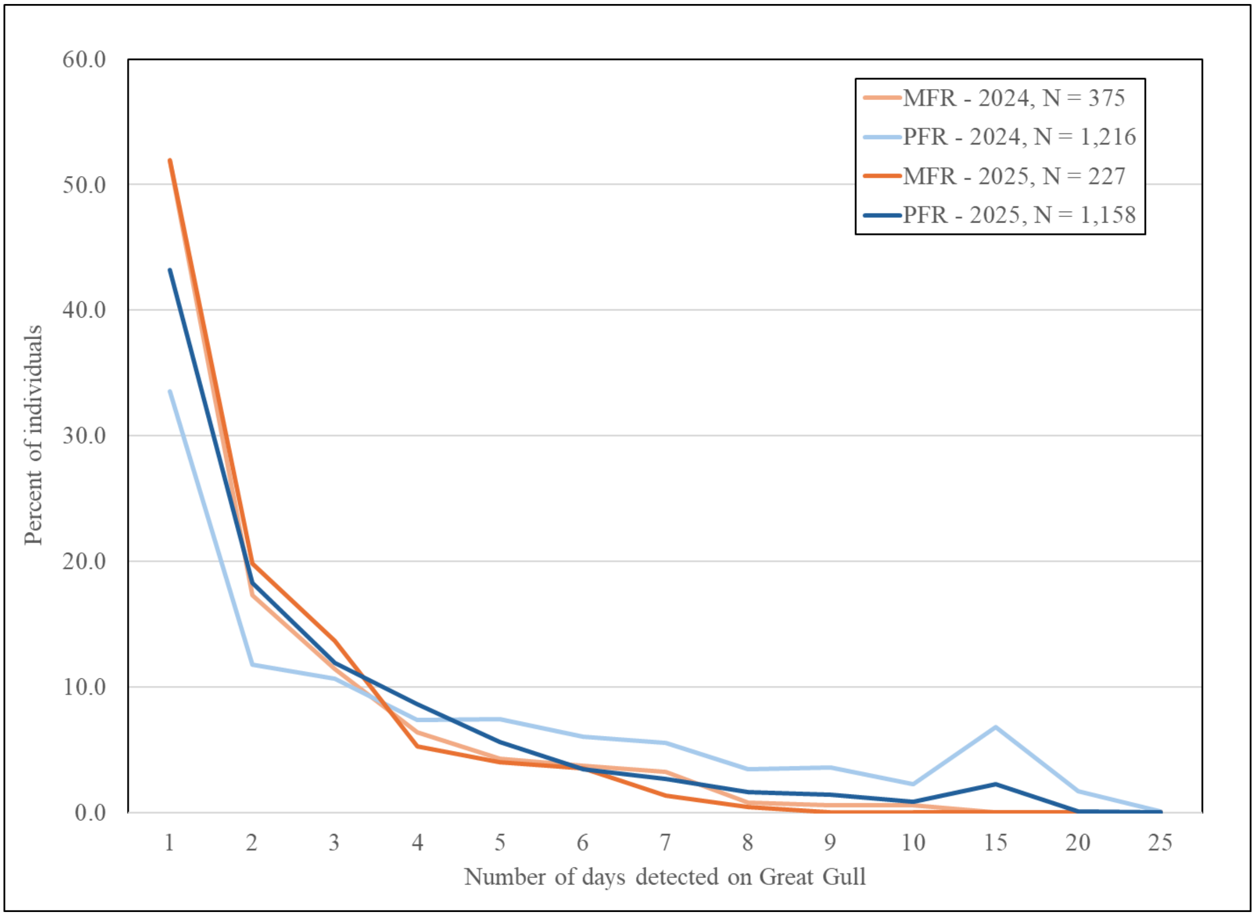


Fig. 27. Interannual differences in detection rates of adult Roseate Terns banded with Metal Field Readable (MFR) or Plastic Field Readable (PFR) bands. Shown are the number of days that individuals were detected on Great Gull in 2024 and 2025. Approximately 50% of terns with MFR were detected on only one day, while 34-43% of adult Roseate Terns with a PFR were detected only once. MFRs are much more challenging to read from blinds than PFRs, so this result was expected.

Apparent Survival Rates of Roseate Terns

We were able to determine the apparent survival rates of Roseate Terns breeding on Great Gull based on resighting probabilities (Fig. 28). Interestingly, 31 % of chicks banded in 2022 (three-year-old individuals) were resighted in 2025, and 18% of two-year individuals banded in 2023 were detected in 2025. Individuals hatched in 2018 (7 years old) appeared to have relatively high survival rates compared to the cohorts from 2017 and 2019. Five individuals originally banded in 2006 (19 years old) were detected in 2025.

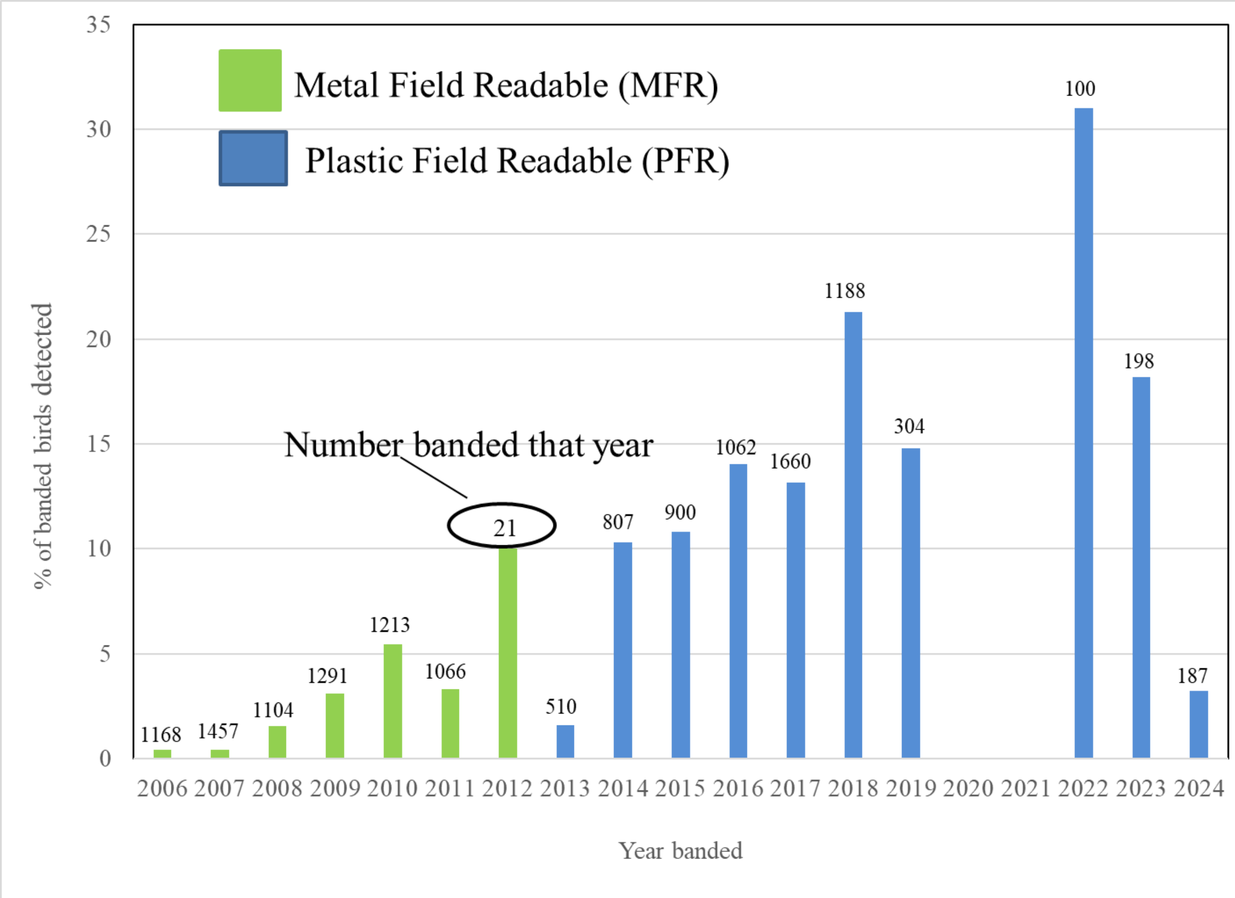


Fig. 28. Annual variation in the apparent survival rates of Roseate Terns on Great Gull Island based on the percentage of individuals detected during resight sessions from 2006- 2024 banding cohorts.

Detection of Roseate Terns Banded in Other Colonies

In 2025, we detected at least 103 adult Roseate Terns that were banded at colonies other than Great Gull Island compared to 127 individuals in 2024 (Table 20). Most foreign resights were individuals banded on Falkner Island (57 (55%) individuals), with 15 individuals from Massachusetts, 13 from New Hampshire, 15 from Maine, and 3 from Canada. There were two Metal Field Readable bands that were assigned to birds banded in Marathon Florida, but these were not confirmed with multiple sightings - both individuals were resighted only once each.

Table 20. Colony origin of adult Roseate Terns resighted on Great Gull in 2024 and 2025 that were banded at other colonies in the NW Atlantic.

Banding Location	Number of individuals: 2025	Number of individuals: 2024
Falkner Island, CT	57	71
South Monomoy Island, MA	3	3
Penikese Island, MA	1	1
Bird Island, MA	7	24
Ram Island, MA	10	17
White and Seavey Islands, NH	13	15
Stratton Island, ME	5	3
Eastern Egg Rock, ME	9	6
Ram Island - ME	1	
Jenny Island, ME	1	2
The Brothers, Canada	3	4

Telemetry Studies

Methods

We tagged a total of 44 terns in 2025: 20 Common Tern and 24 Roseate Terns (Table 21). We used two different types of harness material on Common Terns – Stretch Magic and Teflon (0.075" width) and Roseate Tern radios were attached using only Stretch Magic. Dr. Juliet Lamb (TNC) attached the transmitters to all birds using a two-step process – she tightened the straps until she felt they fit well, then put the birds in a holding crate and watched their movements to make sure birds were walking normally before closing metal crimps to finalize the attachment. Stretch Magic harness material is expected to last 3-6 months before deteriorating and causing the transmitter to be lost. Teflon harness material is expected to last indefinitely.

We used transmitters from two different manufacturers in 2025. Pathtrack nanofix transmitters with a 2.3g GPS logger and accelerometer, and Ornitela Ornitrack 3 4G solar powered transmitters (3.3 g). We deployed Pathtrack transmitters on 40 terns (24 Roseate Terns and 16 Common Terns) and the transmitters were programmed to collect a GPS location every 20 min. Pathtrack transmitters uploaded data to a base station located a high point on GGI, overlooking the Apollo blind (Fig. 3) and in direct line of sight with the nests on the SE terraces. Generally, Pathtrack transmitters can upload to base stations within 1 km of the base station, but the transmitters are programmed to offload data only occasionally.

There were additional base stations in the northeastern US during 2025. Collaborators also had base stations throughout the region (primarily on Cape Cod) to receive uploaded data while terns were staging during migration (Fig. 29).

We also used Ornitela Ornitrack-3 4G solar powered transmitters (3.3 g) on 5 Common Terns. Ornitela tags upload GPS locations to the 4G cellphone network where the LTE Cat-M1 protocol is supported, which covers all North America and some countries in South America. Ornitela tags were programmed to collect a GPS location every 5 min when away from Great Gull and every 30 min when on Great Gull – this allowed us to gather fine-scale movement data for foraging movements when away from Great Gull.

Roseate Tern with a Pathtrack transmitter – antenna is evident above the tail. P. Paton

Results

Tracking efforts were successful in 2025 and we were able to assess foraging and dispersal movements of adult Common and Roseate Terns during the breeding (early June to mid-July) and post-breeding (mid-July to early Sept) seasons (Figs. 30-35) Birds regularly foraged on the Connecticut coast at the mouth of the Thames River (8 miles from GGI), south of Montauk, NY (16 miles south of GGI), and Block Island (25 miles from GGI) and some individuals ventured as far as Ninigret Pond, a salt pond in coastal Rhode Island over 23 miles from Great Gull. Not surprisingly, there was a great deal of individual variation in movements of individuals (e.g., Fig. 34) although the Montauk area seemed to be a key foraging spot for all birds we tracked in 2025.

During the post-breeding season, Roseate Terns dispersed to Cape Cod, where they staged for several weeks before dispersing south (Fig. 33). Since Pathtrack tags only upload to base stations and no base stations were operating in the US south of Cape Cod, we were unable to document these movements, except for terns that may offload date to base stations on the wintering grounds in Brazil.

However, we were able to document southward migration of Common Terns with Ornitela tags, which showed individuals migrating southward along the coast to North Carolina or South Carolina before flying towards Puerto Rico (Fig. 35). It appears that most adult Common Terns departed due south from Great Gull rather than dispersing to Cape Cod, as is the typical behavior for Roseate Terns. In addition, Roseate Tern chicks were regularly resighted at Cape Cod, whereas Common Tern chicks are rarely detected at Cape Cod, again suggested major differences in post-breeding dispersal behavior between Common and Roseate Terns.

Table 21. Total number of Common and Roseate Terns that received GPS transmitters in 2025 based on harness material and transmitter manufacturer.

Harness material	Stretch magic		Teflon		Total
Manufacturer	Pathtrack		Ornitela	Pathtrack	
Common Tern					
Dock	2		5		7
M13				7	7
M6	2			5	7
Roseate Tern					
Apollo	10				10
SE terraces	14				14
Total	28		5	12	45

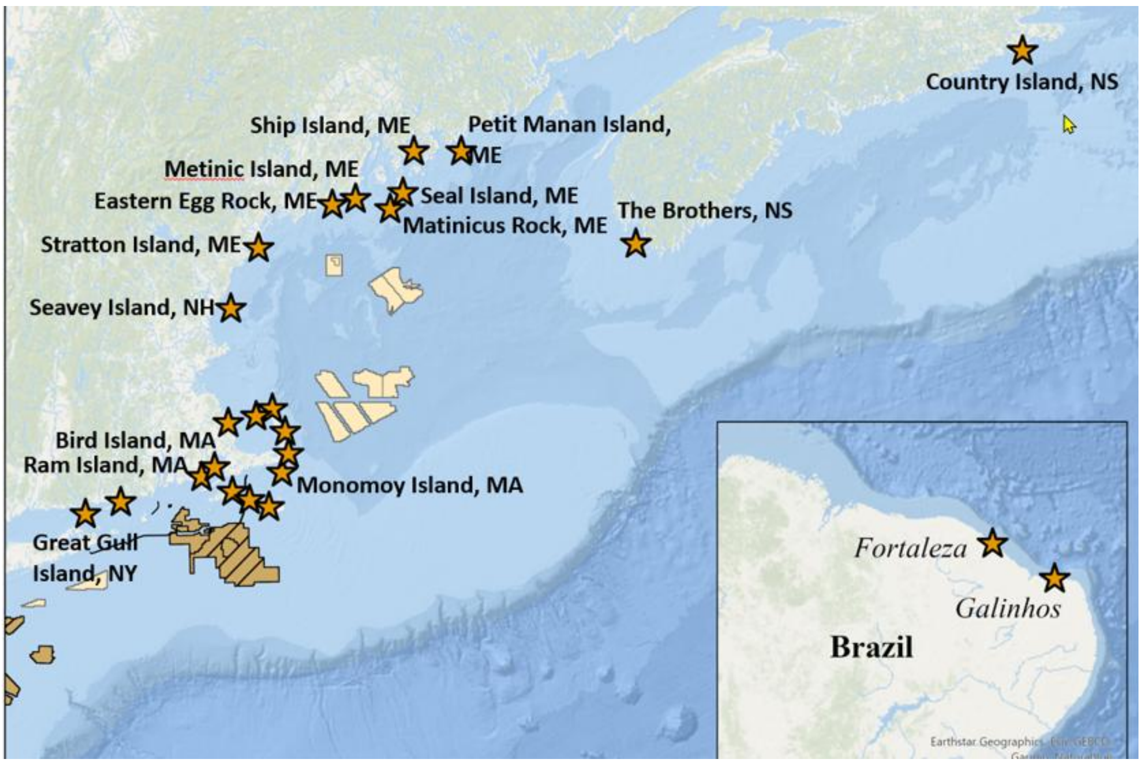


Fig. 29 Locations of Western Atlantic Tern Tracking (WATT) Pathtrack base stations in the NW Atlantic and Brazil operating during 2024 and in 2025. Map created by Keenan Yakola.

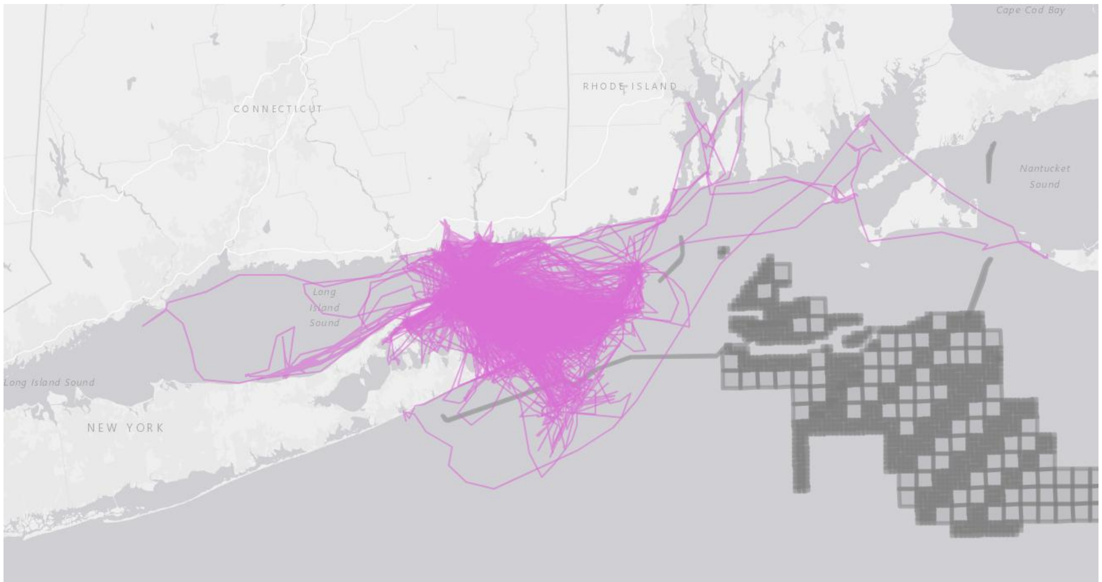


Fig. 30. Breeding season movements (early June to mid-July) of 15 adult Common Terns with Pathtrack transmitters tagged on GGI in 2025. Grey squares are offshore wind areas. Map constructed by Dr. J. Lamb (TNC).

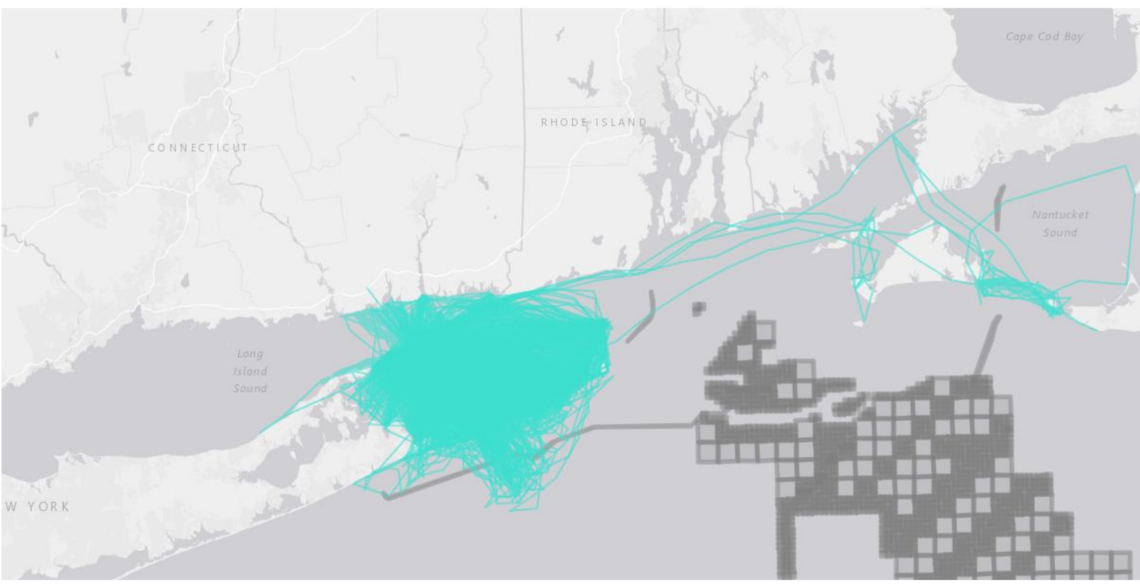


Fig. 31. Breeding season movements (early June to mid-July) of 24 adult Roseate Terns with Pathtrack transmitters tagged on GGI in 2025. Map constructed by Dr. J. Lamb (TNC).

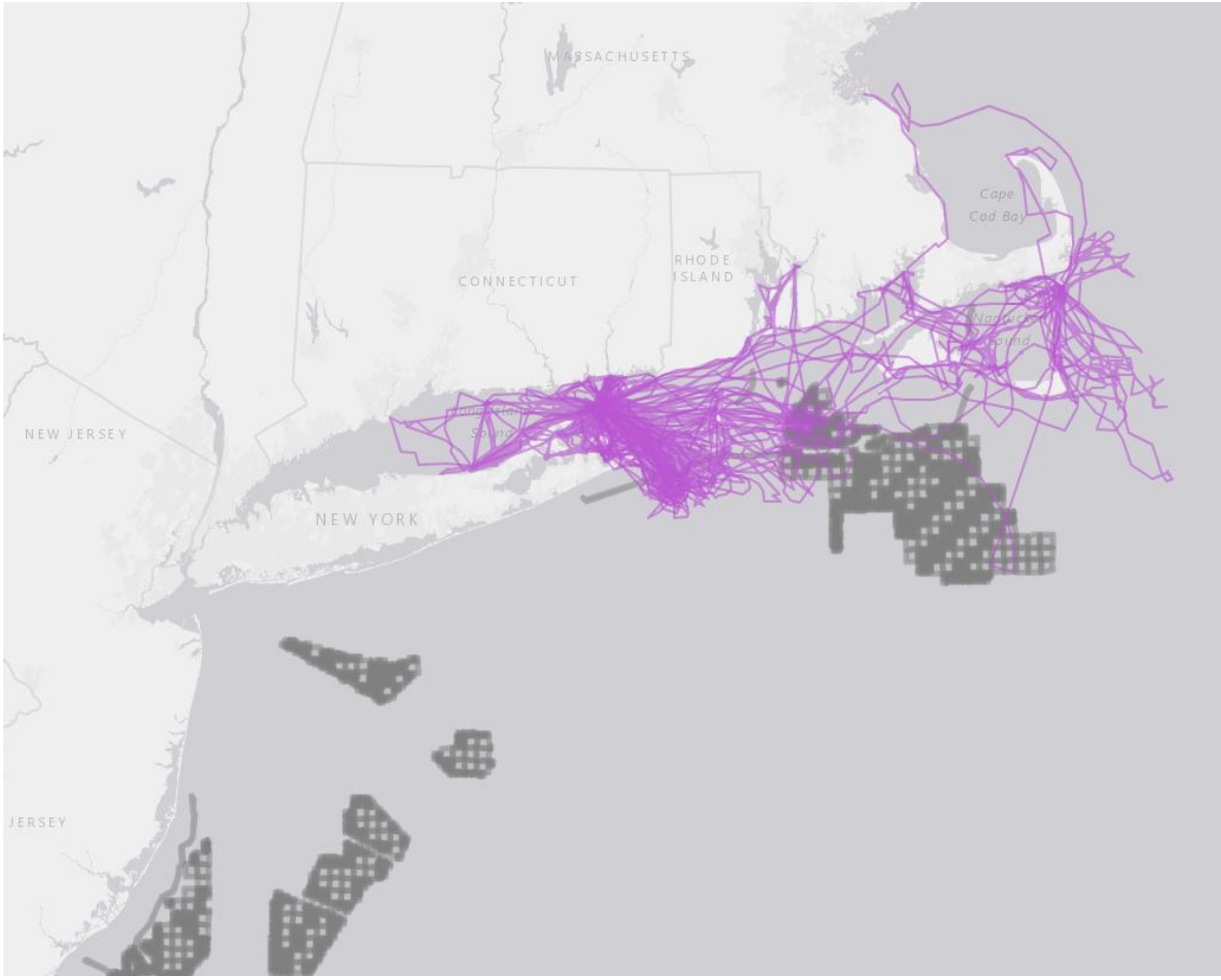


Fig. 32. Post-breeding season movements (mid-July through early Sept) of 15 adult Common Terns with Pathtrack transmitters tagged on GGI in 2025. Map constructed by Dr. J. Lamb (TNC).

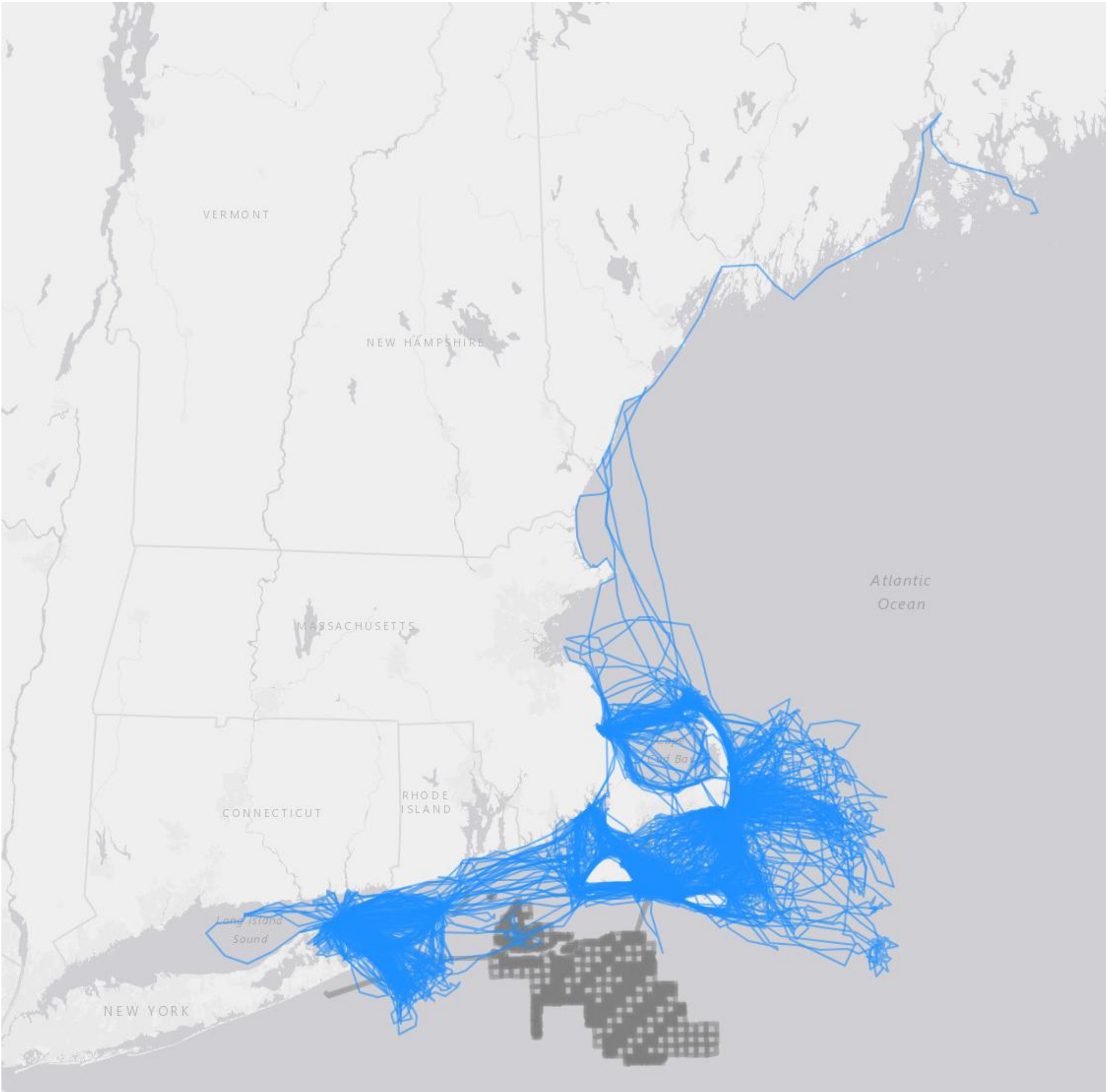


Fig. 33. Post-breeding season movements (mid-July through early Sept) of 24 adult Roseate Terns with Pathtrack transmitters tagged on GGI in 2025. Map constructed by Dr. J. Lamb (TNC).

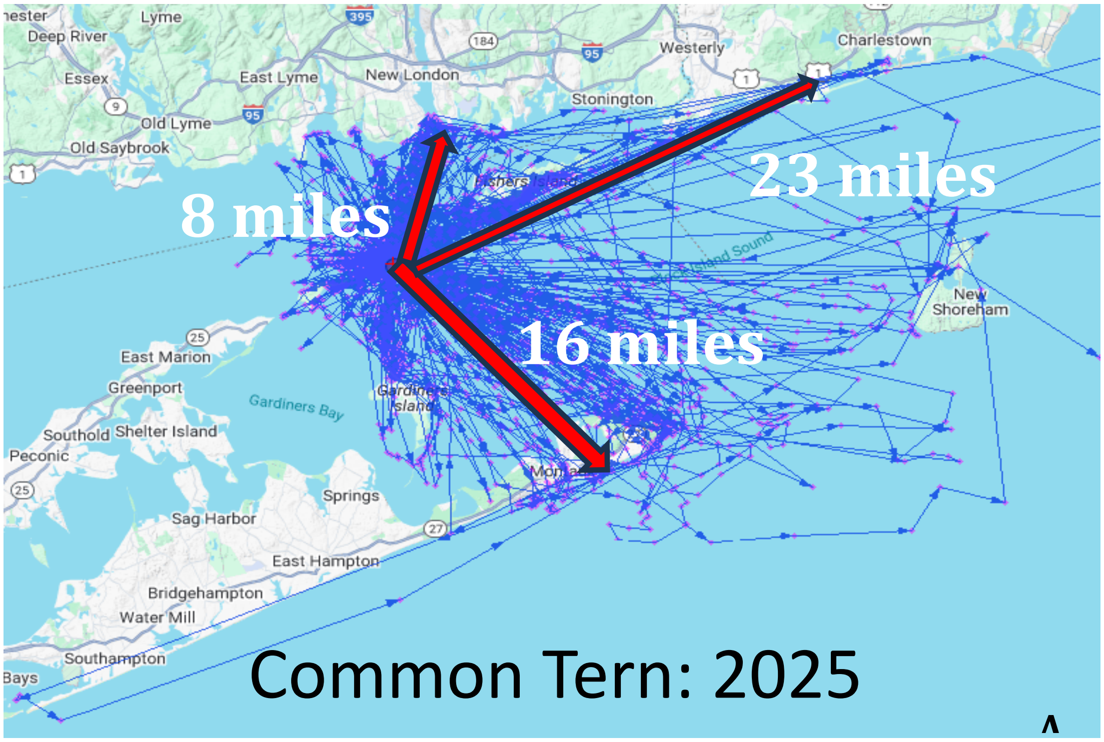


Fig. 34. Common Tern breeding season (early June to early July) movements from GGI in 2025 for individuals with Ornitela transmitters. These transmitters downloaded GPS locations to the 4G cell phone network. Distances to major foraging areas (red arrows) are shown.

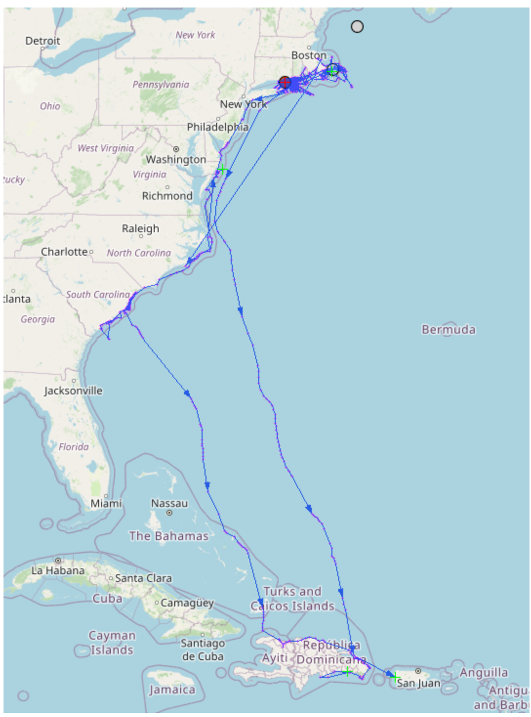


Fig. 35. Post-breeding dispersal tracks (blue lines) of 2 adult Common Terns tagged in June 2025. Both individuals emigrated in late July, 1 staged in South Carolina for about a week, while the other individual took approximately 2.5 days to reach Puerto Rico from GGI. Neither bird staged on Cape Cod before emigrating south.

Interannual Return Rates of Tagged Terns in 2024

Of the 6 Roseate Terns we tagged in 2024, 4 individuals were resighted on Great Gull in 2025. We also assessed the return rates of 16 untagged Roseate Terns that nested at the Apollo Terraces on Great Gull in 2024 and were previously banded (either with a Plastic Field Readable or Metal Field Readable band). All 16 banded control Roseate Terns that did not receive a Pathtrack transmitter in 2024 were resighted on Great Gull in 2025.

Of the 15 Common Terns we tagged with Pathtrack GPS transmitters in 2024, we resighted 7 on GGI during the 2025 field season. We did not have banded control Common Terns without transmitters to compare return rates. Colleagues in New Hampshire (Dr. Liz Craig) and Maine (Keenan Yakola and Don Lyons) also noted lower return rates of GPS tagged terns compared to control birds. This suggests that transmitters with harnesses might affect survival rates of terns. We are carefully assessing this impact and this will drive our decision about future tagging efforts.

Personnel

We had a relatively small crew, typically with 6-7 biologists conducting fieldwork. Research and management operations were led by Peter Paton, Margaret Rubega, and Joan Walsh with a team of three primary biological technicians (Ava DiMauro, Catherine McGrath, and Emily Winslow) supported by Long Island Sound Futures Fund grants to UConn under the guidance of Margaret Rubega, and one biological technician (Meghan Leddy) supported on a US Fish and Wildlife grant to Peter Paton and Nate Senner (UMass). We also received support from the Quebec Labrador Foundation, a longtime friend of the Great Gull Island Project, along with donated support from the Great Gull community. In addition, Dr. Juliet Lamb (The Nature Conservancy) was supported by funds from New York Sea Grant.

Dr. Johanna Harvey (Univ. of Rhode Island), supported by internal grants from the University of Rhode Island assessed the prevalence of Highly Pathogenic Avian Influenza (HPAI) and other disease issues by sampling live terns during banding operations and leading coordination with outside pathology labs to assess carcasses. Jessica Espinosa and Cindy Barreto (UConn.), graduate students and past technicians, returned for a week to assist with the Common and Roseate Tern censuses.

Dr. Bryan Connolly (Eastern Conn. State Univ.), supported by a LISFF grant, conducted plant inventories in May and September, in the first of planned annual efforts to conduct surveillance for new invasive plant introductions to the island. Finally, Gerry Hauser and Matthew Male, supported by donations to the Friends of Great Gull Island, worked on infrastructure including building cabins and vegetation management.

Biologists from the US Fish and Wildlife Service (Coastal Programs and Refuges), The Nature Conservancy, and University of Rhode Island helped us, in addition to all the biologists who came on 2 June for the Common Tern census.

Acknowledgements

We want to thank everyone who helped GGI this year

All- Island Common Tern Census on 2 June 2025

A huge thanks to: Cindy Barreto (UConn), Sophia Brown (NY DEC), Maureen Durkin (USFWS), Megan Gray (URI), Nick Ernst (USFWS), Jess Espinosa (UConn), Megan Gray (URI), Dylan Kakner (URI), Johanna Harvey (URI), John Herbert (Mass Audubon), Erin King (USDA), Alison Kocek (USFWS), Dylan Kakner (URI), Juliet Lamb (TNC), Georgia Male, Jennifer McKay (USGS BBL), Martina Muller (URI), Tori Mezebish Quinn (URI) Peter Paton (URI), Margaret Rubega (UConn), Carl Safina (Safina Center), Arielle Santos (Seatuck Environmental Association), David Sibley (SibleyGuides), Joan Walsh (AMNH), Sean Wiedemann (NY DEC).

Provisioning Stints From Blinds

A big round of applause for Liam Corcoran (7 hrs), Ava DiMauro (34 hrs), Megan Gray (7 hrs), Alison Kocek (3 hrs), Becca Kusa (14 hrs), Meghan Leddy (34 hrs), Catherine McGrath (27 hrs), Martina Muller (3 hrs), Peter Paton (16 hrs), Margaret Rubega (19 hrs), David Sibley (1 hr), Joan Walsh (19 hrs), and Emily Winslow (36 hrs).

Resighting Banded Terns From Blinds

Cindy Barreto (UConn, 1 hr), Mary Bertschi (USFWS Plover program, 34 hrs), Ava DiMauro (UConn, 32 hrs), Megan Gray (URI, 3 hrs), Gerry Hauser (AMNH 2 hrs), Alison Kocek (USFWS Coastal Programs, 46 hrs), Becca Kusa (TNC, 6 hrs), Meghan Leddy (URI, 4 hrs), Matthew Male (AMNH, 9 hrs), Catherine McGrath (81 hrs), Martina Muller (URI, 1 hr), Peter Paton (URI, 54 hrs), Suzanne Paton (USFWS Coastal Program, 29 hrs), Margaret Rubega (UConn, 13 hrs), David Sibley (AMNH, 27 hrs), Joan Walsh (AMNH, 51 hrs), Emily Winslow (63 hrs). We also thank Maureen Durkin, USFWS Rhode Island Piping Plover Coordinator for allowing her crew leader (Mary Bertschi) to come out for a week this year, and for all the techs she has sent out to help on GGI over the past few years.

Infrastructure Repairs

Huge thanks to Gerry Hauser for leading construction efforts on GGI in 2025. Matthew Male did an amazing job helping Gerry. They managed to construct one cabin in spring 2025 and almost completed (90% done) a second cabin in the old pine grove over a former tent platform.

Boat Captains

We could not conduct this project without the assistance of our captains, who included Peter and Adam Douglass (Douglass Marine, Orient Pt; hauling lumber, doors, windows, water, trash, propane resupply), Seth Megargle (Audrey Joy, New London; our primary support boat in 2025, transporting up to 30 people for work days, transporting crews and materials -- including a couple hundred nest boxes), Tom Halavik (USFWS Coastal Program with support from Suzanne Paton; transporting crews and their gear numerous times over the summer).

Vegetation Management

Matthew Male operated the tractor in the spring to rake dead vegetation to provide suitable habitat for nesting terns. Gabrielle Wincherhern helped out with the late-season invasive plant mapping. We thank David Roach and his hard-working crew (All Habitat Services LLC, Brandford, CT) for their expertise in herbicide treatments this spring and fall to control invasive plant species on the island. This crew has been the active professional herbicide crew on Great Gull for almost a decade.

Adult Roseate Tern with river herring. Megan Gray

APPENDIX 1: GREAT GULL ISLAND 2025 BOTANICAL REPORT

Prepared by Bryan Connolly Ph.D. botanist

Field Survey

A botanical survey of Great Gull Island (GGI) was conducted on 5/1/2025 and 8/11/2025. The entirety of the island was surveyed by a meander transect on both dates. Anywhere that could be reasonably reached on foot was surveyed and species occurrence was recorded. See GPS tracks below.

Figure 1. GPS surveyor tracks for botanical inventory of Great Gull Island 2025.

Species

The island's flora is highly dynamic. Coulter reported 129 plant species in 1981, while Stalter and Lamont observed 168 species in 2002, of those 168 species 94 had persisted from the previous survey and 74 species were new. The loss of 39 species and the addition of 74 is a high rate of species turn over. Between the two surveys 207 plant species were observed in the past.

In 2025 the island was surveyed twice in its entirety; on May 1, 32 plant species were observed, then on August 11 an additional 34 species for a total of 66 species observed. There were 34 native, 27 introduced, and 5 invasive species found. See Table 1 at end of document.

The lower number of species currently on the island may be due to several factors. Sea level rise and storms have cause extensive erosion on the island. Invasive and aggressive introduced plants are extensive on GGI and may have out competed other species. For example, Stalter and Lamont 2005 report that Oriental bittersweet was the dominant woody plant on the island and wild radish formed extensive pure stands. These two species are currently still an issue on GGI, two decades of competitive pressure may have taken its toll on the other plant diversity. Additionally, herbicides have been used to manage the vegetation on the island to maintain endangered tern habitat, some of the species loss could be accidental collateral damage.

On top of the 66 species in Table 1, there are credible iNaturalist observations of the species below that were not seen in the 2025 survey. These species could be in such low numbers they were not observed in the survey or were very recently extirpated. This list includes the following:

Amaranthus retroflexus

Erigeron canadensis

Erigeron strigosus

Lysimachia clethroides

Symphyotrichum ericoides

Triodanis perfoliata.

These species will be intensely surveyed for in 2026 to see if they still occur on GGI.

Cultivated Flora

The area near the Carpenter Shop or where the tern research staff have their headquarters has several cultivated plants that occur where they were planted and nowhere else, these plants are not really a free-living naturalized part of the flora. Cultivated plants include:

Allium aflatunense Ornamental Onion

Allium tuberosum Garlic chives

Amelanchier canadensis Serviceberry

Malva alcea Greater Musk-Mallow

Paeonia officinalis common peony

Prunus sp. Plums

Pinus thunbergii Japanese Black Pine

Pyrus communis Pear

Salvia yangii Swanleaf Clouding Sage

Tradescantia sp. Spiderwort.

New Problematic Plants

Two new problematic plants were identified in the 2025 survey. Problematic in this case means species that will not make good tern nesting habitat. First an aggressive blackberry which could be R*ubus bifrons* European Blackberry or *Rubus armeniacus* Himalayan blackberry was observed near the staff cabins; this stand has been herbicided but is not completely dead. There are some plants that the herbicide crew has not treated on top of the berm on the end closer to the tower. *Rubus* is a notoriously difficult genus to identify, this could be another species other than the two mentioned above because not all characters could be observed e.g. flower, fruits. This stand could just be a very large aggressive phenotype of *Rubus allegheniensis* common blackberry. Fruit and flowers will be looked for in 2026. Whatever species this is it should be removed from the island; it is too dense and thorny for good tern nesting habitat.


(left) Figure 2. *Rubus* sp. blackberry observed on GGI

(right) Figure 3. *Baccharis halimifolia* eastern false willow or groundseltree a new species to GGI.

Baccharis halimifolia eastern false willow or groundseltree is a native salt tolerant shrub, with waxy spatulate or orbiculate leaves with prominent teeth, see photo below. This plant is common in coastal areas in the mid-Atlantic and Southern New England (as well as other regions of the Eastern US). This species has not been found in previous survey of GGI but was found extensively just west of M14 on the island, with an additional plant near the tower, and one in the vicinity of Apollo. Though native this species is large and woody and may prevent tern nesting, it is recommended that the groundsel tree be removed from the island. Complete eradication is probably best since it is a fast-growing wind dispersed species.

Plant Propagation

Seaside goldenrod

Seaside goldenrod *Solidago semperviens* is one of the most important plants on the island for tern nesting habitat. First, it survives on Great Gull Island, which many species are not capable of. This plant is small at the start of the season and does not deter terns from nesting. Seaside goldenrod is clump forming creating spaces between plants for nests and for chicks to move freely. Additionally, as the season progresses this plant grows large enough to provide shade that during the hotter parts of the nesting season protects chicks from dying from heat exposure. There have been some attempts on the island to move small seaside goldenrod plants with some limited success. It was thought that large plants could not be moved. On May 1, we conducted an experiment, approximately 10-15 large seaside goldenrod plants were dug up (Figure 4) and the crowns or short rhizomes were divided, a total of 70 plants division were made from the original 10-15 plants. These divisions were spaced about 1 M a part and planted in an area where terns nested but had little cover (Figure 5). All 70 plants started from the divisions survived to the end of the nesting season (Figure 6). We believe this method of propagation was successful because 1) plants at time of division had minimal leaf surface area, and therefore minimal transpiration and water loss, see figure below, 2) early May temperatures on the island are general cool, again creating conditional for less water loss, 3) divisions were watered in immediately with fresh water, 4) a rainstorm occurred within 48-72 hours of planting. This technique of early season division of large seaside goldenrod plants will be used in the future to cover more of the barren areas of the island to improve nesting habitat.



(left)Figure 4. Dr. Margaret Rubega digging up large seaside goldenrod (Solidago sempervirens) plants to be divided for propagation.

(center)Figure 5. Recently divided and planted divisions of seaside goldenrod May 1, 2025

(right)Figure 6. Divisions of seaside goldenrod after establishment and three plus months of growth Aug 11, 2025

Butterfly weed

To increase the diversity of clump forming perennials that could provide nesting habitat for terns Butterfly weed (*Asclepias tuberosa*) was selected as a species to try to establish on Great Gull Island. This species is also a host plant to monarch butterfly caterpillars and could provide a source of nectar for migrating monarch adults which frequent the island. Common milkweed as seen in the species inventory list does occur on the island already but tends to have long rhizomes and spread out stems, not ideal for tern habitat. Seeds of butterfly weed was started a bit late for the season in late May/early June 2025, a total of 118 seedling were started in the Eastern Connecticut State University biology greenhouse. These seedlings were about 5-10 cm when brought out to the island and planted on August 11th. These plants were planted and watered in after planting, they have yet to be assessed for survival rates and growth.


(Left) Figure 7. Butterfly weed seedlings growing in the Eastern Connecticut State University greenhouse.

(Center) Figure 8. Butterfly weed planting by staff cabin on GGI.

(Right) Figure 9. Close up of butterfly weed seedling planted on GGI.

Future Plans

Mark Lavoie of Lavoie Horticulture has been contacted; he has created several grass mixes adapted for difficult to vegetate areas. Weather prevent us from traveling to the island with him in fall of 2025; we hope to visit the island next spring to trial native grass seed mixes that we believe will be compatible with tern nesting habitat.

Soil Test Data

The soil on Great Gull Island is highly disturbed from the decommissioning of Fort Michie, and some portions of the island's soil are likely derived from dredge spoils. Invasive plants still thrive in this material but after invasive plant control measures native plants do not re-establish in some spots and results in barren areas. One area is a soil berm is particularly difficult to establish vegetation on and is highly erodible. Soils tests up until this year have never been done on the island. Soil was collected on August 11th from 4 barren locations following the protocols of the University of Connecticut soil nutrient analysis laboratory. This soil was brought to the lab and analyzed. A brief summary of the soil results is below:

- Berm north 4.2 pH, calcium, magnesium, phosphorus, and potassium were all below optimum.
- Berm south 3.9 pH, calcium, magnesium, phosphorus, and potassium were all below optimum.
- M 14 3.9 pH, excessive phosphorus, optimum potassium, below optimum for calcium and magnesium.
- Upstairs 3.8 pH, excessive phosphorus, below optimum for calcium, magnesium, and potassium.

The low pH of these results really stood out, for context, forests in the northeastern US generally have a pH of 4.5-5.5, while lawns are recommended to be at 6.0-6.5, and vegetable gardens 6.5-6.8. This measurement is a logarithmic scale meaning each full number difference is a 10 fold change in acidity or alkalinity. Therefore, the pH of the "upstairs" location is 1000 times more acidic than the recommended pH for garden soil. The low pH is likely a major reason for the barren area in the island. All four locations were also below the optimum soil levels for calcium and magnesium. Only M14 had optimum potassium. While both berm sites had low phosphorus, M14 and upstairs had excessive phosphorus.

Summary

The flora of Great Gull Island is highly dynamic with a high rate of species change. Two new problematic plants were discovered in this survey that were not previously known on the island. Large plants of seaside goldenrod were easily divided and established. The soil of GGI is extremely acidic and that may prevent re-vegetation after invasive control. New tern friendly grass mixes that can hopefully tolerate GGI conditions will be tried next year. Surveys will continue in subsequent years to detect any new or emerging invasive plant threats.

Table 1. List of vascular plant species observed on Great Gull Island in 2025.

	Great Gull Island Plants 2025		
	Scientific Name	**Common Name**	**Native (N), Introduced (Intro), Invasive (IV)**
1	*Achillea millefolium*	common yarrow	N
2	*Allium vineale*	crow garlic	Intro
3	*Ambrosia artemisiifolia*	common ragweed	N
4	*Asclepias syriaca*	common milkweed	N
5	*Asparagus officinalis*	asparagus	Intro
6	*Atriplex prostrata*	Fat-Hen	N
7	*Baccharis halimifolia*	Groundsel-tree	N
8	*Calystegia sepium*	hedge false bindweed	N
9	*Celastrus orbiculatus*	Asian bittersweet	IV
10	*Chenopodium album*	lambsquarters	Intro
11	*Cirsium arvense*	creeping thistle	IV
12	*Cirsium vulgare*	common thistle	Intro

13	*Cynanchum louiseae*	black swallowwort	IV
14	*Cyperus esculentus*	Yellow Nutsedge	N
15	*Daucus carota*	wild carrot	Intro
16	*Digitaria sanguinalis*	Hairy Crabgrass	Intro
17	*Dysphania ambrosioides*	Mexican-tea	Intro
18	*Elymus repens*	creeping wild-rye	Intro
19	*Equisetum arvense*	field horsetail	N
20	*Eragrostis cilianensis*	Stinkgrass	Intro
21	*Eragrostis pectinacea*	Purple Love Grass	N
22	*Erigeron annuus*	annual fleabane	N
23	*Euphorbia maculata*	spotted sandmat	N
24	*Hypericum punctatum*	spotted St. John's-wort	N
25	*Juncus tenuis*	Slender Path Rush	N
26	*Lactuca serriola*	prickly lettuce	Intro
27	*Lepidium virginicum*	poor-man's pepperweed	N
28	*Leucanthemum vulgare*	ox-eye daisy	Intro
29	*Melilotus albus*	white sweet-clover	Intro
30	*Melilotus officinalis*	yellow sweet-clover	Intro
31	*Morella caroliniensis*	small bayberry	N
32	*Oenothera biennis*	common evening-primrose	N
33	*Onoclea sensibilis*	sensitive fern	N
34	*Oxalis stricta*	common yellow wood sorrel	N
35	*Parthenocissus quinquefolia*	Virginia-creeper	N
36	*Persicaria pensylvanica*	Pinkweed	N
37	*Phragmites australis*	common reed	IV
38	*Phytolacca americana*	American pokeweed	N
39	*Plantago lanceolata*	English plantain	Intro
40	*Plantago rugelii*	Rugel's plantain	N
41	*Poa compressa*	flat-stemmed blue grass	Intro
42	*Polygonum aviculare*	dooryard knotweed	Intro
43	*Portulaca oleracea*	common purslane	Intro
44	*Potentilla norvegica*	Norwegian cinquefoil	N
45	*Potentilla recta*	sulfur cinquefoil	Intro
46	*prickly lettuce*	Lactuca serriola	Intro
47	*Pseudognaphalium obtusifolium*	sweet everlasting	N
48	*Raphanus raphanistrum*	wild radish	Intro
49	*Rhus copallinum*	winged sumac	N
50	*Rhus glabra*	smooth sumac	N
51	*Rosa carolina*	Carolina rose	N
52	*Rubus discolor?*	Himalayan/European blackberry??	Intro
53	*Rubus flagellaris*	northern dewberry	N
54	*Rudbeckia hirta*	black-eyed susan	Intro/N
55	*Salsola kali*	Saltwort	Intro

56	*Sambucus nigra*	black elderberry	N
57	*Solanum dulcamara*	climbing nightshade	IV
58	*Solanum emulans*	Eastern Black Nightshade	N
59	*Solidago sempervirens*	seaside goldenrod	N
60	*Spartina patens*	saltmarsh hay	N
61	*Taraxacum officinale*	common dandelion	Intro
62	*Toxicodendron radicans*	poison-ivy	N
63	*Trifolium arvense*	rabbit-foot clover	Intro
64	*Trifolium repens*	white clover	Intro
65	*Verbascum thapsus*	common mullein	Intro
66	*Xanthium strumarium*	rough cocklebur	N

References: Stalter, R. and Lamont, E. E. 2005. The Historical and Extant Flora of Great Gull Island, New York. The Journal of the Torrey Botanical Society, Vol. 132