



Seabird Restoration & Research Efforts: 2018

Maine Coastal Islands National Wildlife Refuge

The 2018 seabird nesting season was a mix of conservation success stories as well as a continued example of how many species of wildlife are struggling to adapt to changes in the Gulf of Maine. Maine Coastal Islands National Wildlife Refuge actively manages six seabird colonies along the Maine coast. We place seasonal technicians on the islands for 10-14 weeks to monitor the seabirds, control predators, and conduct research. One of the highpoints of this season was the first successful nesting of common murrens in Maine in over 130 years! Technicians working on Matinicus Rock documented



Common tern chick

at least six murre chicks. We hope this is the first step in establishing a thriving murre colony on Matinicus Rock. In addition, Seal Island NWR continues to support the largest tern and puffin colonies in Maine. The Refuge also continues to be involved in several research projects, as we try to better understand seabird ecology and the challenges that seabirds are facing. Our 2017 pilot effort to track common terns with solar powered satellite tags continues to shed new and exciting information on tern foraging, migratory, and wintering behavior. We are now using DNA analysis of seabird feces to help identify what species of fish the birds are consuming. We hope this information will assist us in our efforts to work with fisheries management agencies to manage the commercial harvest of forage fish.

We also had some conservation challenges this season. The entire Ship Island common tern colony of 519 pairs abandoned the island just their eggs were beginning to hatch. We believe a great horned owl was raiding the colony, and the adult terns chose to abandon the island to avoid the threat of predation. We also had a snowy owl preying seabirds at Petit Manan Island in late June, long after that bird should have flown north.

Much of our seabird restoration and research success is only possible due to our great partnership with National Audubon Society, who help us manage Matinicus Rock, Pond, and Seal Islands. We also have established great partnerships with several universities (i.e. University of New England, Long Island University, UMASS, and Boston University), in an effort to better understand seabird foraging ecology and diet.

Increasing Ocean Temperatures Linked to Decline in Forage Fish Availability:

Sea surface temperatures (SST) in the Gulf of Maine were noticeably warmer during the spring of 2018. That warming trend continued throughout the summer. By early August, SST were approaching 70°, which is 5° above the 30 year average. Researchers have determined that the Gulf of Maine is warming faster than 99% of the global ocean. We believe that forage fish either sought deeper, cooler waters or moved further north. Either way, seabirds were not able to find suitable fish to feed their chicks. Seabird colony technicians working throughout the Gulf of Maine documented a decline in food deliveries to tern and puffin chicks in mid-July. Productivity rates at many of the tern colonies were 30-40% below average. Puffin chicks take longer to develop and generally don't leave the islands until early August. As a result, the decline in forage fish availability was particularly challenging for puffins. On several islands, we documented that the puffin chicks stopped developing for several weeks. While many puffin chicks died, other chicks started growing again in mid-August when water temperatures started to decrease. Seabird managers have not observed this phenomena occurring in our 35 years of monitoring puffins. It is unclear what effect this food shortage might have on the long-term survival rates of chicks that were eventually able to fledge from their burrows.



Puffin Chick

Current Estimate of Seabirds Breeding in Maine

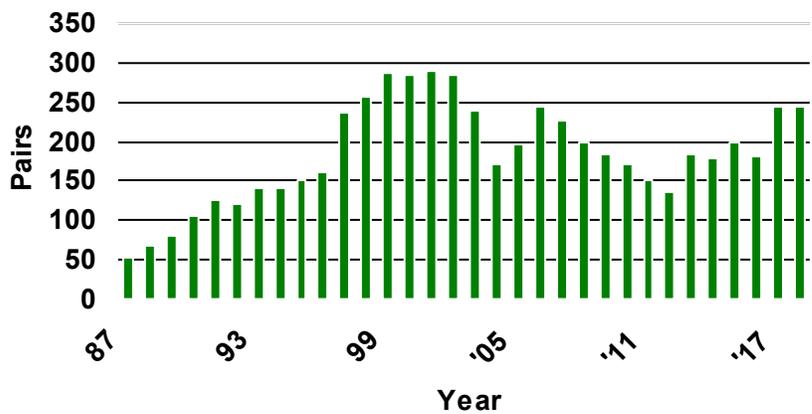
Species	# Breeding Pairs	# Colonies
Roseate Terns	245	5
Arctic Terns	2,523	8
Common Terns	9,515	12-14
Atlantic Puffin	1,145+	5
Laughing Gull	775	3
Great Cormorant	38	2
Razorbill	750+	6
Double Crested Cormorant	9,510	81
Herring Gull	21,488	180
Great Black-Backed Gull	6,934	183
Common Eider	21,000	320
Black Guillemot	12,000 adults	166
Leach's Storm Petrel	10,370	33

Species in shaded boxes are not surveyed every year, and the data represents the most recent survey information.



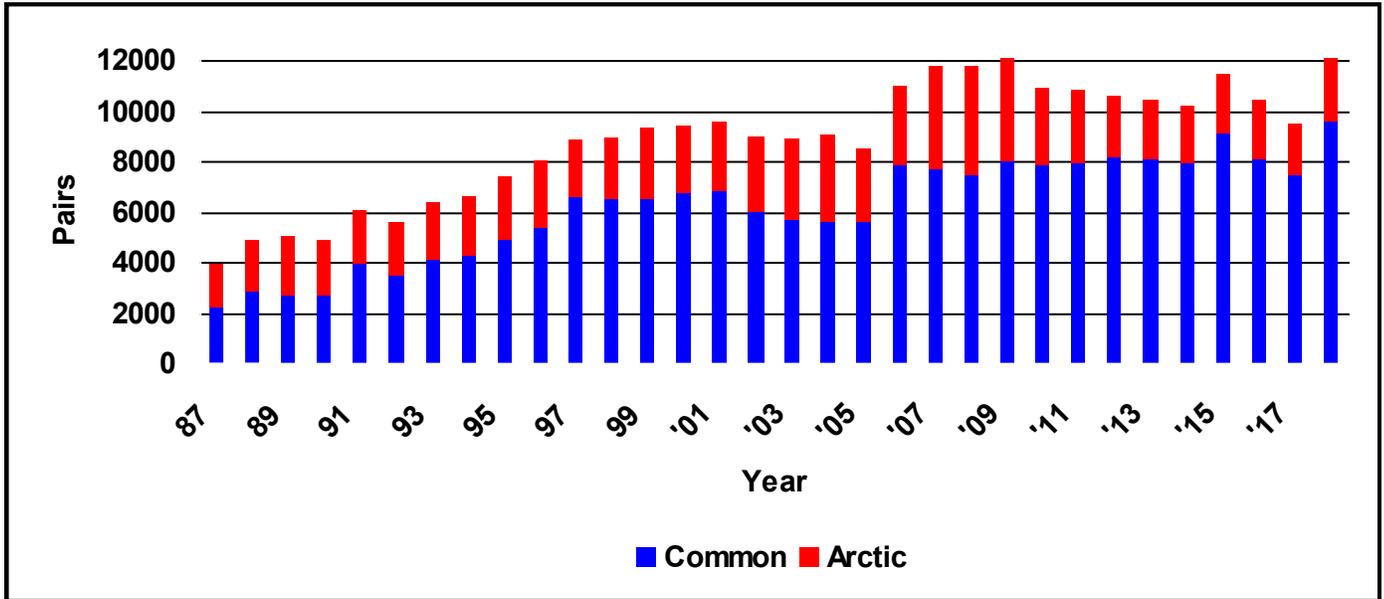
Roseate Tern

Pairs of Roseate Terns Nesting in Maine: 1987-2018



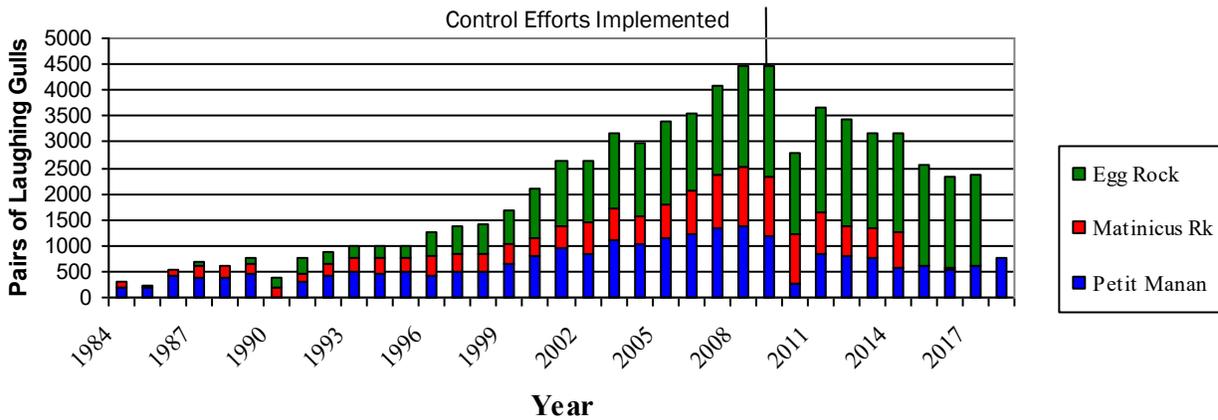
The entire northeast population of roseate terns experienced a significant decline between 2000 and 2009. Managers do not know the cause of that decline. Conditions seem to have improved and the population has increased by 45% since 2013. Researchers are trying to learn about where the terns spend the winter (Brazil and Argentina) and any potential threats they may face during migration.

Common and Arctic Tern Recovery in Maine: 1987-2018

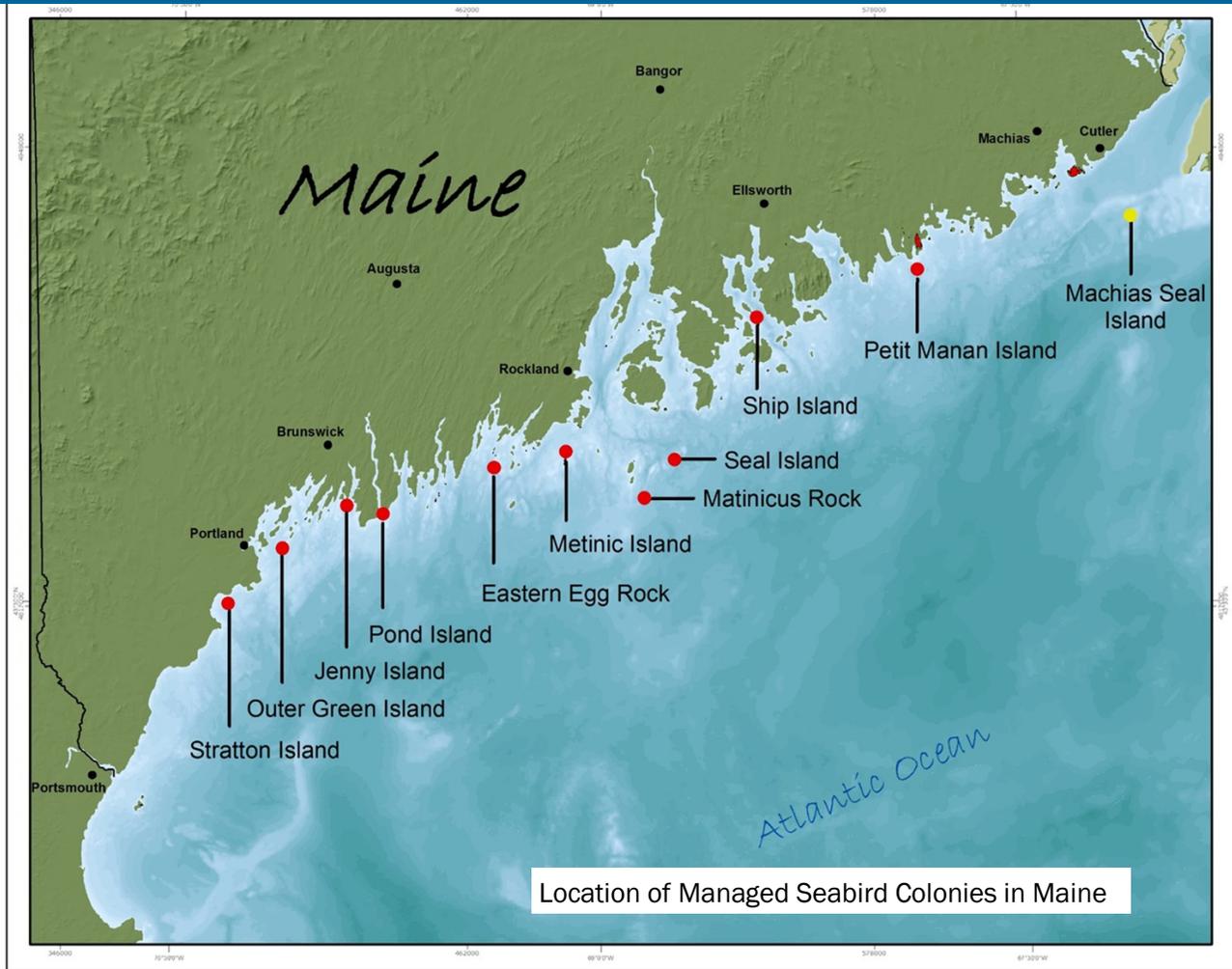


In Maine the common tern population has increased by 28% since 2008, while the Arctic tern population has decreased by 41% during that same time period. The cause of the Arctic tern decline is unknown, but it appears that colonies across the globe are declining. This suggests that issues outside the breeding range may be influencing the species. Arctic terns winter along the icepack of the Antarctic, and complete annual migrations that exceed 42,000 miles !

Pairs of Laughing Gulls Nesting on Petit Manan, Matinicus Rock, and Eastern Egg Rock: 1984-2018



In Maine, laughing gulls only nest on 3-4 islands where seabird managers prohibit the larger great black-backed and herring gulls from nesting. Laughing gulls prey on tern eggs and chicks, and compete with the terns for nesting habitat. Laughing gulls will also steal food from the terns, particularly in years when preferred food (herring and hake) appear to be scarce. To enhance tern productivity and decrease competition for nesting habitat, USFWS and NAS began a Laughing Gull control effort in 2008



Results of 2018 Seabird Surveys in Maine

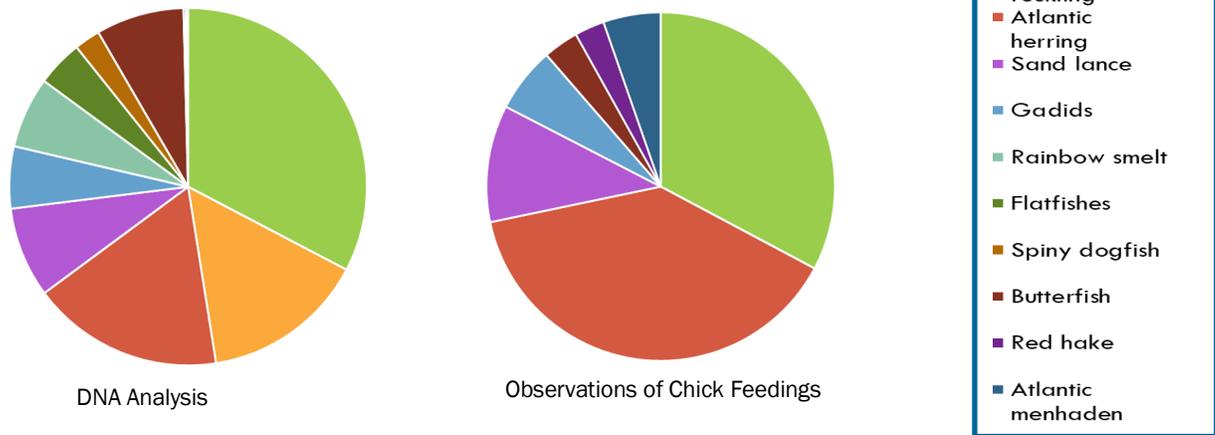
Island	Common Tern	Arctic Tern	Roseate Tern	Atlantic Puffin	Razorbill	Laughing Gull
Petit Manan	899	378	0	62	3	766
Ship Island	519	0	0	0	0	0
Seal	1,207	831	0	565	59	0
Matinicus Rock	268	717	0	355+	400+	8
Metinic	351	491	0	0	0	0
Eastern Egg Rock	1,021	86	87	178	0	1
Pond	1,065	11	2	0	0	0
Jenny	1,426	1	24	0	0	0
Outer Green	1,553	0	4	0	0	0
Stratton	1,206	8	128	0	0	0
All other islands	25	5	0	2-4	No census	0
2018 TOTAL	9,540	2,523	245	1,145+	Est 750	775
2017 TOTAL	8,540	2,151	245	1,100	Est 750	2,365

Research Needs at MCINWR:

- Foraging ecology and diet information for terns, puffins, and razorbills
 - Strategy: New tern GPS tracking project planned for 2019
- Influence of climate change and commercial harvest on forage fish availability
 - Strategy: Continue research in seabird diet using fecal DNA
- Reason for recent decline in Arctic terns and great cormorants
- How other species of concern such as shorebirds, songbirds, raptors and bats are utilizing the Maine coast during migration
- Migration and wintering distribution of puffins and razorbills
- Foraging ecology of Leach’s storm-petrels, and better methods for monitoring petrel populations
 - Strategy: New graduate student research project on petrels planned for 2019
- Potential wildlife conflicts with offshore wind development

Research Highlight: Using DNA Analysis to understand Seabird Diet

In 2017, MCINWR began to partner with the University of New England to use the DNA in seabird feces to understand what species of fish the seabirds are consuming. Although our seasonal technicians spend many hours each summer documenting what diet items are fed to seabird chicks, we know very little about the diet of adult seabirds. It looks like DNA analysis will help us answer that question! The common tern data below indicates that the DNA in common tern feces indicates the birds are eating several species of fish that we haven’t recorded during our feeding studies. We continued collecting samples from terns and puffins in 2018 and are anxious to see the results for the seabirds nesting on PMI, Metinic, Seal, and Matinicus Rock.



Research Highlight: Tracking Common Tern Foraging, Migration, and Wintering Behavior Using Satellite Tags

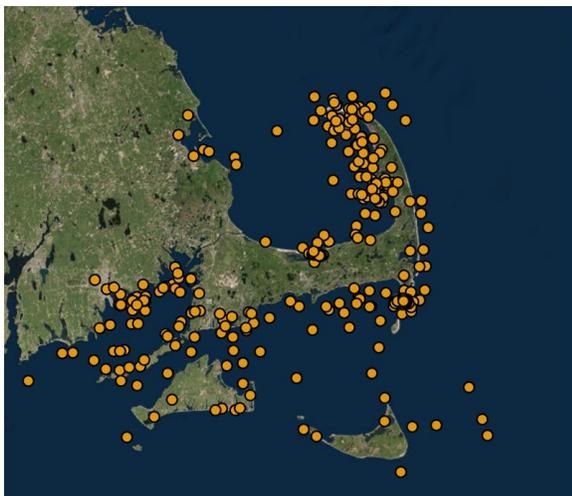
In 2017, the Refuge attached solar powered satellite tags to five common terns at Petit Manan Island. The tag weighed only two grams and were attached with harnesses. This is a new attachment method for us, and we needed to monitor the terns to make sure there were no adverse effects from the tagging effort. We used GoPro cameras to monitor the terns and their chicks throughout the breeding season. The tags could potentially transmit data for several years.

This technology allowed us to track their daily foraging efforts as the terns flew up to 50 km to find food for their chicks.

Upon completion of the breeding season was over, all five terns flew to Cape Cod where they spent 1-4 weeks feeding on sand lance and herring before continuing their migration to South America.

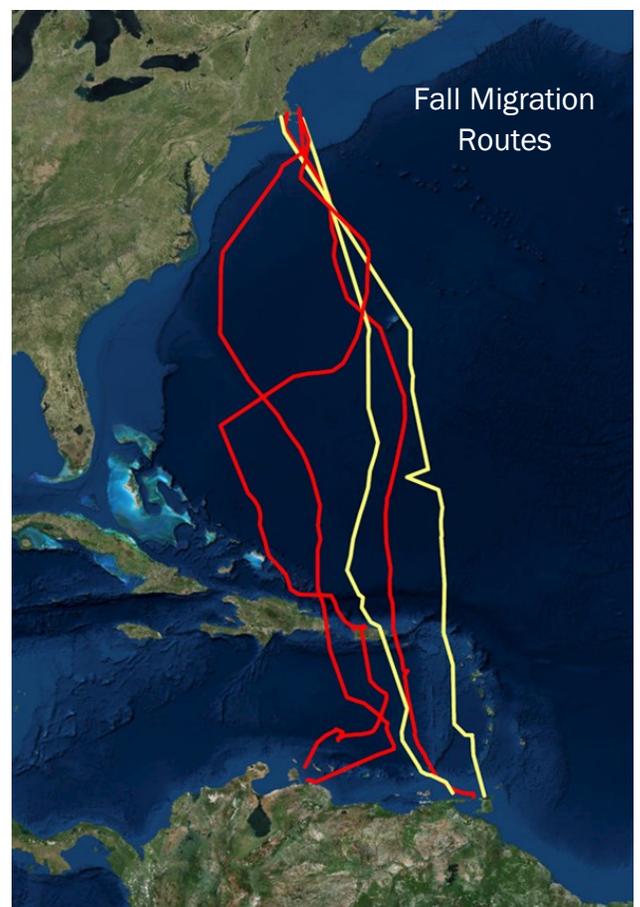


Tagged common tern ready for release on Petit Manan Island



Cape Cod: Fall Staging area for all 5 common terns

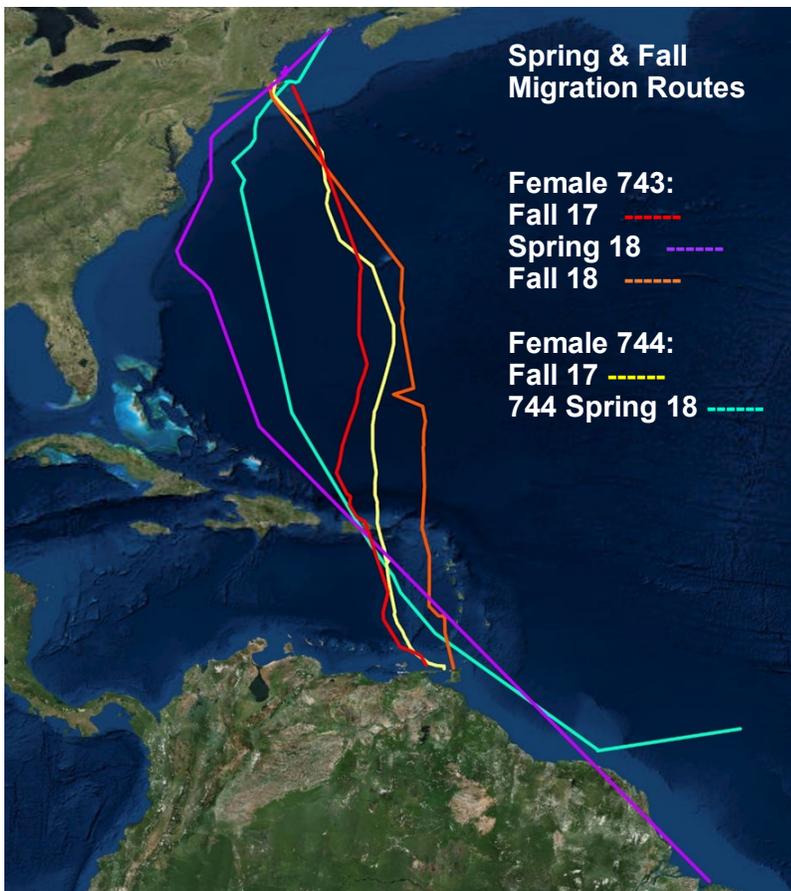
Map to the Right: Female common terns (yellow lines) departed Cape Cod in mid August and flew to Venezuela in six days. Male common terns (red lines) stayed on Cape Cod until mid September and took 7-10 days to reach Venezuela. All three male terns encountered at least one hurricane during their migration. The birds travelled an average of 4,432 km on their fall migration.



Wintering Areas:

Three of the satellite tags continued transmitting the terns' movements during the winter of 2017-18. The birds spent time in Suriname and French Guiana, before spending the majority of the winter in Brazil. In particular, all three birds spent considerable time in Marajo Bay east of the Amazon River estuary. One tern continued flying along the Brazilian coastline and reached Argentina before the transmitter failed.

Wintering locations of three common terns. Red areas represent those locations used most frequently, while blue areas show migration corridors used by the terns.



The satellite tags on the two females (743 and 744) allowed us to document their northward migration in May (purple and green lines). The birds travelled over 6,200 km before they reached Petit Manan Island to begin the 2018 nesting season. By August, only one tag remained active but we were able to document a second fall migration for female 743 (orange line) and continue to track her movements throughout the winter of 2018-19.

This is the first time common terns have been tracked with satellite tags. We hope to use this information to better understand their foraging ecology, to document the location of foraging areas in the Gulf of Maine, to document migration corridors, and to identify wintering areas in South America.

Need for Restoration:

Arctic, common, and roseate tern populations were decimated in the Gulf of Maine in the late 1800's due to a combination of shooting and egging for use as food and bait. Thousands of terns were also harvested to provide feathers for the growing millinery trade. When these activities were halted in the early 1900's, tern populations increased to at least 14,775 pairs in 1931 (including Machias Seal Island). Unfortunately for the terns, gulls also benefited from federal protection, and their numbers rapidly increased along the coast. The prevalence of open landfills allowed herring and great black-backed gulls to produce a greater number of chicks. These chicks also experienced higher survival rates due to the year-round abundance of food. Both species are effective predators of tern eggs and young, and their presence can lead to complete nesting failure or island abandonment by many species of seabirds. Gulls also initiate nesting earlier in the season than terns, which forces terns to nest in marginal habitat. As a result, terns may be more vulnerable to increased predation, inclement weather, and flooding from storms. We estimate that in the early 1900's the Gulf of Maine supported 10,000 pairs of gulls. By the late 1970's, that number had increased to 100,000 pairs. The combination of expanding gull populations and habitat loss resulted in a 50 year decline in the tern population. We estimate by 1977 the Gulf of Maine tern population had decreased to 5,320 pairs. Since 1977, a management plan developed and implemented by the Gulf of Maine Seabird Working Group (GOMSWG) has worked to reverse this decline.

How do we restore a seabird colony?

The first task in re-establishing a colony is to make it safe for terns to nest on their former breeding islands. In some cases, it was sufficient to maintain a human presence on the island to discourage nesting gulls. In other cases, small populations of gulls have been controlled through egg and nest destruction, pyrotechnics, and limited shooting. Larger gull populations were removed with avicide DRC 1339. Avicide allowed managers to remove the breeding population of gulls in a relatively short period of time. Continued gull harassment and nest destruction prevents any additional gulls from settling on the island. If the terns had recently abandoned the site, they may quickly return to the island once the gulls are removed. In situations where terns had not utilized the island in decades, it was necessary to actively attract birds to the islands using social attraction equipment. Managers use sound systems to continuously play the sounds of a tern colony and tern decoys were scattered across the island. Social attraction has been shown to be highly effective in re-establishing seabird colonies on several islands within the Gulf of Maine. Laughing gull, common eider, Leach's storm-petrel, Atlantic puffin, razorbill, and black guillemot may also colonize the islands once the gulls are removed.



Common Tern Decoy



Razorbill Decoys



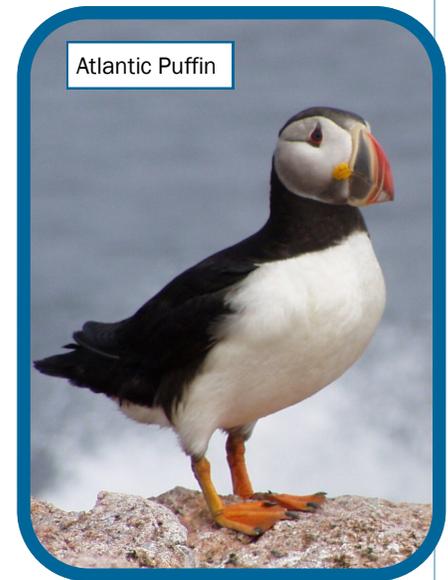
Atlantic Puffin visiting a Razorbill Decoy

Petit Manan Island (PMI)

Petit Manan is a 16 acre island located approximately three miles south of Petit Manan Point in Steuben. This island was historically one of the most important colonial nesting seabird islands in the Gulf of Maine. Significant numbers of terns had nested on PMI, including 1,500 pairs observed in 1971. The light station was automated in 1972, meaning US Coast Guard (USCG) staff no longer needed to live on the island. The numbers of nesting gulls gradually increased on PMI after the USCG departed. The Service acquired this historic lighthouse station in 1974. By 1983 terns no longer nested on PMI, but they were attempting to nest on various other islands in the region. The Service initiated gull control on PMI in 1984, and within one week the terns returned to the island. We believe the rapid success of this project was due to the return of Arctic and common terns that had temporarily been displaced from Petit Manan due to the presence of nesting gulls.

In 2018 the island supported 899 pairs of common terns, 378 pairs of Arctic terns, and 766 pairs of laughing gulls. No endangered roseate terns nested on the island this season. The terns primarily fed their chicks herring and hake this season, but food deliveries for all species decreased sharply in late July. Common tern productivity was 0.88 chicks /pair while Arctic terns produced 0.69 chicks /pair. The Refuge is currently studying the effects of prescribed fire and mowing on the islands' vegetation.

In 2009, the island supported a record high of 104 pairs of puffins. Unfortunately the puffin colony has declined in recent years, and the island supported 62 pairs of puffins this season. We believe puffin burrows have been destroyed by storms and we have been constructing artificial burrows for the puffins. This season we had a high count of 178 puffins, 34 razorbills, 10 common murrelets, and 240 black guillemots visiting PMI. We documented three pairs of razorbills nesting this year, but all three attempts failed. Leach's storm-petrels, black guillemots, and common eiders also nest on PMI.



Atlantic Puffin



Arctic Tern

Seabirds Nesting on Petit Manan: 2014-2018

Year	Common Tern	Arctic Tern	Roseate Tern	Atlantic Puffin	Laughing Gull
2014	668	524	0	73	560
2015	709	477	0	77	620
2016	574	384	0	55	543
2017	657	431	0	58	605
2018	899	378	0	62	766

Ship Island

Ship is an 11 acre island within Blue Hill Bay, located 2.5 miles from Tremont. Historically Ship Island supported over 300 common tern nests, while an additional 500 pairs nested on the adjacent Trumpet Island. Terns stopped nesting on Ship and Trumpet in the 1940's. A tern restoration project was initiated in 1993, and in 1995, after an absence of more than 50 years, terns once again nested on Ship Island. The colony continued to grow and by 1999, the island supported 558 pairs of common terns. Between 2000 and 2004 mink and possibly other predators disrupted the colony, resulting in high abandonment rates and very few chicks being produced. The Refuge decided to terminate the Ship Island project in 2005, however terns continued to nest on the island in small numbers.

After reviewing survey data for the coast of Maine, the Refuge decided to return to Ship Island in 2010. We believed that we had gained sufficient skills to address the mink predation issues. In addition, terns continued to nest throughout the Blue Hill Bay system and we believed that the birds deserved a chance to nest on an island where predators are controlled. The terns responded to our management actions and have nested on the island for the past nine years, and productivity rates are generally very good on the island. In 2018 the island supported 519 pairs of terns. While mink have not been a problem in recent years, we have struggled to control great horned owls. We have removed four owls from the island, and believe a great horned owl caused the complete abandonment of the island in mid June. No tern chicks were raised on the island in 2018. The Refuge will increase our live trapping efforts in 2019 to try and remove the owl before it can adversely impact the tern colony.

In recent years, the Refuge has been trying to create additional nesting habitat in areas of the island that are safe from flooding during storm tides. We have created several gravel / sand nesting areas in the upland portion of the island. We have also conducted prescribed burns on Ship Island in recent years to enhance nesting habitat for the terns. Invasive plants remain a management concern across the entire island as they limit potential nesting habitat for the terns.



American Mink (Photo: Wikipedia)



Great Horned Owl

Photo: Park Service Canada

Seal Island NWR

Seal Island NWR is a 65 acre rocky island located just six miles east of Matinicus Rock, in outer Penobscot Bay. Seal Island was once the largest Atlantic puffin colony in the Gulf of Maine. For over 200 years it was also a summer campsite for fishermen harvesting herring, groundfish, and lobster. The fishermen also used their nets to harvest the nesting seabirds, which led to the demise of the colony by 1887. The island was eventually re-colonized by cormorants, gulls, and terns. By 1953 the growing gull population had completely displaced all nesting terns. The US Navy used the island as a bombing target from the 1940's - 1960's. The Service acquired the island in 1972, and began a seabird restoration effort in 1984. After six years of gull control and social attraction, 20 pairs of Arctic and common terns nested on Seal Island in 1989. In an effort to jump-start a breeding population of puffins on the island, National Audubon Society translocated 950 puffin chicks from Newfoundland to Seal Island between 1984-89. The effort was successful and puffins successfully bred on Seal Island in 1992. In 2018, the island supported 831 pairs of Arctic terns and 1,207 pairs of common terns. Food resources were scarce this year and common tern productivity dropped to 0.48 chicks / pair while Arctic terns produced 0.76 chicks / pair. The primary diet items delivered to tern chicks were hake and butterfish. Seal Island supported 565 pairs of puffins and 59 pairs of razorbills this season. Atlantic puffins produced 0.60 chicks / pair. Seal Island continues to be one of the few islands in the US to support breeding great cormorants, and this season 32 nested on the island. During the nesting season Explorer.org broadcasts images of the seabird colony, including a camera inside an active puffin burrow. Seal Island continues to be cooperatively managed by National Audubon Society and the Service.

Seabirds Nesting on Seal Island: 2014-2018

Year	Common Tern	Arctic Tern	Razorbill	Atlantic Puffin
2014	1,383	855	19	492
2015	1,380	861	32	397
2016	1,309	949	26	510
2017	1,079	739	36	509
2018	1,207	831	59	565

Matinicus Rock & Seal Island....Not Just for the Birds



In January 2016, the National Marine Fisheries Service flew an aerial survey of the Maine coast to count gray seal pups. Gray seals give birth in December and January. The survey found pups on four islands in Maine, including two Refuge Islands: Seal and Matinicus Rock. Seal island had over 1,040 pups while Matinicus Rock had over 140 pups.

Matinicus Rock

Matinicus Rock is a 27 acre island located 24 miles south of Owls Head. The island was owned by the USCG for over 155 years, and is the site of the historic Matinicus Rock Light Station. In the early 1900's, National Audubon Society placed wardens on the island to protect the nesting seabirds. As a result, Matinicus Rock was the only puffin colony (2 pairs) within Maine to survive the hunting that decimated most seabird colonies. Since 1900, Matinicus Rock has been a principal breeding site for Arctic terns on the Maine coast. In 1901, there were approximately 500 pairs of terns, and the population increased to approximately 3,000 pairs by 1931. In 1990, 1,252 pairs of Arctic terns nested on Matinicus Rock. This decline was likely the result of terns moving to the newly established colony on Seal Island NWR. The USCG transferred the island to the U.S. Fish and Wildlife Service in 1999. In 2018, Matinicus Rock supported 268 pairs of common terns and 717 pairs of Arctic terns. Terns primarily fed their chicks hake and amphipods this season. Productivity rates were low for both species, with common terns producing 0.54 chicks / pair and Arctic terns producing 0.55 chicks / pair. In 2014, the island supported 689 pairs of laughing gulls but since 2015 the island staff have harassed the gulls during the settlement period. The approach has been extremely effective, and this year only eight pairs of gulls nested. We estimate a minimum of 355 puffins and 400 razorbills nest on the island. Productivity was low for both species with puffins producing 0.45 chicks / pair and razorbills producing 0.62 chicks / pair. We confirmed eight active murre nests this season, and six chicks were produced. This represents the first successful breeding effort by common murres in Maine in over 130 years! Matinicus Rock also supports the only known active breeding location of manx shearwater in the United States. This was the 10th year that shearwaters bred on the Island, and the research crew observed seven adults and confirmed five chicks. Matinicus Rock continues to be cooperatively managed by National Audubon Society and the Service.



Seabirds Nesting on Matinicus Rock: 2014-2018

Year	Common Tern	Arctic Tern	Razorbill	Atlantic Puffin	Laughing Gull
2014	223	564	No count		689
2015	206	709	No count		0
2016	167	621	400+	355+	35
2017	166	600	No count		1
2018	268	717	No count		8

Metinic Island

The Service acquired 149 acres of the 330 acre Metinic Island in 1994 and 1995. The island is located 12 miles southeast of Rockland. Sheep have grazed the island for generations, and we use them to help manage the vegetation on the island. The Service excludes the 120 sheep from the tern nesting area each summer. When the Service acquired Metinic, a small number of terns nested on the island, however the presence of nesting gulls limited the productivity of the colony. In 1998, the Service initiated a tern restoration project on the north end of the island. The Service placed tern decoys and a sound system, which played the sounds of an active tern colony in an effort to attract additional terns. Although terns landed among the decoys, no terns nested within the restoration area. In 1999, one pair of common terns and two pairs of Arctic terns nested adjacent to the decoy area. Later in the season, nine additional pairs of terns nested near the decoys. By 2004, the colony had grown to over 700 pairs of terns. In 2012, a combination of a severe storm, gull predation, and gull control efforts (i.e. extensive shooting) combined to cause the abandonment of the Metinic tern colony. The colony returned in 2013, and by 2018 the island supported 351 pairs of common terns and 491 pairs of Arctic terns. The island also supports nesting black guillemots, common eiders, Leach's storm-petrels, herring, and black-backed gulls. The island is managed by the Service.

Tern Nesting on Metinic Island: 2014-2018

Year	Common Tern	Arctic Tern
2014	220	257
2015	343	260
2016	290	317
2017	331	295
2018	351	491

Pond Island NWR

The U.S. Fish and Wildlife Service acquired Pond Island from the USCG in 1973. The 10 acre island is located in the mouth of the Kennebec River, and until 1937 supported a common tern colony. Roseate and common terns nested on the nearby North and South Sugarloaf Islands until 1987. Historically, North Sugarloaf was the largest roseate colony in Maine. Nesting gulls had displaced terns on all three islands prior to the restoration efforts that began in 1996. One pair of common terns nested in 1996, and five pairs nested in 1997. Unfortunately, none of these nesting attempts produced any chicks. In 1998, when the one pair of terns nesting on Pond failed to hatch their eggs, NAS transplanted two common tern chicks from the nearby Jenny Island. The chicks were immediately cared for by the adults, and later fledged from the island. In 1999, 10 pairs of common terns nested and for the first time in more than 60 years, raised chicks on Pond Island. The colony has continued to grow, and in 2018 Pond Island supported a record high of 1,065 pairs of common terns, 11 pairs of Arctic terns, and two pairs of endangered roseate terns. Common terns produced an average of 1.28 chicks / pair and primarily fed their chicks sand lance and herring. This island continues to have chronic predation issues, and this year the crew live-trapped a snowy owl and also observed evidence of a mink on the island. In recent years, the technicians have been very successful at quickly trapping the owls, and tern productivity remains high on the island. Pond Island is cooperatively managed by National Audubon Society and the Service.

Tern Nesting on Pond Island: 2014-2018

Year	Common Tern	Arctic Tern	Roseate Tern
2014	612	4	0
2015	685	6	0
2016	773	6	1
2017	942	8	3 late season nests
2018	1,065	11	2

Machias Seal Island (MSI)

Machias Seal Island lies along the Maine and New Brunswick border and is the largest puffin and razorbill colony in the Gulf of Maine. In 2004, they documented 2,158 Arctic and 1,006 common tern nests, at least 3,500 pairs of Atlantic puffin, 560 pairs of razorbills, and 136 pairs of common eider. Unfortunately a combination of adverse weather events and a lack of herring to feed the chicks resulted in total nesting failure in 2005. No terns nested on the island in 2007 or 2008. In late 2009, thousands of terns arrived on the island and demonstrated courtship behavior. In 2011, the researchers estimated that 600 pairs of terns tried to nest on MSI. Unfortunately a combination of peregrine falcon and gull predation resulted in complete abandonment of the tern colony in late June. In 2014, 179 pairs of Arctic terns and eight pairs of common terns nested on MSI, but only produced four chicks. In 2018, 450 pairs of Arctic terns and 26 pairs of common terns nested on MSI. Due to the complexity of the alcid nesting area it is very difficult to get accurate counts of breeding pairs. The most recent estimates are: at least 2,850 pairs of razorbills, 5,400 pairs of Atlantic puffins, and 350-500 pairs common murre. The Atlantic Cooperative Wildlife Ecology Research Network has been conducting seabird research on MSI since 1995. Several commercial tourboat operators visit the island and bring a limited number of tourists ashore. The ownership of the island is disputed between the United States and Canada. The Canadian Coast Guard staffs the lighthouse on the island. The Service has a Memorandum of Understanding with Maine Department of Inland Fisheries and Wildlife (MDIFW) to manage the island.



Eastern Egg Rock

Eastern Egg Rock (EER) in Muscongus Bay was the first island in Maine to have an active tern restoration program. Common and Arctic terns had been displaced by gulls by 1937, but restoration activities led to re-colonization of the island in 1980. The tern colony increased to 597 pairs in 1983, but declined to just 54 pairs between 1984-1986 due to a combination of avian cholera, restoration of the Petit Manan tern colony, and black-crowned night heron predation. The colony has steadily increased since 1986, and this year the island supported 1,021 pairs of common terns, 86 pairs of Arctic terns, 87 pairs of roseate terns, and 178 pairs of puffins. EER supports 35% of the Maine roseate tern population. In recent years, EER has also supported over 2,000 pairs of laughing gulls but this year the colony moved to Western Egg Rock. The island is owned by the Maine Bureau of Public Lands, and is cooperatively managed by National Audubon Society and MDIFW.

Jenny Island

The two acre Jenny Island is located within Casco Bay, an area that once supported nesting terns on at least nine different islands. By 1990, the expansion of gulls in the Bay reduced the population to 124 pairs of common terns, nesting on three islands. Gull control and increased human presence on Jenny Island were implemented in 1991. The tern colony at Jenny Island increased from 45 pairs in 1990 to 1,050 pairs in 2000. In 2018, 1,426 pairs of common terns, one pair of Arctic terns, and 24 pairs of roseate terns nested on the island. The island is owned by the Maine Bureau of Public Lands, and is cooperatively managed by National Audubon Society and MDIFW.

Stratton Island

Stratton Island is a 35 acre island located in Saco Bay, approximately 1.5 miles off Prouts Neck, in Cape Elizabeth. The island supported 1,500 terns in 1937, unfortunately gulls continued to displace the terns until the entire tern colony was extirpated in 1986. The tern restoration project was initiated in 1987, and succeeded in restoring five pairs of common terns. The colony continued to grow, until chronic predation by black-crowned night heron completely eliminated all productivity and reduced nesting numbers for numerous years. Managers applied aversive taste repellents on the tern chick's leg bands, but that did not halt the predation. The heron was shot in 1994. The colony has responded to the lack of heron predation, and in 2002 supported 1,375 pairs of terns. In 2018, the island supported 1,206 pairs of common terns, eight pairs of Arctic terns, and 128 pairs of roseate terns. Stratton Island is the largest roseate tern colony in Maine, and supported 52% of the state population of roseates. Stratton Island also supported 122 pairs of least terns this year but some eggs and chicks were predated by a black-crowned night heron. The island is owned and managed by National Audubon Society.

Outer Green Island

In 2002, the National Audubon Society initiated a new seabird restoration effort in outer Casco Bay on Outer Green Island. The island is 4.5 miles from the mainland, and it was thought the island would provide a nesting site free from mainland based predators. During the first season, one pair of common terns nested in June, but another 10 nests were established later in the season. In 2003, the island supported 94 pairs of common terns. In 2004, the colony benefited from predator disturbance on several of the other islands in the region and the colony grew to 510 pairs of common terns and eight pairs of roseate terns. In 2005, a mink swam to the island in mid July and killed more than 350 terns (mostly chicks). The mink was trapped in early August. In 2018 the island supported 1,553 pairs of common terns and four pairs of roseate terns. Outer Green is now the largest common tern colony in the state. Outer Green Island is owned by MDIFW and the project is managed by National Audubon Society and MDIFW.



Facts about Seabirds in Maine:

- Within Maine, 99% of Atlantic puffins, common and Arctic terns and all roseate terns, nest on one of the 10 managed colonies.
- MCINWR supports 45% of common terns and 96% of the Arctic terns nesting in Maine. With the exception of 1 pair of Arctic terns in NH, Maine supports all of the Arctic terns breeding in the lower 48 states.
- Within the US, 85% of Atlantic puffins nest on 3 MCINWR islands. The Refuge also supports over 85% of the razorbills breeding in the US.
- Within Maine, 88% of endangered roseate terns nest on two islands.

Recent Changes in Gull and Cormorant Populations



The last statewide survey for gulls and cormorants occurred in 2013. Between 2008 and 2013, great black-backed gulls declined by 31%, herring gulls declined by 12%, and double-crested cormorants declined by 42%. The causes of these declines are not known, but may include predation and declines in marine productivity. The Refuge is working with our partners to try and secure funding for a 2019 gull and cormorant survey so that we can determine if these populations are continuing to decline.



Surveys also indicate that common eiders in Maine have declined by approximately 30% in the past 20 years. Potential causes for this decline include gull predation on eider eggs and chicks, and the declining abundance of their primary food, blue mussels

Common Eider Male (Left) and Female (Right)

(Photo: Kirk Rogers)