

GOMSWG MINUTES – 2010

Welcome and Introductory Remarks: Dr. Stephen Kress, National Audubon Society, Seabird Restoration Program

Steve provided some background as to where we physically are. Today's meeting is on Hog Island, the home of the Audubon camp in Maine since 1936 and still owned by NAS. Difficult financial times have necessitated the development of new partners, including Camp Kieve and others. Beginning this year was a new seabird biology educational program. Other logistics were explained followed by group introductions. The number of individuals who signed the attendance sheet was 71.

Steve described the formation of the original GOMTWG group. Back in 1984, a small group of individuals met in Bangor to develop a conservation plan for terns in Maine because populations had been declining for 50 years. The group acknowledged that the primary problem in Maine was predation by large gulls. Management efforts began with several specific island projects. Following each field season, interested individuals began post-season meetings on Hog Island. 2010 marked the 26th year for this activity.

Today's activities involved island reports from Canada to Massachusetts followed by eight afternoon presentations.

The Brother Islands, Nova Scotia

Julia McKnight

The Brothers Islands are managed, infrequently visited islands, supervised by local steward, Ted D'Eon with support from the Canadian Wildlife Service.

Census

The tern census was conducted on 12 June, 2010. The crew counted 686 Common (COTE) and Arctic (ARTE) Tern nests and 28 Roseate Tern (ROST) nests on North Brother Island. An additional ten ROST nests were documented during the season; bringing the total count to 38 nests by June 27. Terns did not nest on South Brother Island again this year and have not since 2003 (when there were 102 nests).

Current population estimates of breeding terns on North Brother Island are the highest since 2006 (Figure 1). Despite this increase in the number of ARTE and COTE, the number of ROST has undergone a steady and worrisome decline such that, in 2010, the fewest ROST were recorded on the island since annual monitoring began in 1997. In the last five years alone, we have documented a 43% decline in the number of ROST breeding on North Brother Island.

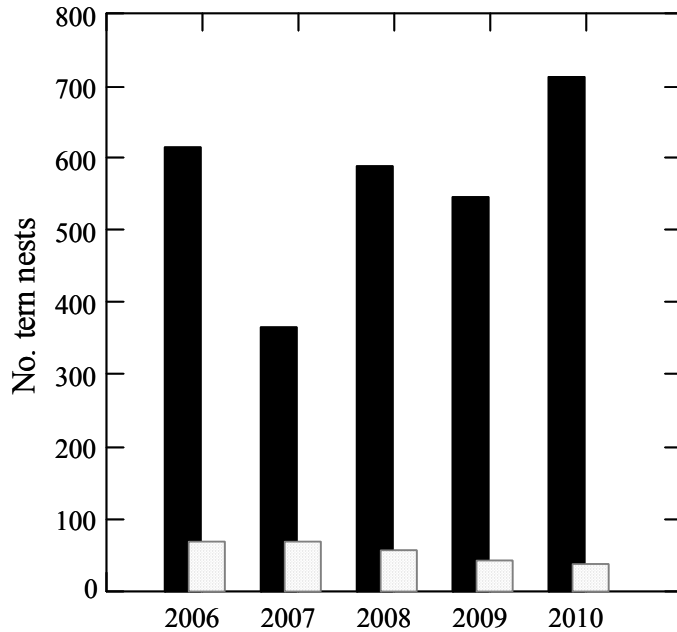


Figure 1: Comparison of tern nest counts on North Brother Island from 2006 to 2010. Black indicates the number of Common and Arctic Tern nests; shaded indicates the number of Roseate Tern nests.

Roseate Tern Productivity

The mean clutch size for ROST on North Brother Island was 1.58 ± 0.50 ($n= 38$ nests). ROST productivity is unknown, although 14 ROST chicks were banded on July 15. No major predation events were documented in the past two seasons; though in 2008, a Great Horned Owl surely affected productivity (and took at least 11 adult ROST).

Predator Control

Gulls did not attempt to nest on North Brother Island. On South Brother Island, eight Great Black-backed Gull nests were destroyed in May and June. Three unfinished unidentified gull nests were also destroyed on South Brother Island in May.

Common Eiders

Three Common Eider nests were found on N. Brother Island. The clutch size for one nest was five and unknown for the other nests. Common Eiders did not nest on S. Brother Island.

Machias Seal Island

Kevin Kelly and Tony Diamond, University of New Brunswick

Summary

The food supply at MSI this year has been below average. In the early season large amounts of Butterfish were seen and in the late season large amounts of Euphausiids were seen. This summer was the first summer of work on a Masters project for Kevin Kelly, working with Becky Holberton and building off her work in past years on alcid conditioning.

This season we also participated in the GPS datalogger project with the USFWS. We deployed five GPS locators on MSI. Four of these birds abandoned their burrows and the chicks either

disappeared or were found dead in the burrow. The fifth puffin was recaptured but when the unit was plugged in it had no data on it. One of the birds who abandoned was resighted later in the season but the GPS unit was no longer attached.

A single Laughing Gull nest was found on the island this year, the first one in a few years. Other bird highlights this year included the second ever documented Cory's Shearwater in New Brunswick, a White-winged Dove and a Blue Grosbeak on the island.

Terns

This year marked the sixth consecutive year with no fledged terns on MSI. There were a total of 91 nests found in marked plots this year, up significantly from last year (35). No tern census was done this year to avoid excessive disturbance to the colony; Estimates of the total tern nests range from 300-500. Normal courtship behaviour began in early May and egg laying began in late May. Colony behaviour changed on June 15th when the entire colony, but for a handful of dedicated incubators, began to abandon the island during the day and return at night. By the end of June fewer birds were returning at night and by mid-July terns were still seen daily but only in pairs or small groups, and never landing on the island. This year did feature the first known tern chicks since 2006. A single Arctic Tern chick was found on June 30th but it died of starvation within 24 hours with no attendant parents to feed it. A few days later another hatched chick was found but it suffered the same fate.

Alcids

	Monitored Burrows	Mean Lay	Mean Hatch	Burrow Occupancy	Hatching Success (total hatch/total active nests)	Fledging Success (total fledge/total active nests)	Growth Rate (mass)
Puffin Linear Growth (day 10-30)	100	May 15	June 24	0.76	0.78	0.71	4.8 grams/day
Razorbill Linear Growth (day 5-15)	87	May 22	June 26	0.62	0.48	0.44	3.2 grams/day

Atlantic Puffin chick diets consisted of 43.9% Euphausiids, 13.4% Herring, 11.8% Sandlance, 8.4% Hake, 7.4% Butterfish and 5.9% larval fish. Razorbill chick diets consisted of 40.2% Butterfish, 23.4% Herring, 11.1% Sandlance and 10.3% Hake. Butterfish were seen more often early in the season, while the Euphausiids showed up later in the season. This season we also had a few instances of Atlantic Saury brought in by puffins, the first recorded instance of these fish at Machias Seal Island.

Predators

This season gull scaring was performed by daily walks around the island to scare them off, by the use of a pellet gun and with a scare pistol by researchers under contract to the CWS. Scaring techniques were largely ineffective with gulls returning shortly after the initial disturbance or else flying to nearby gull rock (250 metres) to loaf. On a visit to gull rock in mid June 25 nests with 67 total eggs were found and destroyed. On a subsequent visit in mid July 13 new nests with 31 eggs were found and destroyed.

One or both of a pair of Peregrine Falcons were seen often this year throughout the breeding season. These caused great disturbance to the terns especially, and it is thought that their presence together on the island for the first time was the tipping point for tern abandonment, as they occurred on the same day.

A single Laughing Gull nest was found on MSI this year with only one egg found in it. It was abandoned approximately the same time as the tern abandonment and LAGUs were seen sparingly following the tern abandonment.

Maine Islands

Eastern Brothers Island

Kelly Young – Island Supervisor, Brandon Coones

2010 was the 4th year of efforts to establish a new tern and alcid breeding colony on Eastern Brothers Island in Jonesport, Maine. The 17 acre island is currently utilized by black guillemots, common eiders, and Leach's storm petrels.

Black Guillemots and Mink Predation

A gull distress sound system (BirdGard) was not used this spring to deter gull nesting and loafing. The Refuge was concerned that in addition to mink predation over the last several years, the BirdGard sound system was contributing late BLGU nest initiation. On May 16, a high count of 625 guillemots were seen adjacent to the island birds were actively prospecting burrows. By June 13, few guillemots were found in burrows and the first mink sign of a cached adult guillemot was found. An average of 480 guillemots were seen during morning counts throughout the season. A female mink and 4 young offspring were removed from June 26 to July 10 using a .22 rifle, conibear traps, and a large Havahart trap. The mink killed a total of 30 BLGU adults, 5 BLGU eggs, and 2 COEI. At least half of the E. Brothers BLGU population did not nest in 2010 and 25% of the nests initiated failed due to mink predation. Only 41 of 73 burrows contained eggs by the end of July compared to an estimated 200 active nests in 2009 (137 confirmed and 70-85 unconfirmed).

Terns

A tern sound system, 50 tern decoys, and an electric fence to protect the tern nesting area from sheep were deployed on May 15, 2010. Sheep grazed Eastern Brothers year-round for the first time since the mid-1990's and vegetation height and density across the island has been considerably reduced. The first common tern was observed on May 15, a COTE nest with 2 eggs on June 6, and 2 chicks hatched on June 27. One chick fledged on July 20 but the second chick died within a few days after hatching. Small groups of terns 2-5 were seen throughout the season. Adults commonly delivered butterfish to chicks.

Alcids

One hundred alcid decoys were placed along cliffs on March 18. Small numbers of RAZO were regularly seen foraging near the island though no birds were observed interacting with decoys this year. Up to 75 RAZO were seen >500 yards from shore and puffins (max of 24) were seen on three occasions.

Petit Manan Island

Amanda Boyd- Island Supervisor, Matt Stevens, Kayla Pelletier, Leticia Solis

Petit Manan Island					
	2006	2007	2008	2009	2010
COTE					
# of Nests	1601	1343	1307	1374	912
Mean Clutch Size	2.04	1.70	1.83	1.93	1.7
Mean Hatch Success*	78.0%	64.8%	85.3%	85%	47.9%
Mean Fledge Success*	74.4%	76.7%	71.6%	56%	54.4%
Chicks fledged/Pair*	1.18	0.76	1.12	0.90	0.43

ARTE					
# of Nests	779	1038	1255	1268	688
Mean Clutch Size	1.99	1.53	1.55	1.68	1.6
Mean Hatch Success*	83.6%	51.9%	75.3%	78.0%	21.6%
Mean Fledge Success*	52.9%	62.8%	81.3%	54%	62%
Chicks fledged/Pair	0.84	0.45	0.95	0.70	0.21

ROST					
# of Nests	22	5	4	4	2
Chicks fledged/Pair	0.78	0.20	1.00	0.20	0.00
LAGU nests	1282	1350	1363	1171	270
ATPU nests	70	53	93	104	88
COEI nests	138	49	105	101	53
LHSP Nests					25
*when available, data in parenthesis includes fledglings later dead after the GOMSWG fledge date of 15 days					

Census

The GOMSWG census was conducted June 16 and 18th. During the census we counted tern, laughing gull and common eider nests across the entire island. We documented 1,513 tern nests with a Lincoln Index (1.05%) corrected total of 1,595 nests. This is a 38 % decrease from the 2009 season (2,642 nests). Our species ratio was determined by identifying incubating terns on 221 nests (13% of tern nests) across the island. We determined that the colony consisted of 43% ARTE (686 nests) and 57% COTE (909 nests). The island supported only one pair of ROST this season. PMI had 53 breeding pairs of common eiders.

Tern Productivity

COTE and ARTE numbers showed a significant decrease in reproductive success as compared to the previous eight years. We banded 286 tern chicks this summer. We followed tern chicks beyond the GOMSWG 15day fledging date, and found that reproductive success decreased by 13% during this time period.

Tern Provisioning:

We followed 35 ARTE and COTE nests for a total of 140 hours, including 490 prey deliveries. The average number of food items delivered per hour for Arctic terns was 2.04 and 3.29 for common terns. The primary prey delivered to COTE chicks was Atlantic Herring. The primary prey delivered to ARTE was invertebrates. A-chicks (first hatch) received 84.3% of the food deliveries while B-chick (second hatch) received .49% of the food deliveries. The other food deliveries consisted of stolen or discarded prey items, unknown (observer couldn't determine who received food item) or parents consumed prey item. Kleptoparasitism was frequently observed at end of field season.

Diet Item	% COTE diet	% ARTE diet
Herring	26.8	6.7
Butterfish	24.7	5.6
Sand Lance	2.8	0
Invertebrate	21.5	48.3
Larval Fish	4.0	28.1
Lump Fish	7.0	5.6

ARTE Metapopulation Project

We continued to participate in the ARTE Metapopulation Project in 2010. We read 161 bands this season, including 89 ARTE, 70 COTE and 2 ROST. We used modified bow net traps to trap 42 ARTE and 18 COTE this season.

Predators and Control Efforts

During the census, all LAGU eggs were poked resulting in a total of 270 nests counted and destroyed. Many of the LAGU appeared to be initiating nesting efforts at the time of the census, so a second LAGU census was conducted 20 July. The second census re-sampled 8 of the 21 grids of LAGU habitat (40% of the control area). An additional 207 nests were counted and destroyed during the second census. Using a correction factor, it is estimated that the LAGU population on PMI this summer consisted of 594 pairs. Twenty-four additional LAGU nests were destroyed later in the season. As part of LAGU control, Refuge staff removed 30 adult LAGU this season. We observed at least 48 tern eggs missing or destroyed by predation throughout the season. One HEGU, one GBBG and one CORA were shot by the crew when observed preying on tern and/or alcid nests.

We had predation concerns with a pair of Common Ravens that were believed to be nesting on Green Island. The CORA were recorded on PMI 58 times during the field season. One RAZO egg (out of only 3 RAZO burrows on the island) was found predated, believed to have been eaten by a CORA. Shortly after discovering the predated RAZO egg, one CORA was shot trying to enter into ATPU burrow.

Peregrine falcons visited PMI over 100 times, for 47 days of the season. Peregrines created a lot of disturbance to the nesting birds on the island. The terns were frequently observed swarming around the island in reaction to the Peregrine presence. The disturbance caused the terns not to incubate their eggs on a regular basis. So therefore, Refuge staff did their best at keeping the PEFA away by using noise makers, and bird deterrents. In addition to the Raven and the Peregrine, a Northern Harrier, a Long-eared Owl and several Merlin were observed in the 2010 season.

Alcids

This season we documented 89 pairs of puffins. The alcid high counts for the season were: 212 Atlantic puffins (6/17), 32 Razorbills (7/4), 17 Common Murres (6/19) and 464 black guillemots (5/23). We observed 3 active razorbill burrows, all of which did not produce chicks. We banded 30 puffins this summer (11 chicks and 19 adults). Puffin productivity was 0.49 chicks / burrow. We re-sighted 148 individual ATPU this field season.

Ship Island

Audrey Albrecht – Island Supervisor, Ethan Barton

Background

Ship Island, a new Maine Coastal Islands NWR tern restoration project, supported a successful Common Tern (*Sterna hirundo*) colony in 2010. The Refuge managed a restoration project on Ship island from 1993-2005. The Refuge terminated the project in 2005 due to excessive predation from mink. During the four years that Ship Island was a productive tern colony under Refuge management, the colony averaged more than 1.5 chicks/nest, and herring dominated the diet. Prior to the predation issues that plagued Ship Island, it was one of the more productive tern colonies along the coast.

Refuge staff have evaluated the geographic distribution and number of tern colonies along the Maine coast and determined that a restoration project on Ship Island will contribute to tern recovery objectives within the Gulf of Maine. Over the past 10 years, Refuge staff acquired considerable experience trapping mink on seabird islands and are confident we can adequately protect the terns nesting on Ship Island.

Census

The island was monitored by a two-person crew from May 13-July 28. Early season gull presence caused the abandonment of ~30 nests in late May. A complete census was conducted on June 18 and June 21. The GOMSWG window tern count for Ship was 41 active nests and 15 abandoned nests. A Lincoln correction factor was not needed or applied. The number of tern pairs continued to increase as the season progressed and gulls were dissuaded from the island. A peak of 80 pairs (160 terns) was recorded at the end of July.

Nesting

The first tern nest was located on May 17 and the last new nest was found on July 25. At the time of the crew's departure on July 28, there were 45 abandoned or failed nests, 32 hatched

nests, and 85 more whose fate is unknown. For all nests documented throughout the season, clutch sizes included sixty 1-egg clutches, seventy-nine 2-egg clutches, twenty-one 3-egg clutches, one 4-egg clutch, and one 5-egg clutch. The majority of the abandoned nests were 1-egg clutches.

Productivity

Because of late nesting and an asynchronous colony, productivity (chicks per pair) is not available. The first nest hatched on June 30, and nests were still hatching at the time of the crew's departure. Only 32 of 117 active nests had hatched by July 28, with a total of 64 chicks produced. Very few hatched chicks were later found dead. Forty of the chicks hatched were at least 13 days old at the time the crew left.

Provisioning

The crew had limited success monitoring the provisioning of food to chicks this season. Nest 7 was the most easily observed, and was watched from hatching to fledging. Of 214 feedings observed, there were 9 species of prey delivered. 46% of feedings recorded were invertebrates, 20% herring, 9% unknown, and the other 25% were sand lance, stickleback, butterfish, pollock, hake, bluefish, and unknown larval fish. The average delivery rate was 3.1 prey items per hour. Due to the vegetative cover, it was not always evident which chick was being fed, but all 3 chicks survived and were observed receiving food until the last day of observation. Earlier in the season, herring was a more common prey item. As the season progressed, there was an influx of invertebrates, and towards the end we saw an increased diversity of fish species.

Predator Control

The presence of the crew seemed to be beneficial, particularly for predator control. Fortunately no mink invaded the island in 2010. Mink traps were set early in the season and checked daily. Gulls regularly loafed near the colony at low tide and regularly disturbed terns until a problem gull was shot and displayed. A total of 2 HERG and 2 GBBG were removed. Peregrine Falcons (*Falco peregrinus*) frequently predated the colony with 24 observed and 9 observed tern kills.

Seal Island National Wildlife Refuge

Island Supervisor: Matt Klostermann; Resident Intern: Lauren Scopel

The birds on SINWR benefited from much better weather than last year, but were hurt by a poor food supply. Many tern chicks died from starvation and puffin chicks seemed to grow rather slowly compared to 2009, when herring was plentiful.

Tern Census

Due to safety concerns on the island, a complete tern census was not performed in 2010. However, a partial census was conducted (14 of 30 marked grid squares were counted) and the total number of nests in these areas has been determined to consistently represent, on average, 57% of the total nest number of the colony over the last eleven years in which a complete census was performed (1996-2006). The total estimated number of nests was 3,026. Species ratio was determined by marking a circle with a radius of 16 meters around 9 blinds and identifying as many nests to species as possible within that radius.

Table 1. Number of nests per species from 2006-2010 (2007 numbers are from the second census, conducted just before hatch).

	2006	2007	2008	2009	2010
Arctic Tern	1,015	823	1,084	991	1,238
Common Tern	1,726	1,005	1,283	1,580	1,788
Roseate Tern	1	0	0	0	2
Laughing Gull	0	0	0	0	0

Tern Productivity

Common and Arctic Tern productivity in 2010 were both the lowest recorded on the island in more than 20 years. Terns brought their chicks mostly large butterfish early in the season, which the chicks were unable to eat, and many died from starvation. One of our two Roseate Tern nests fledged a chick.

Table 2. Number of tern chicks fledged per nest from 2006-2010.

	2006	2007	2008	2009	2010
Arctic Tern	0.72	0.67	0.93	0.74	0.53
Common Tern	0.94	0.66	1.11	1.07	0.53
Roseate Tern	0.00	-	-	-	0.50

Tern Feeding

Common Tern chick diet was composed mostly of butterfish, while Arctic Tern chick diet was composed mostly of amphipods and hake. The high proportion of amphipods provided to ARTE chicks and the high proportion of butterfish provided to COTE chicks resulted in large numbers of starved chicks.

Table 3. Major prey species and percentage of diet for Arctic and Common Terns.

	Amphipod	Hake	Butterfish
Arctic Tern	22.93	23.72	16.6
Common Tern	0.96	21.77	42.58

Predation

Gull predation in 2010 was constant, but not severe. At any one point in time, a few individual gulls were sporadically taking tern chicks and eggs. A Merlin was residing on the island for 2-3 weeks in July and took many large chicks. A juvenile Peregrine Falcon and then an adult visited the island for about a week in late July and took several fledgling and adult terns.

Table 4. Gull control measures in 2010 by species.

	# Nests Destroyed	# Shot
Herring Gull	185	7
Great Black-backed Gull	57	4
Laughing Gull	0	4

Atlantic Puffins

The estimated minimum number of active puffin burrows was 500. Our high count of puffins was 746, which was up from 651 in 2009. Puffin productivity was estimated to be 0.77 chicks/pair (sample size = 61 active burrows) as compared to 0.72 chicks/pair in 2009. Puffin chick diet was composed of 30.95% pollock, 19.22% hake, 8.84% herring, and 7.65% butterfish.

Black Guillemots

This year was the fourth year that Black Guillemot productivity and growth were tracked on the island. Productivity was determined to be 0.5 chicks/pair, which was down from 0.62 chicks/pair in 2009. Guillemots laid later than normal this year and many pairs seemed to stop incubating in late June/early July. Also, since nesting was late, many nests were not tracked to fledging and the fates of those nests were unknown.

Razorbills

A total of 19 active Razorbill burrows were found on the island this year, which is up from 14 last year. Hatch success was 0.63%.

Common Eiders

A total of 78 nests were counted in late May, although their main nesting area (Area 4) was not counted to minimize disturbance to the birds.

Great and Double-crested Cormorants

The cormorant colony on the western end of the island was counted by boat to minimize disturbance to the birds.

Bird Sightings

A Red-billed Tropicbird was seen on the island for the sixth year in a row. It was first sighted on May 21 and was last sighted on August 6. It was seen on 50 days throughout the summer – up from 36 days last year – and was again seen loafing under a boulder in Area II.

Matinicus Rock NWR

Co-Supervisors Nathan Banfield and Caroline Poli

During the 2010 season Matinicus Rock received 7 inches of rain. Our average temperature was 62 degrees F and our average sea surface 54 degrees F. The food quality this year was poor with many tern and alcid chicks fledging at low weights. Predation from Herring, Great Black-Backed, and Laughing Gulls was a problem throughout the season.

Tern Census

927 tern nests were counted during census (June 15-16). 674 of these were Arctic Terns and 253 were Common Terns for a species ratio of 73% ARTE and 27% COTE. Our Lincoln Index correction factor was 1.092. One Roseate Tern nest was found this year after census was completed.

Laughing Gull Census

This is the first year since 2004 that we observed a decrease in Laughing Gull nests. Heavy culling seems to be having an effect on the LAGU population. The 958 nests counted this year represent a 17% drop from last year.

Productivity

Arctic Terns fledged 0.38 young per nest. Mean clutch was 1.77 for 56 nests. Common Terns fledged 0.61 young per nest. Mean clutch was 2.57 for 38 nests. Predation by gulls was a major factor in this year's low productivity, with Laughing Gulls preying opportunistically on tern eggs and chicks throughout the season. We found that productivity was lowest in plots where LAGUs and terns nested in close proximity (0.08 and 0.14) and highest where terns nested among other terns or in LAGU-free areas (.86 and 1.0). Predation by Herring and Great Black-backed Gulls was also widespread. Poor quality food was another factor in overall low productivity.

Atlantic Puffin hatch success was 0.77 (n = 71) and productivity was 0.70 (n = 71). This is slightly lower than previous seasons. We banded 177 chicks this year. Although this is 67% more than the previous all-time record high, our success is attributed to a thorough, methodical technique, and does not necessarily represent a population increase. Razorbill hatch success was 0.37 (n = 63), and productivity was 0.16 (n = 61). 51% of all active nests failed due to missing eggs or chicks (32 of 63). This suggests heavy predation. Gull activity in the colony was high throughout the season. Ravens were also observed moving throughout the colony and most likely were a factor. Poor quality food was another factor in low productivity. Some indicators of poor food observed this season were late laying, sporadic and prolonged incubation, slow chick growth, and low fledging weights.

Leach's Storm Petrel hatch success was 0.56 (n = 71). This is low compared to the 5 year average of 0.9. Manx Shearwaters were seen on the water in groups of 11 to 16 regularly throughout the season and heard calling on 57 out of 78 nights. On July 28th we found a large downy chick in one of at least four burrows known to be active. This is the second documentation of a Manx chick at Matinicus Rock. The first record was in September of 2009 when a fully feathered chick was found in a different burrow.

Feeding Studies

Arctic Tern feedings were 34% hake, 23% butterfish, 27% unknown prey, and 9% invertebrate. The average feeding rate was 1.24 deliveries/hour. Common Tern feedings were 31% butterfish, 29% hake, 10% invertebrate, 14% unknown. The average feeding rate was 1.11 deliveries/hour. Additional Common and Arctic Tern prey items included pollock, Atlantic saury, herring, lumpfish, stickleback, snipefish, squid, rock eel, and sandlance in small quantities.

Puffin bill-loads consisted of 37% white hake, 23% silver hake, 11% butterfish, and 7% herring. In the previous two seasons, euphausiids and herring represented the majority of puffin feedings. This is the first season in which silver hake was a major part of chick diet. Razorbill feedings were 40% hake, 28% butterfish and 15% herring.

Gull Control

During census, all eggs in 958 LAGU nests were poked to prevent hatching. An additional three nests were destroyed outside the census period. 127 adult LAGU were shot throughout the season, with effort concentrated on parts of the island where LAGUs and terns nested in close proximity to each other. No Herring Gull or Great Black-backed Gull nests were found this year. Adults killed included 16 Herring Gulls and 10 Great Black-backed Gulls. We analyzed stomach contents of 7 gulls and found an eider duckling in one Black-backed and a RAZO fledgling in another.

Unusual Birds

A White-winged Dove was observed on August 7th. Photographs were taken. Our high count for Common Murres was 144. No eggs were observed this year.

Metinic Island

Brette Soucie – Island Supervisor, Charlie Walsh

Census

The Gulf of Maine Seabird Working Group (GOMSWG) census was conducted on June 10, 2010. A corrected total of 759 tern nests were counted on the North End of Metinic. One roseate tern nest was found with one egg on June 7 but was not successful. The South End of the island is privately owned and visited only during the GOMSWG census window.

Metinic Island					
	2006	2007	2008	2009	2010
COTE					
# of Nests	138	338	303	387	406
Mean Clutch Size	2.25	2	2.17	2.37	2.32
Mean Hatch Success*	93%	75%	85%	87%	84%
Mean Fledge Success*	73%	56%	81% (71)	47% (41)	44% (35)
Chicks fledged/Pair	1.73	0.8	1.49 (1.09)	1 (0.8)	0.85 (0.70)
ARTE					
# of Nests	322	321	409	393	352
Mean Clutch Size	1.9	1.7	1.61	1.75	2.32
Mean Hatch Success*	66%	67%	83%	81%	84%
Mean Fledge Success*	63%	38%	80% (59)	50% (41)	37% (35)
Chicks fledged/Pair	1	0.4	1.11 (0.97)	0.81 (0.64)	0.32 (0.29)
ROST					
# of Nests	2	0	0	0	1
Chicks fledged/Pair	1	-	-	-	0
South End					
ARTE and COTE nests	28	2	9	1	2
*when available, data in parenthesis includes fledglings later dead after the GOMSWG fledge date of 15 days					

Productivity

Overall Fledging/reproductive success was low this year (under the 1 chick/nest USFWS goal). We believe that this was a result of inadequate food supply starting the last week of June and continuing throughout the rest of the chick rearing season. Due to the increase in butterflyfish, stickleback, and invertebrates, most of the 2nd and 3rd hatched chicks and many of the 1st hatched chicks were unable to acquire the necessary nutrients.

Provisioning

We were able to follow 7 Common tern and 12 Arctic Tern nests throughout the season, for a total of 135 observational hours and 907 feedings. COTEs fed at an average rate of 1.7 feedings/hour, while ARTES fed at 1.3 feedings/hour. Both Arctic and Common Terns delivered Atlantic Herring most frequently to their chicks consisting of about 30% of their diet which is comparable to the past couple years. However, the next most frequent deliveries differed. Arctic Terns brought miscellaneous invertebrates (including ants and moths) then Hake, while Common terns most frequently brought butterflyfish and sand lance. Herring comprised ~50% of COTE diet until the end of June, followed by 30% herring and 50% butterflyfish in July. The overall Arctic tern chick diet consisted of 32% herring, 30% invertebrates, and 14% butterflyfish with the highest invertebrate abundance in mid-July.

	Herring	Invert	Butterfish	Sandlance	Stickleback	Hake	Tadpole
COTE	148	13	130	47	34	6	8
ARTE	114	107	49	5	7	30	11

Predators

- One Peregrine Falcon remained on island throughout the season (observed 14 times). At least 5 adult tern kills were found early in the season. A bird banger was used to successfully scare the falcon into the forest.
- Evidence of an owl (owl feathers and one tern kill) was found in the colony on multiple occasions. We occasionally observed adult terns abandon the colony at night (sometimes complete abandonment, sometimes partial) which resulted in many dead pipping eggs. Padded leg hold traps were erected on two separate perches, yet the owl was never seen or caught.
- Gulls: eggs from 203 Herring gull nest and 18 Great Black-backed gull nests were punctured. No LAGU nests were found, though there were up to 6 LAGU seen near the colony at a time (chasing the terns as they came in to feed their chicks).
- Great Black-backed gulls were noted at the beginning of the season to be scoping out the colony and harassing the terns as they were initiating nesting. Two were shot, one of which was displayed in the colony.
- Herring Gulls were responsible for the death of at least 6 tern fledglings. Three HERG were shot with one displayed in the colony. Two additional HEGU with broken wings were removed.

Black Guillemots

55 Guillemot nests were located with a hatch success of 56% and an egg depredation rate of 11%. 43 chicks were found and 35 were banded, weighed, and measured.

Petrels

66 Leach's Storm-petrel burrows showed signs of activity (smell, fresh piled dirt, activity at night) early in the season however only 5 were noted to have eggs or adults present at the end of July. At the end of our field season, 28 burrows were no longer active and 20 still showed some activity yet nothing could be seen with the burrow scope. An inexpensive scope was purchased from a hardware store to aid in guillemot and petrel monitoring. The scope did not work well in the stone wall area which contains sharp turns and additional light (causing glare) but worked in other areas.

Common Eider

Eider numbers were low this year with averaging only between 100-150 eiders at each morning count which appeared to average between 150 and 300 the past couple years. Only 45 observations of eider crèches were documented (at least 6 separate crèches). Eight eiders were banded by USGS and MDIFW.

Incidental Sightings

Species highlights: American Avocet, American Oystercatchers, Razorbill, Atlantic Puffin, Whimbrel.

Eastern Egg Rock

Juliet Lamb, Supervisor

Summary

Census numbers for all nesting larids dropped on Egg Rock in 2010, with Roseate and Common tern numbers reaching a five-year low and Laughing gulls decreasing for the first time since 2006. Unlike 2009, in which weather was the primary determinant of breeding bird productivity on Eastern Egg Rock, 2010's success seemed to depend mostly on food quality and availability. In mid-July, unfledged tern chicks began to lose weight and eventually starved to death. Nevertheless, productivity remained close to the historic island average.

Census

Island staff identified Arctic and Roseate tern nests between 9 and 20 June, with both species decreasing over 2009 levels: Arctic terns to 83 total nests (from 100), and Roseates from 101 to 82 nests. From 14 to 15 June, researchers conducted an island-wide Common tern and Laughing gull nest count. Common terns also decreased from 2008, with a raw total of 616 nests that was then corrected, via a Lincoln index of 1.159, to 714 nests. Laughing gulls nesting also decreased for the first time since 2006, with 1,553 nests found (compared to the all-time high of 2,127 nests in 2009). 59 Common eider nests were identified opportunistically during the census.

Larid Productivity

Researchers studied tern productivity using both fenced and unfenced plots. The 56 nests in the common tern plots hatched at a high rate of 2.36 chicks per nest, although the fledging rate fell to 1.09. Roseates, generally less exposed, hatched 1.89 chicks/nest and fledged at a rate of 0.72 chicks/nest for the 73 nests we followed. Arctic terns were hit hardest by predatory gulls, as well as by late-season storms, and our 36 study nests fledged only 0.64 of the 1.83 chicks hatched per

nest. For the third season in a row, a group of 23 Laughing gull nests was fenced and monitored throughout the season; this group hatched 2.30 chicks/nets and fledged 0.87. Predation events were rare in 2010, and poor weather did not seem to have a significant impact on fledging success; instead, the highest cause of mortality in all larid species was starvation, with intraspecific competition also a factor for Laughing gulls.

Diet

Researchers observed 13 Common tern nests for a total of 922 hours. Hake was the most frequently-fed item, comprising 35% of feedings. Butterfish followed close behind at 23%, and the only other items fed at any significant rate were herring (8%) and ants (5%). Arctic tern diets, determined from 301 hours spent observing eight successful nests, were slightly weighted toward hake, at 29%, followed closely by amphipods at 20%. Lumpfish and butterfish, at 7 and 5 % respectively, were the only other fish species comprising more than 1% of ARTE chick feedings. Roseate terns, observed over 307 hours for eight nests, were most strongly skewed toward hake (61%), followed by herring and butterfish at 4%. Average prey sizes were small, with hake, the most abundant food item, averaging close to one culmen length for all species. Boluses collected opportunistically from laughing gull chicks were predominantly fish, shrimp, clam worms, and scarab beetles, with large numbers of cunner dropped in the paths.

Atlantic Puffins

Puffins had their most abundant year in Egg Rock history, with 123 active burrows on the island. The fledge rate of 0.96 chicks/nest was about average for the island. The majority of their feedings (62%) were hake, but herring (15%) and butterfish (5%) were also significant components. Most hake were small, averaging only 1.16 culmen lengths.

Predation

The largest sources of predation on Egg Rock were Herring and Black-backed gulls, with most activity occurring around peak hatch and peak fledge. Researchers shot 12 Herring and two Great Black-backed gulls over the course of the season, as well as destroying one HERG nest. Egg Rock also participated in efforts to reduce Laughing gull numbers in the Gulf of Maine, both by poking all LAGU nests during census and by shooting 156 adults. There was a fairly high level of Laughing gull predation on Common and Arctic tern eggs, and several fledgling common terns were found dead around the island following apparent attacks by Laughing gull adults. During the first week of August, a juvenile Peregrine falcon visited the island multiple times per day and was observed taking tern and Laughing gull fledglings, both on the island and on the water.

Other

This was the second year of research for a graduate student project on tern habitat management. Island staff also successfully deployed 15 geolocators on Arctic tern adults nesting on the island. This summer, Egg Rock welcomed 74 visitors, primarily donors and media personnel.

	2006	2007	2008	2009	2010
COTE					
census count	763	1206	1129	1036	714
Clutch	2.11	2.04	2.31	2.3	2.36
Hatch	1.33	1.75	1.95	1.97	2.08
Productivity	0.64	1.19	0.87	0.70	1.09
ROST					
census count	113	118	129	101	82
Clutch	1.6	1.51	1.9	1.93	1.89
Hatch	1.15	1.15	1.5	1.34	1.72
Productivity	0.95	1.06	1.03	0.69	0.72
ARTE					
census count	80	101	111	100	83
Clutch	1.57	2	1.79	1.8	1.83
Hatch	1.23	1.48	1.39	1.1	1.69
Productivity	0.62	0.97	0.71	0.37	0.64
LAGU					
census count	1486	1705	1972	2127	1553
Clutch	--	--	2.57	2.26	2.30
Hatch	--	--	2.1	1.74	1.91
Productivity	--	--	1.2	0.74	0.87
ATPU					
number of nests	82	90	101	107	71
Productivity	0.89	0.93	0.95	0.79	0.86
Gulls Shot					
GBBG	2	5	2	1	2
HERG	5	4	6	6	12
LAGU	0	0	93	89	156
Gull Nests Destroyed					
GBBG	1	0	0	0	0
HERG	1	2	5	1	1
LAGU	0	811	1982	2127	1553

Pond Island NWR

Elizabeth Zinsser, Supervisor

Weather on Pond Island in 2010 was both warmer and drier than in 2009. The mean temperature was 66.1°F with a high temperature of 88°F and a low temperature of 49°F. The average sea surface temperature was 57.7°F with a high of 65°F and a low of 52°F. The seasons' rainfall total was 9.06 in.

“Funk” was first identified on July 1, 2010 and was observed on several second wave hatched chicks through July 12, 2010. Cases were found on the spine, in the productivity plots and on the beach dunes. Fifteen young chicks (2 or 3 days old) were observed with sores on their backs, swollen eyes and bloody nares. Older chicks were found with necrotic sores on their heads and wings and appeared weak. All of the young chicks died as a result of funk but the older chicks recovered. Funk mortality was not significant overall in the colony.

Arctic Tern nests disappeared as eggs, most likely due to predation by European Starlings or American Crows. Roseate Terns were found nesting in the colony however they abandoned shortly after camp was opened. Neither Arctic Terns nor Roseate Terns fledged any chicks.

Census

Census for Common Tern nests was conducted on June 15th, 2010. The census crew found 519 nests and a Lincoln Index Factor of 1.04 was calculated. The corrected number of nests, including the feeding study and productivity nests was 590, an increase of 34% compared to 2009. Before census three Arctic Tern nests were found on the spine of the island; three pair of Roseate Terns were discovered on June 1st, when the island was opened for the season, but all nests were abandoned within 2 days of arrival on the island. A Common Eider census was not conducted due to the presence of poison ivy in the nesting areas.

Productivity

Common Tern clutch size was 2.71 eggs per nest, with an average hatch of 2.35 eggs per nest. Fledging rates were significantly higher this year at 2.08 chicks per nest, compared with last years' fledging rate of 0.79 chicks per nest. Chick mortality was sporadic throughout the season, largely resulting from neglect of C chicks. Only one chick death could be directly attributed to exposure; it was found dead after a rain storm.

Neither the Arctic Tern nests nor Roseate nests yielded any chicks this season. The Roseate nests were directly next to the camp area and the parents abandoned shortly after our arrival on the island. The Arctic nests were likely predated, either as eggs by Common Ravens or European Starlings or as chicks by a Great Horned Owl. No relay nests were found.

Tern Chick Diet

This year four feeding studies comprising 24 nests were watched, yielding 2,647 feedings over a total of 1,056 hours of observation. Sandlance made up the largest portion of the chick diet at 39.1%, a decrease from 46% of feedings in 2009. Herring was the second most common prey item at 10.9%, a decrease from 17% in 2009. Bluefish made up 6.4% of the diet as the third most common prey item. In 2009 the third most common prey item was Sand Shrimp at 12 % of

feedings. Hake was the fourth most abundant species at 5.7% and Butterfish made up 4.3% of the diet. An interesting note about tern feedings this summer was that terns were occasionally bringing in multiple sandlance in one feeding. Between two and five sandlance could be brought in at once.

Predation

The 2010 season was characterized by a lack of predator problems as compared to past years. A single Great Horned Owl was active in the colony between June 22, 2010 and June 30, 2010. The owl took at least 7 Common Tern adults and 1 Arctic Tern adult. It is unknown whether the owl took any chicks. The owl was captured in a leg hold trap after 229 trap hours over four nights. The terns continued to abandon at night for a week after the owl was caught but no further sign of predation was found.

	2006	2007	2008	2009	2010
COTE					
Nmbr. Nests	36	30	45	39	39
Avg. Clutch	2.2778	2.5	2.6889	2.7436	2.7083
Avg. Hatch	1.1667	2.3667	2.3333	2.2051	2.3452
Avg. Fledge	0.4	2.0333	1.0667	0.7949	2.0833
ARTE					
Nmbr. Nests	5	0	4	4	3
Avg. Clutch	1.6	-	1.75	1.50	1.67
Avg. Hatch	0.4	-	0.5	1.0	0
ROST					
Nmbr. Nests					3
Avg. Clutch					1.3
Avg. Hatch					0
Avg. Fledge					0
Gulls Shot					
GGGB			3	1	2
HERG			3	0	1
Gull Nests Destroyed					
GBBG			2	0	0
HERG			2	0	0

No gull nests were found on Pond Island this summer making 2010 the second consecutive year that the island was free of nests. Great Black-backed Gulls were observed taking harassing the Common Eiders early in the season and were seen to eat a single duckling. Herring Gulls began predated the colony on July 4, 2010 and continued to do so until the island closed on July 23, 2010. Researchers observed approximately 2 chicks a day being taken by Herring Gulls. There

was also a Great Black-backed Gull taking chicks on the spine but its impact was less well documented because the spine is not visible from camp or the blinds. One Herring Gull was shot on July 16, 2010 and two Great Black-backed Gulls were shot, one on July 16, 2010 and one on July 18, 2010.

Merlin predation was not a consistent problem in 2010. A Merlin was first observed on June 10, 2010 and visited the colony on June 18, June 22, and July 5. The only Merlin kill was found on June 22, 2010.

Jenny Island

Island Supervisor: Yvan Satgé

In 2010, Jenny Island was occupied from June 14th to July 21st. Research plots, blinds, feeding studies, and research canvas tent were set up prior to June 14th. Numbers of nesting terns (Common and Roseate) greatly increased since the previous season. All of the birds studied had already fledged or passed the 15 day fledging date when we closed down the field station. Killings of chicks by neighboring adults and starvation of most of C chicks were the main cause of mortality. Nevertheless due to both good weather and high quality of food, productivity was the highest (1.90 fledgling per pair) since 2000 when mink predation jeopardized the future of the colony. Adult terns were observed feeding hake, herring and butterfish. Mackerel was brought in, in large quantities at the end of the season.

Gull control mostly involved destruction of all LAGU nests and the removal of two predatory Herring Gulls. Three decapitated Common Terns were found during census and on the following days and a Great Horned Owl was trapped on June 21st.

Census

A direct nest count was conducted on June 14th. 801 Common Tern (COTE) nests were counted. The adjusted count was 854 nests. This number represents an increase of 48% from the 2009 season. 29 Roseate Tern (ROST) nests were found during or before census and 3 more were found before the end of the GOMSWG count period for a total of 32 nests (29 more nests than in 2009). No Arctic tern (ARTE) nested on Jenny Island this year. 38 initial Laughing Gull (LAGU) nests and 2 re-nests were counted (only 8 nests were found in 2009); no re-layed LAGU nests were found after the GOMSWG census period.

Tern Productivity

A sample of 48 COTE nests were monitored to determine productivity. The average clutch size was 2.77, the average hatch was 2.41, and the average number of chicks fledged (reaching 15 days) per pair was 1.9 (an increase of 10% from 2009). ROST productivity was calculated from all 32 nests: the average clutch size was 1.75, the average hatch was 1.56 and the average number of fledglings was 1.25.

Table 1: GOMSWG Census Results 2004-2010

Year	COTE	ROST	ARTE	LAGU
2004	213	2	1	1
2005	532	11	0	1
2006	589	15	1	5
2007	680	16	0	15
2008	556	2	0	10
2009	578	3	0	8
2010	854	32	0	38/2*

* initial/re-nest

Note: 19 out of the 35 identified banded ROST breeders had fledged from Eastern Egg Rock, ME.

Table 2 : COTE Productivity 2004-2010

Year	N	Avg. Clutch (SD)	Avg. Hatch (SD)	Avg. Fledging (SD)
2004	31	2.35 (0.11)	2.13 (0.10)	1.13 (0.17)
2005	25	2.20 (0.58)	1.88 (0.93)	1.00 (0.65)
2006	43	2.47 (0.50)	2.20 (0.89)	1.05 (0.82)
2007	51	2.35 (0.49)	2.08 (0.79)	1.67 (0.58)
2008	45	2.24 (0.57)	2.02 (0.78)	0.89 (0.53)
2009	39	2.51 (0.51)	2.31 (0.66)	1.72 (0.51)
2010	48	2.77 (0.47)	2.41 (0.79)	1.90 (0.66)

Table 3: ROST Productivity 2005-2010

Year	N	Avg. Clutch	Avg. Hatch	Avg. Fledging
2005	11	1.64	1.27	1.18
2006	11	1.45	1.36	1
2007	16	1.82	1.75	1.72
2008	2	1.5	1.0	0.0
2009	3	2	1.33	1.5
2010	32	1.75	1.56	1.25

Predator Control

Predatory events occurred at the beginning and the end of the season: two decapitated COTE were found on June 14th and another one on June 19th. A Great Horned Owl was trapped on the 21st with a leg-hold trap and, except for one decapitated chick found the same day (probably killed by the same owl before being trapped), no further sign of owl predation was observed. Predated split and poked eggs were observed during census but no more were found once the field station was set up and LAGU nests destroyed. Later in the season, two Herring Gulls were observed taking Common Eider chicks and were shot. A Great Blue Heron landed close to the colony and was scared away, and a Black Crowned Night Heron has been seen flying by but no

predation attributed to herons was observed. A Merlin caught a fledgling on July 18th. No signs of mammal predation were found prior to the opening and no mammal predation occurred during the season.

Feeding Studies

COTE feeding studies were carried out from three observation blinds this season; ROST nests were too scattered and hidden to allow a relevant feeding study. 20 COTE nests were monitored. 1,128 hours of observation produced 1,538 feedings, resulting in an average rate of 1.35 feedings/hour. The mean prey length was 1.37 bill lengths. Hake, Herring and Butterfish formed the majority of the feedings (respectively 34.2%, 21.7% and 11.7%) which shows a switch from Herring to Hake from the last season (50.4% of Herring and 7.8% of Hake in 2009). Other fish species delivered to the colony were Mackerel (5.2%), Lumpfish (5.0%), Pollock (2.2%) and Sand Lance (1.2%). Mackerel appeared abruptly in the diet on July 13th and, although it decreased in frequency, was delivered until the end of the season.

Table 4: COTE Diet 2010

Prey Item	% of Diet
Hake	34.2
Herring	21.7
Butterfish	11.7
Unknown fish	7.4
Mackerel	5.2
Lumpfish	5.0
Hake or Herring	4.6
Unknown	2.9
Pollock	2.2
Sand Lance	1.3
Others species	4.0

***Hen Island, Prince Gunnet Island and Uncle Zeke Island, ME
(Unmanaged) Monitored by C. Scott Hall, SRP Research Coordinator and Yvan Satgé,
Supervisor of Jenny Island***

Census

Census was carried out on June 16th. No terns were nesting on any of the three historic islands. No signs of predation were observed. In 2008 and 2009 respectively 121 and 109 COTE nest had been found on Hen Island. Some of the increase in the number of COTE nesting on Jenny Island in 2010 can be accounted to the move of this satellite colony.

Outer Green Island 2010

Co-supervisors Grant Humphries and Emily Weiser

Census

The GOMSWG census was conducted on 15 June 2010. The count produced a total of 1,067 Common Tern (COTE) nests and 15 Roseate Tern (ROST) nests. A Lincoln Index Correction factor of 1.014 was applied to the COTE count and all research nests were added to bring the total to 1,151 COTE nests. This was an increase of 37.5% over 2009's nesting numbers and the largest number ever recorded on OGI. All 22 grid squares on the island contained COTE nests, which is a first in the 9-year history of Outer Green Island (OGI). The vast majority of the nests were located on the island's periphery, especially the southern end. This was the first year since 2007 that ROST nested on the island, probably due in part to a sound attraction system installed last year. The ROST nests were distributed in 4 clusters of 2-5 nests each, with two additional solitary nests. Most were on cliff edges just outside of the COTE nesting area, with 5 nests on rocks in vegetation. The next tern colony to the south, Stratton Island, hosted a predatory mink early in the season, which may have prompted many COTE and ROST to move to OGI to breed this year. No Arctic Terns (ARTE) nested on OGI this year, but one or two pairs were seen prospecting the colony later in the season.

GOMSWG Census totals for Outer Green Island, ME:

	2002	2003	2004	2005	2006	2007	2008	2009	2010
COTE	1	94	510	971	732	937	828	837	1151
ROST	0	0	8	36	6	7	0	0	15
ARTE	0	0	0	0	0	0	1	2	0

Productivity

COTE egg laying began about the same time as 2009 but earlier than previous years, with the first eggs seen on 24 May 2010. Average clutch size ($n = 68$) was very high at 2.81 eggs per nest, the second highest recorded for OGI. This may be because COTE were bringing in large numbers of herring during egg-laying. The first COTE hatched on 15 June 2010 with peak hatch occurring between 20 and 25 June 2010. Hatching success was very high at 2.6 chicks per nest, which is the second highest recorded for the island. Productivity was exceptionally high with 2.1 chicks fledged per nest, by far the highest recorded for the island. Good weather throughout the summer, with only two or three major thunderstorms and lots of warm sunny days, probably helped boost fledging success this year. Food was generally good and a large run of 3-4 bill-length mackerel occurred just before peak fledging. Several productivity plots had very high fledging success with up to 2.7 chicks fledged per nest. Only one plot had relatively poor productivity; it experienced relatively high rates of mortality due to conspecific attacks and starvation and fledged only 1.5 chicks per nest.

ROST also experienced very good success this year. Clutch sizes averaged 1.73 eggs per nest, hatching success was 1.40 chicks per nest, and fledging success was 1.32 chicks per nest.

Yearly OGI Common Tern Reproductive Performance:

	2004	2005	2006	2007	2008	2009	2010

Census Count	497	971	732	936	828	837	1151
Avg. Clutch Size	2.26	2.22	2.35	2.48	2.32	2.87	2.81
Hatching Success	1.92	1.69	1.92	2.24	2.08	2.70	2.63
Fledging Success	1.45	0.67	1.13	1.71	0.61	1.68	2.09

Yearly OGI Roseate Tern Reproductive Performance:

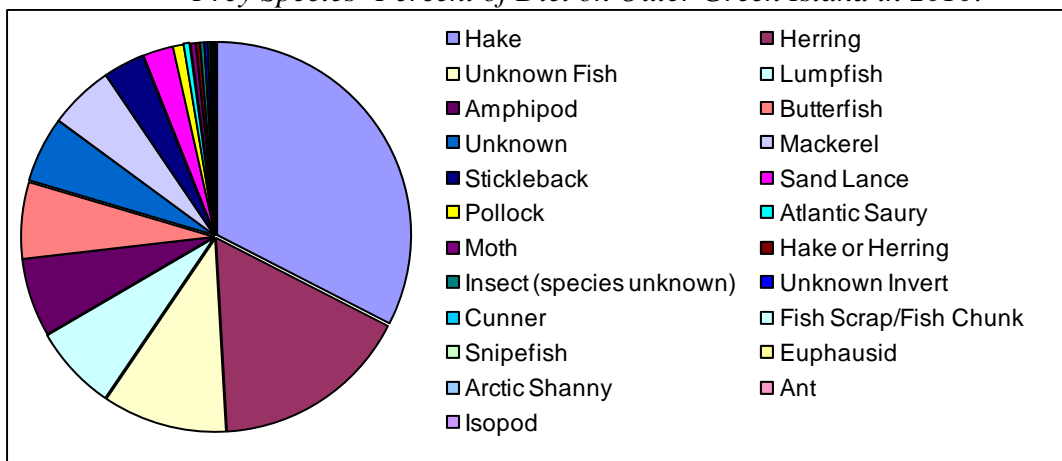
	2005	2006	2007	2008	2009	2010
Census Count	36	6	7	0	0	15
Avg. Clutch Size	1.47	1.40	1.63			1.73
Hatching Success	1.14	1.40	1.25			1.40
Fledging Success	0.97	1.47	1.36			1.32

Provisioning

Courtship provisioning was monitored at 19 COTE nests on OGI, with 104 feedings observed over 187 hours of observation, for an average of 0.6 feedings per hour. During courtship feeding, herring (48.6%) was the most prevalent fish observed provisioned to mates, with hake (16.2%) and lumpfish (9.5%) the next most abundant fish. The abundance of high-quality herring likely helped explain the relatively high average clutch size on the island.

Chick provisioning was recorded at 27 COTE nests on the island, with 2,886 feedings observed over 1,524 chick-hours of observation, for an average feeding rate of 1.9 per hour. Average prey size was 1.2 bill lengths, which was relatively small for the island, probably due to large numbers of very small (~1 bill length) hake brought in early in the chick-rearing period. Hake (32.5%) was the most common fish provisioned to chicks, followed by herring (16.6%), lumpfish (7.1%), and various other fish and invertebrates. By mass, mackerel was probably also a very important part of diet, especially around peak fledging; but mackerel made up only 5.4% of fish by number.

Prey Species' Percent of Diet on Outer Green Island in 2010:



Predation

Predation was a relatively minor problem on OGI this year. Two Great Black-backed Gull (GBBG) nests were destroyed on the island when field camp was opened in mid May, and

neither pair attempted to re-nest on OGI. Three pairs of GBBG attempted to nest on neighboring Junk of Pork and a total of 5 nests were destroyed, including 2 re-nests. No Herring Gulls (HERG) attempted to nest on either island this year. Gull predation was not a problem until tern chicks began fledging, when both GBBG and HERG were observed to take just fledged or nearly fledged chicks. Nine gulls (5 HERG, 3 GBBG, 1 Laughing Gull) were culled at this time to reduce predation.

Yearly Number of Gull Nests Destroyed on Outer Green and Junk of Pork Islands:

Number of Nests Destroyed (OGI & Junk of Pork)	2004	2005	2006	2007	2008	2009	2010
Great Black-backed Gull	30	48	28	16	10	9	7
Herring Gull	3	33	8	9	5	2	0
Total	33	81	32	25	15	11	7

Weather

2010 was a warm season on OGI. The island received a total of 9.1 inches of precipitation on 32 of the 70 days recorded between 18 May and 27 July 2010. Temperatures ranged between a low of 45 and a high of 89, with average temperatures of 58°F for May, 61°F for June and 69°F for July.

Other Species/Projects

The 2010 field season was the fourth year of monitoring Black Guillemot (BLGU) productivity on OGI. This year, 10 of the 12 known BLGU burrows were occupied and 8 burrows hatched eggs. The average clutch size was 1.8 eggs per burrow and the average hatch was 1.4 eggs per burrow. Of the 14 chicks that hatched, one was found dead (crushed by a rock) and one went missing, bringing the fledging success to 1.2 chicks per burrow for the season.

Common Eiders continued to nest on the island. Although no full scale surveys were made, 8 nests were found of which 4 were confirmed successful. Two of the remaining nests were on a trail to a blind and were abandoned, likely due to disturbance.

Stratton Island

Island Supervisor: Rich Stanton, National Audubon Society SRP

Census

Complete nest counts were conducted for Common, Roseate, Arctic, and Least Terns. A total of 731 Common Tern nests were counted during the census; this was corrected for observer error (Lincoln Index = 1.10). Fifty-three feeding study and productivity plot nests were then added to yield an adjusted total of 857 Common Tern nests. This is a 17% decrease from 2009's adjusted total of 1,037 Common Tern nests. Nests of Roseate and Arctic terns were flagged before the Common Tern census and when encountered up to 20 June 2010. This year's count of 35 Roseate Tern nests was lower than 2009's count by 54%. The 12 Arctic Tern nests found in 2010 was the same as in 2009. Table 1 shows the number of tern nests found each year from 2004-2010.

Least Terns have nested on Stratton Island since 2005. Three colony-wide censuses were conducted in 2010. During the first census on 11 June, 76 active nests were found. Extremely high tides (11 ft. +) combined with storm surge overwashed most of the nests in the colony between 10-14 July. Six nests were washed away completely. The 76 active nests encountered in 2010 mark a 6% increase from 2009's 72 active nests.

Table 1. Number of tern nests found on Stratton Island from 2004-2010, by species.

Year	COTE	ROST	ARTE	LETE
2004	231	11	9	0
2005	156	2	3	19
2006	672	84	9	58
2007	752	80	9	113
2008	951	67	9	59
2009	1037	76	12	72
2010	857	35	12	76

Productivity

Common Tern productivity (fledglings/nest) was estimated from a sample of 53 nests in 5 fenced enclosures and 2 unfenced feeding studies. Thirty-two Roseate Tern and 12 Arctic Tern nests were monitored in unfenced productivity plots. Common and Arctic Tern chicks surviving to 15 days old were considered fledged. Roseate Tern productivity was calculated using methods developed by the Roseate Tern Recovery Team.

Compared to 2009, clutch sizes were similar for all tern species. However, hatching success was very different. Common Tern hatching success was greatly reduced this year, at 70% compared to 95% in 2009. Arctic Tern hatching success was 76% in 2010 compared to 54% in 2009. Only 47% of Roseate Tern nests hatched in 2010, compared to 69% in 2009. Fledging success for Common Terns was 1.67 chicks/nest in 2010 compared to 1.74 chicks/nest in 2009. Fledging success for Roseate Terns was lower than last year, at 0.98 chicks per nest. Arctic Tern productivity was 0.92 in 2010. Arctic Tern productivity was not calculated in 2009.

Chick survival in 2010 was likely influenced by a combination of predation pressure, weather events and food availability. Total rainfall in 2010 was 11.98 inches, much less than the 23.7 inches received in 2009. No chicks in our productivity sample died of exposure, and quality food such as herring was available throughout the chick-rearing season. Gull predation was observed on several occasions, especially on foggy days and at night. Black-crowned Night Heron predation on Common and Arctic Tern chicks also occurred. Breeding parameters for Common, Arctic, and Roseate Terns are summarized in Table 2.

Table 2. Breeding parameters for Common, Arctic, and Roseate Terns on Stratton Island in 2010. Data for 2009 shown in parentheses.

Species	Mean Clutch Size	Hatching Success	Fledging Success	# of Nests Monitored
COTE	2.64 (2.76)	1.85 (2.60)	1.71 (1.74)	55 (42)
ARTE	2.00 (---)	1.50 (---)	0.92 (---)	12 (12)
ROST	2.06 (1.98)	0.88 (1.46)	0.98 (1.31)	32 (61)

Tern Provisioning

Thirteen Common, 7 Roseate, and a subset of Least Tern nests were included in chick provisioning studies. Observers spent 455 nest hours watching Common Terns, 166 nest hours watching Roseate Terns, and 24 nest hours watching Least Terns. Feeding rate (items delivered/hour) for Common Terns was 1.66 in 2010 compared to 2.00 in 2009. Feeding rate for Roseate Terns was 2.34 compared to 1.06 in 2009. Average prey size (measured in bill lengths) was 1.42 for Common Terns, 1.77 for Roseate Terns, and 1.17 for Least Terns.

Common Terns fed a variety of herring, hake, and sand lance to their chicks in 2010 (Table 3). Roseate Terns fed primarily sand lance with lesser numbers of herring and hake. Least Terns fed primarily hake with small numbers of sand lance and herring. Kleptoparasitism of Least Terns by Common Terns was seldom observed during the season. However, kleptoparasitism among Common and Roseate Terns was observed frequently after chicks had fledged, presumably reflecting a late-season decrease in fish availability.

Table 3. Principal prey items (percent) in tern chick diets on Stratton Island 2010. *n* is the total number of prey items delivered.

Prey Item	COTE	ROST	LETE
Herring	34.27	11.34	4.55
Hake	14.65	6.44	71.66
Sand Lance	10.06	51.55	4.86
Butterfish	4.08	0.00	0.40
Stickleback	0.64	0.00	0.00
<i>n</i>	785	388	247

Predator Activities and Control Efforts

Herring and Great Black-backed Gull control measures included nest destruction, egg-poking, displacement walks, audio harassment (using a Bird-Gard electronic playback system) and shooting of predatory and territorial individuals. Gulls were displaced and all nests destroyed in Gull Meadow during daily walks between 6 May and 12 July. Gull eggs were poked on Little Stratton during visits on 13 May, 1 Jun and 9 Jun. On Bluff Island, gull eggs were poked during visits on 27 May, 12 June, and 15 June. Overall, 17 Herring Gull nests (34 eggs) and 12 Great Black-backed nests (28 eggs) were poked or destroyed on Stratton, and 131 Herring Gull nests (309 eggs) and 127 Great Black-backed Gull nests (184 eggs) were poked on Bluff. Additionally, 39 Herring Gull and 30 Great Black-backed Gull chicks were killed during visits to Bluff. Thirty-three Great Black-backed and 30 Herring Gulls were shot in 2010.

A single Black-crowned Night-heron (BCNH) was removed on July 5th during active predation in the Least Tern colony. Unfortunately, game camera's documented additional predation by BCNH confirming that more than one individual was active in the tern colony this year.

A mink was seen on 6 May which killed at least 1 Common Tern and several ducklings, and likely caused a substantial reduction in the number of Roseate Terns nesting in 2010 by causing nocturnal nest abandonment and desertion. An array of Conibear and foot-hold traps were placed in strategic places around the island, including along a ≈50m diversionary “mink fence” surrounding the largest concentration of Roseate Tern nests. Despite over 13,000 trap hours, the mink was not captured, although definitive mink sign was last seen in mid-June. A dog trained to detect mink sign visited the island as well.

Common Eiders

A partial Common Eider nest census was conducted in 2010. Counts on various dates took place on Little Stratton, Gull Meadow, the heronry, and Bluff Island. A total of 167 nests were found. No count occurred on the south side of the pond where 131 nests were found in 2009. Nearly all ducklings were consumed by gulls shortly after hatching. However, several older (class III) ducklings were regularly seen in late July, a first since records for Common Eiders were first reported in 2003.

Wading Birds

A wading bird census was conducted between 20 and 22 May, requiring 20 person hours. Numbers for Snowy Egret (73 nests), Glossy Ibis (61 nests), and Black-crowned Night Heron (16 nests) marked a substantial decrease from 2009's totals. The number of Great Egret nests increased from 19 in 2009 to 34 in 2010. Six Little Blue Heron adults were seen during the 2010 census, versus 3 in 2009.

Black Guillemots

There was at least one active Black Guillemot burrow located in the South Rocks area of Gull Meadow. Additional nests may have been located on East Beach and Bluff Island, since adults were regularly observed in those areas. Up to 12 adults were observed during the season.

American Oystercatchers

At least 1, and likely 2, American Oystercatcher pairs nested on Little Stratton in 2010, where 2 chicks were observed. An additional nest on Bluff Island is possible since a vocal pair was present. Up to 7 adults and 3 fledglings were observed in 2010.

Other Notes

- 1) Stratton Island welcomed approximately 200 visitors, including members of the general public and scheduled tour groups.
- 2) Detections of rare or unusual species included:
 - A hen Long-tailed Duck seen during the 1st week of July
 - A second-cycle Mew Gull seen on 6 June
 - A Seaside Sparrow mist-netted and photographed on 18 May
 - A Hooded Warbler heard singing on 31 May
 - An American Bittern seen on 7 and 28 July

- A Black Skimmer photographed on 23 July
- A group of 19 Red Knots seen in early June
- A Black-headed Gull seen on 31 July
- 3 Manx Shearwaters seen on 3 August

Stratton Island - Least Terns

Wayne MacCabe

Least Terns are listed as an endangered species in Maine and are especially vulnerable to human disturbance, habitat degradation and predation associated with nesting on the main land beaches. Least terns used Stratton Island as a spring roost for many years but did not begin to nest on the island until 2005. At the time, Audubon researchers were using social attraction techniques including decoys, audio lures, and habitat modification to encourage the Least Terns to nest on the south side of the island. These techniques were used again in 2006, although in both years the terns selected nesting sites away from the attractants.

In 2006 and 2007, waves of Least Terns arrived on Stratton Island to nest during late June and July after desertion events at depredated mainland colonies. There were no major desertions among mainland Least Tern colonies in 2008. In 2009, Stratton Island had a total of 72 active nests, even with poor weather conditions during peak hatch, with many chicks dying of exposure; Stratton Island was still able to fledge 16-25 fledglings.

Chick shelters were placed next to every nest as to encourage chicks to take shelter during extreme weather conditions as well as hide from predators. This year, newly designed chick shelters were installed and 50% of chicks used the shelters for the first five days but their instincts were to move up into the beach grass. Only one 15 day old chick seemed to jump from shelter to shelter until fledging. The only disadvantage would be predators associating shelters with an easy food source.

Three censuses were conducted in 2010. During the first census on June 11th, 74 active nests were found on the visitor's beach and 2 on East beach. During the second census on 22 June, only 3 additional nests were found. The final census on July 12th there were a total of 11 nests found, 8 on visitor's beach and three on East beach. Since totals from the second and third census counts consisted mainly of re-nesters, the first census best reflects the total number of nesting pairs on Stratton Island in 2010.

Table 1.

Census	2008	Nest #s	2009	Nest #s	2010	Nest #s
1	6/13	59	6/15	72	6/11	74
2	6/26	13	6/25	10	6/22	3
3	7/15	4	7/9	10	7/12	11

Predation was a huge factor in productivity in the Least Tern colony this year. During the first wave hatch on 23 June, large numbers of chicks and eggs were found missing. During morning sweeps slashed eggs and heron tracks were found throughout the colony. Two motion sensor

cameras were put in the colony as early as 2 June to monitor depredation and a third was added during peak hatch. On 25 June a Black-crowned Night Heron and Herring Gull were observed walking through the LETE colony on the motion sensor cameras. From then on, night blind stints were conducted between the hours of 2030-0000 and 0300-06:00. At 0553 on 5 July a BCNH was shot as it approached the LETE colony. That same morning the HERG was shot on heron beach.

Depredation continued after the removal of these two birds. Night blind stints were resumed as other BCNH tracks were found around the wrack line and in the Least Tern colony. Many efforts were taken to extinguish further depredation but lack of staff, poor nocturnal equipment, and inability to distinguish predatory individuals from “grazers” at night is to blame. NOTE: A late season sweep of the heronry for BCNH boluses at marked nests yielded a tern specialist forager. In a series of boluses under one nest, 48 LETE bands, 5 COTE bands, 4 ARTE bands and 1 ROST band were recovered. An additional bird eating specialist was found at another marked nest, most of the feather remains were consistent with COEI duckling down.

As in past seasons, daily dusk counts for fledglings were used to monitor productivity. One hour before sunset the LETE biologist would position himself, overlooking the LETE colony with a spotting scope. Daily dusk counts were recorded from 15 June to 26 July, a high count of 3 fledglings was observed from 15 July to the 18th, no other fledglings were seen. Using the high count of 3 fledglings, productivity is estimated at 0.04 chicks per pair. All LEST chicks were banded at hatch and the colony was searched for dead banded chicks daily, weather permitting. Subtracting the totals of banded chick mortalities (2 chicks) and dusk high counts (3 fledglings) from the total of 94 banded chicks leaves 89 depredated chicks. It is convincingly easy to say that with the evidence of recovered bands, tracks, photos, night observations and with individual least tern mobbing that 89 chicks were depredated by a Black-crowned night heron and Herring gull.

A feeding study was also conducted in the LETE colony from 22 June through 2 July (stopped due to lack of chicks). Stakes were placed around 45 nests in the colony and assigned to a single nest number, as chick mobility increases rapidly with growth. Overall, 247 feedings were recorded in 8 three hour feeding stints. With an average bill size of 26mm the average prey size was 30.34mm (1.17 bill lengths). Unlike the past years, herring was the primary prey item this season at 72% of deliveries. Sand lance and herring was a close second with 4.8% and 4.4%, followed by lumpfish at 1.6%, butter fish and killifish comprised .4%. The average feeding rate per hour was 10.29.

On 10 July, due to a new moon high tide combined with tidal surges many nests were washed away on visitor’s beach. Attempts to move nests were futile as you can only move nests a few inches a day without the birds abandoning. Due to this high predator activity several nest were also abandoned in 2010

In conclusion, 2010 proved that Least Terns are a very sensitive species. Many factors need to come together for Least Terns to have a successful year, with protection from human disturbance, around the clock predator monitoring, an abundant food source and near perfect weather conditions still doesn’t seem to be enough. On a positive note, Least Terns are long-

lived birds with many breeding seasons and with the right conditions and management hopefully in the future biologists can continue to refine their techniques to produce a successful year.

2010 Maine State Synopsis of Nesting Least Terns

Kate O'brien

On June 10th a coordinated GOMSWG window count survey documented a minimum of 202 least tern pairs within the State of Maine. 126 of those Least Tern pairs nested at Crescent Surf while 76 nested on Stratton Island. A second coordinated survey on June 22nd documented 211 nests, as well as over a dozen chicks (n=75 pair at Stratton, n=136 pair at Crescent Surf). In late

July, after predation problems at Stratton and Crescent Surf, a colony of 18 pairs attempted to nest unsuccessfully at Goose Rocks. The tern nesting season was extended at Crescent Surf and there were predation problems at all sites, making estimation of productivity difficult. Stratton

Island produced 5 fledgers while Crescent Surf produced at least 45. State productivity was estimated to be 0.24 fledgers per a pair. The least tern population appears to have increased in the State from 170 pairs to >211. 211 is the highest coordinated nest count recorded since record keeping started in 1977. Close coordination of nest counts at other sites, as well as a tightening up of counting protocols as increased the accuracy of tern estimates. This increase (41 additional pairs), likely reflects a true increase within the State.

	WELLS	LAUDHOLM FARM	CRESCENT SURF	GOOSE ROCKS	WESTERN BEACH	STRATTON ISLAND	HIGGINS	RAM ISLAND	SEAWALL	POPHAM	REID STATE PARK	TOTAL
2003	0	20 (0)	57(8)	8(0)	0	-	38 (53)	0	0	0	33(5)	156 (66)
2004	15 (10)	1(0)	[50 (3)]	0	0	-	45 (54)	0	0	0	50(2)	146 (69)
2005	0	4(1)	[52 (7)]	0	[40 (3)]	18(9)	[22 (0)]	0	[17 (0)]	0	0	114 (20)
2006	[1(0)]	0	30 -10	[25 (1)]	0	103 (15)		0	0	0	[1(0)]	134 (26)
2007	1(1)	0	[37 (1)]	[45 (2)]	0	113 (10)8	0	0	0	0	0	150 (112)*
2008	0	0	92(52)	2(0)	[2]	72 (33)	0	0	0	0	0	166 (89)*
2009	0	0	102** (62)	[6** (0)]	0	72(16)	[16 (0)]	0	0	0	0	170 (78)
2010	0	[1**]	136** (45)	[18**]	0	75**(3)	0	0	0	0	0	211* (48)

[] colony deserted

* simultaneous count at all occupied nesting sites, not a site specific high nest count

** high nest count

Wells Beach, Wells, Maine

Maine Audubon

Population Estimate: No terns attempted to nest at this site

Laudholm Beach, Wells, Maine

Deirdre Whelan and Kate O'Brien, Rachel Carson NWR

Population Estimate: One nesting pair, no fledglings.

Comparison: Least terns had not nested on site since 2005, when four nests were reported, one nest hatched to produce a single fledgling. Laudholm Beach has yet to recover from storms, which stripped away sand to reveal a cobble beach. Several years of deposition have yet to create suitable habitat.

Predator Control: None at Laudholm, however across the Little River at Crescent Surf there was predator control. The beach remains in poor condition here, with minimal sand.

Crescent Surf Beach, Kennebunk, Maine

Kate O'Brien and Deirdre Whelan, Rachel Carson NWR

Population Estimate: There were 126 active nests during the statewide least tern census on June 10th, however the high count of nests was 136, on June 22nd. It is likely the number of pairs nesting on Crescent Surf was even higher, as an additional 12 chicks were counted during the survey on June 22th.

Continual predation at Crescent Surf made estimation of productivity extremely difficult as birds were produced a few at a time and fledglings did not remain on the beach for the entire season. Several simultaneous daytime beach counts were conducted and numbers of fledglers counted on July 15, August 5, Aug. 13th, and August 27th were used to estimate productivity. These numbers coincide with the number of chicks observed as well, and represent our best estimation of total productivity given the mean residency time reported by Perkins in 2004. It is more likely an underestimate versus an overestimate given mean fledgling residency time declines over the breeding season.

At Crescent Surf, removal of fox eventually enabled late season fledglings, however it is likely that hundreds of Least Tern chicks were consumed as they moved away from the nests and outside of the electric net fence. Despite several fox being removed from the beach during nesting season, there continued to be fox predation documented until early August. During the month of August fox were only detected on one night.

The solar powered net fence was largely successful in protecting nests, with the exception of two events. One where the fox entered after a high tide swept the fence over and another time the fox

managed to get inside the fence, but did not appear to predate nests (the fox was concentrating on escaping the net fence).

Interesting observations: Over 40 Roseate Terns were seen loafing for several days. Many of these birds were color banded and/or had field readable bands. Observations were submitted to Massachusetts Audubon.

Comparison: In 2009, the high count of nests was 102 on July 8th. The high fledgling count was 62, yielding an estimated productivity of 0.75. Productivity was poor from 2003-2007. In 2002, 81 pairs of Least Terns produced 145 fledglings.

Predator Control: USDA Wildlife Services removed predators from the Crescent Surf beach area from throughout the breeding season.

Goose Rocks Beach, Kennebunk

Maine Audubon

Population Estimate: A high of 18 nests were documented on July 23rd after nest failure at Crescent Surf and Stratton Island. Nests were abandoned on August 7th.

Comparison: Last season six pairs of Least Terns nested at Goose Rocks Beach at the Batson River Sand Spit. A total of six nests were found on June 3 and June 5, although all nests were predated by June 8. One nest with two eggs was seen from July 3 to July 22, and it was predated by July 30.

Predator control: USDA Wildlife Services removed numerous predators using a variety of methods from Goose Rocks Beach area. Domestic cats remained an issue. Owl tracks were documented later in the season.

Western/Ferry Beach – Scarborough

Maine Audubon

Population Estimate: No Least Terns attempted to nest at Western Beach in 2010.

Comparison: Terns did not nest in 2009. There were 2 nesting pairs in 2008, however they abandoned after a skunk predated their nests. In 2006 and 2007, although a few pairs were exhibiting nesting behavior, no nests were located. In 2005 there were a total of 40 active nests. Crow predated chicks and eggs and reduced productivity. Prior to 2005 Least Terns had not nested here since 1981.

Predator Control: None.

Stratton Island:

Reported under island summaries

Higgins Beach – Scarborough

Maine Audubon

Population Estimate:

Comparison: In 2009 at a minimum of 15 nesting terns were observed, however all nests were predated and the colony abandoned. In 2008 and 2007, there were no nesting pairs, although there was scraping seen in 2007. In 2006, a single nest was abandoned by June 27th.

Predator Control: None

Other Notes: Least terns fed in and loafed near the Spurwink River throughout the season. Several fledglings were spotted staging in the area in late July.

Seawall Beach, Morse Mountain – Phippsburg

Maine Audubon

Population Estimate: No Least Terns nested at this site.

Comparison: No birds have attempted to nest here from 2006-2010. In 2005, an early colony was established with 17 nests, but later was decimated from fox or coyote predation.

Reid State Park – Georgetown

Maine Audubon

Population estimate: There were no nesting Least Terns at either Mile or Half-mile Beach in 2010.

Comparison: Least terns have not nested here since 2006. A single nesting pair was documented in 2006, but no fledglings were produced.

Predator Control: None.

New Hampshire Islands

No Reports

Massachusetts Islands

Monomoy Islands - Monomoy National Wildlife Refuge

Shilo Felton – Biological Technician, U.S. Fish & Wildlife Service

Kate Iaquinto – Wildlife Biologist, U.S. Fish & Wildlife Service

North Monomoy Island

Common Tern

Census

On 17 June, observers counted 3 Common Tern nests in the historic nesting area on the northwest portion of the island. This is a decrease of 272 nests from 2009 and 70 nests in 2008 and is most likely due to habitat loss.

Productivity

Productivity was not quantitatively measured, but was estimated to be zero, as there was no evidence of any nests hatching successfully. Poor productivity is most likely due to habitat loss due to overwash and a high concentration of predators, including gulls and Black-Crowned Night Herons.

South Monomoy Island

Common Tern

Census

On June 15-16, a total of 6,372 Common Tern nests were counted on the north tip of South Monomoy. The nesting area was delineated into 60 m² grids and nests were tallied by grid. A Lincoln Index adjustment brought the total to 6,450 nests. This is a 174.8% increase from the 2,347 nests counted in 2009. A second census was not conducted, but an additional 60 nests (22.9% of the total 262 enclosed nests) were initiated in productivity enclosures after the census window, indicating an additional 1,916 nests in the colony after 20 June.

Productivity

The reproductive success of Common Terns on South Monomoy was good based on 202 A-count nests in 25 fenced productivity enclosures located throughout the colony. An increase in suitable nesting habitat as well as a drastic decrease in predator presence may have aided in increasing this year's productivity. The following calculations are based on A-nests only and reproductive success is measured by nest attempts.

Table 1. Comparison of Productivity Information for A-Period Nesting Common Terns on South Monomoy Island: 2008 to 2010

	2010	Standard Deviation	Standard Error	Sample Size	2009	2008
Average Clutch Size	2.62 eggs/nest	0.56	+/- 0.04	202	2.17 eggs/nest	2.18 eggs/nest
Average Eggs Hatched Per Nest	2.30 eggs hatched/nest	0.92	+/- 0.06	202	0.62 eggs hatched/nest	0.76 eggs hatched/nest
Hatching Success	88% of the eggs laid hatched				29%	79%
Fledging Success	54% of the chicks hatched fledged				57%	66%
Reproductive Success	1.25 chicks/nest	0.61	+/- 0.04	202	0.35 chicks/nest	1.12 chicks/nest

Table 2. Number of Pairs and Reproductive Success of Common Terns on South Monomoy Island 2006-2010

	2006	2007	2008	2009	2010
Number of Pairs	9310	7948	6834	2347	6450
Reproductive Success	0.96	0.70	1.12	0.35	1.25

Feeding Stints

Staff conducted 44 1-hour long Common Tern feeding stints from June 9 - July 30. A 60m² area of observation was defined by the observer. Prey item and prey length were recorded during each stint. Observers recorded 1817 total feedings during 44 hours of stints. Sand lance was the most common prey item (48%). Other delivered prey items included mackerel, herring, hake, butterfish, bluefish, two shellfish, and one squid. The average prey length was 1.66 culmen-lengths.

Adult Trapping and Banding

Fifty-two banded adult Common Terns were recaptured this season using Potter traps. Forty-two recaptured Common Terns that were trapped were originally banded at Monomoy NWR. The remaining recaptured terns have been reported to the Bird Banding Lab to obtain information about the origin of their bands. A total of 41 un-banded adult Common Terns were also banded opportunistically during trapping efforts. Of the 93 Common terns trapped, 50 were tested for Avian Influenza and all preliminary testing results were negative.

Salmonellosis

Presence of Salmonella estimated to be very low in the Common Tern colony this year, though Salmonella was determined to be the cause of death for one Common Tern fledgling that was submitted for testing at the National Wildlife Health Center in Madison, WI.

Roseate Tern

Census

There were six Roseate Tern nests counted during the census on June 15-16. Observers continued to search for Roseate Tern nests throughout the season. Two nests were found after June 20, but contained chicks between 15 and 23 days post-hatch and were, therefore, determined to have been laid within the A-period census window.

Productivity

The reproductive success of Roseate Terns on South Monomoy was good based on the fledging success of 8 nests within the Common Tern colony on the north end of the island. The following calculations are based on the total number of A nests and reproductive success is measured by nest attempts. No calculations are included for 2008 and 2009, as Roseate Terns did not nest on South Monomoy Island these years.

Table 3. Comparison of Productivity Information for A-Period Nesting Roseate Terns on South Monomoy Island: 2010

	2010	Standard Deviation	Standard Error	Sample Size
Average Clutch Size	1.50 eggs/nest	0.49	+/- 0.17	8
Average Eggs Hatched Per Nest	1.25 eggs hatched/nest	0.71	+/- 0.25	8
Hatching Success	83% of the eggs laid hatched			
Fledging Success	90% of the chicks hatched fledged			
Reproductive Success	1.13 chicks/nest	0.83	+/- 0.30	8

Table 4. Number of Pairs and Reproductive Success of Roseate Terns on South Monomoy Island 2006-2010

	2006	2007	2008	2009	2010
Number of Pairs	2	2	0	0	8
Productivity (chicks fledged/nest)	0.33	1.00	0	0	1.13

2010 Attraction Project

In an effort to attract Roseate Terns to South Monomoy Island due to habitat loss on Minimoy Island year, a Roseate Tern Attraction Project, started in 2009, was continued this season. The project was discontinued when several pairs of Roseate Terns were located in different areas of the colony. It was deemed unnecessary to play the recording since live pairs were present.

Adult Trapping and Banding

In addition to nine chicks banded on South Monomoy, seven Roseate Tern adults were trapped using Potter traps and banded with service and field readable bands.

Roseate Staging and Re-sighting: In conjunction with Mass Audubon and USGS, Refuge staff has been conducting counts of staging Roseate and Common Terns on the Refuge and South Beach in Chatham. Staging terns were sited on the Refuge from August 6, 2010 through September 8, 2010, and Refuge staff confirmed a total of 164 re-sighted banded Roseate Terns throughout these counts.

Least Tern

Census

An A-period census was conducted on the northern and southern ends of South Monomoy Island on June 20. A total of 38 nests were counted in nesting colonies on the north and south ends of the island. B-period nests were only established on the southern end of the island and a census

on July 11 found 11 total nests. In comparison, only five nests were found during the A-period census in 2009 and 144 nests in 2008.

Productivity

Productivity was not quantitatively monitored, but was estimated to be fair as several nests produced chicks. Productivity was qualitatively estimated to be poor in 2008 and 2009.

Laughing Gull

Census

On June 15-16, 355 active Laughing Gull nests were counted within the island's tern colony, compared to 547 in 2009 and 1,317 in 2008. This decrease in nests from previous years might provide a possible explanation to the increase in nest numbers and productivity within the Roseate and Common Tern populations on South Monomoy Island.

Productivity

Productivity was not monitored, but it was estimated to be qualitatively fair to poor based on the number of chicks and fledglings seen throughout the nesting season. Nine Laughing Gull nests were destroyed on June 4 because they were in close proximity to a Roseate Tern nest.

Kleptoparasitism

Kleptoparasitism stints were continued this year to monitor the number of kleptoparasitism attempts by Laughing Gulls on Common Terns. A total of 60 one-hour long stints and an additional five stints under one-hour long were conducted in the tern colony on South Monomoy Island. Observers recorded a total of 1,181 kleptoparasitism attempts over approximately 65 hours for an average of 18 attempts per hour. Laughing Gulls were successful in 45% of the attempts, Common Terns were successful 34% of the time, the outcome was unknown 14% of the time, and prey items were dropped in 7% of the attempts.

Minimoy Island

Common Tern

Census

On June 16, 194 Common Tern nests were counted. No Lincoln Index was conducted to minimize disturbance. This is a large decrease from 1,453 nests in 2009 and 1,258 nests in 2008 and is predicted to be due primarily to the decrease in habitat on Minimoy Island and the increase in habitat on South Monomoy, allowing terns to nest in more favorable habitat.

Productivity

Productivity was not monitored, but based on production and survival productivity was estimated to be qualitatively poor. Loss of habitat from overwash and some predation by gulls impacted Common Terns throughout the season.

Roseate Tern

Census

One Roseate Tern nest was found during the June 16 survey which is an increase from 2009 when there were no Roseate Tern nests found. A total of 30 Roseate Tern nests were counted during the A-census window in 2008. Minimoy Island has been subject to a lot of habitat changes and severe overwash in recent years.

Productivity

Two chicks hatched from the one nest located on Minimoy Island. Both chicks were banded several days after hatching and followed until they were approximately fifteen days old. Chicks were not monitored after fifteen days of age, but it is assumed that they both fledged successfully.

Black Skimmer

Census

On June 16, five Black Skimmer nests were counted. Five nests were also counted in 2009 and 2008.

Productivity

Productivity estimates were determined based on five A-count nests. Average clutch size was four eggs per nest. Ten of the chicks hatched from these five nests were banded. Though no bands were re-sighted, two Black Skimmer juveniles were confirmed to have fledged on August 17. Therefore, we can roughly estimate productivity to be 0.4 for this year. In 2008 and 2009 reproductive success was zero.

Laughing Gull

No laughing gull nesting activity occurred on Minimoy this year.

Predators (Refuge-wide)

Great Black-backed Gull and Herring Gull

Gull harassments in area A (gull-free zone) on South Monomoy were conducted periodically May 31-July 1, though no nests were found. Great Black-backed and Herring Gulls were present in the tern colony mid-May through August. Gulls were responsible for taking at least 381 tern eggs throughout the Refuge and Refuge staff witnessed one depredation of a Common Tern fledgling by a Great Black-backed Gull on Minimoy Island. Fifteen Great Black-backed and Herring Gulls were removed from the island this year.

Northern Harrier

A nest was not found, but based on Northern Harrier presence on South Monomoy Island it is likely that at least one pair nested on the island. Northern Harriers were seen in the tern colony four times July 25-August 2, landing during at least one of these visits.

Coyote

A total of 19 coyotes were removed this season. Dissection of one of the stomachs collected in July revealed 70 Common Tern chicks consumed. Evidence of coyote (scat and tracks) was found in or around the tern colony on 14 days throughout the season. There was evidence of

coyote depredation on tern eggs, as well as eggs and chicks of other nesting birds including Piping Plover, American Oystercatcher, and Laughing Gull.

Black-crowned Night-Heron

Black-crowned Night-Herons were censused on May 17 and 20 on North Monomoy and South Monomoy Islands, respectively. On North Monomoy Island 148 active nests were counted. No nests were found on South Monomoy Island. Evidence of Black-crowned Night-Herons within the tern colony was first observed on June 11 though none were ever sighted landing in the colony. Only eight Common Tern eggs were found dead due to depredation by Black-crowned Night-Herons.

Owl (Unidentified Species)

Evidence of an unidentified species of owl was found within the tern colony June 29-August 18. Within this time period 54 chicks were depredated by owls. The owl itself was never sighted.

Peregrine Falcon

Three Common Tern fledglings in August and one adult in May were determined to have been depredated by Peregrine Falcon within the tern colony. A Peregrine Falcon was sighted within the tern colony three days in mid-August.

Massachusetts Tern Census Numbers, 2010

Ian Nisbet

These numbers were compiled at the Massachusetts tern and plover meeting, held on 3 August. They are preliminary and are subject to minor changes when full reports are submitted. They were presented by Ian Nisbet, on behalf of Carolyn Mostello (MA Natural Heritage and Endangered Species Program)

	COTE	ROST	ARTE	LETE	LAGU	BLSK
TOTAL pairs in MA 2010	16,237.5	1,392	2.5	3,418	1,249	5 + 2 late
% CHANGE from 2009	+2	+4	-55	-4	-23	+25
MASS GOM (includes Monomoy NWR)	9,413	2	2	1,892	1,249	5
% CHANGE from 2009	+6	+++	-50	+3	-23	+25

The “0.5” entries represent a mixed pair of Common Tern x Arctic Tern, which bred on Penikese Island for the fourth successive year and raised 2 hybrid chicks in 2010.

In Massachusetts as a whole, Common and Roseate Terns, Laughing Gulls and Black Skimmers increased slightly, whereas Least Terns decreased slightly and Laughing Gulls decreased more significantly. Arctic Terns are now functionally extinct south of Cape Cod, with only one hybridizing male remaining at their last breeding site at Penikese Island; the only other breeding site is at Plymouth Beach in the GOM, where only 2 pairs were reported in 2010 vs 4 pairs in

2010. Total numbers of Common Terns exceeded 16,000 pairs; numbers have changed little since 2004, following a rapid increase from a low of less than 4,000 pairs around 1980. Roseate Terns may have leveled off following a rapid decrease between 2000 and 2007.

In the GOM part of Massachusetts (south to Monomoy NWR), Arctic Terns and Laughing Gulls decreased, for unknown reasons. There were considerable rearrangements of Common Terns: about 2,800 pairs appear to have moved back from Plymouth Beach, Ram Island and Norton's Point to Monomoy, after about 4,500 shifted from Monomoy to these sites last year.

Buzzards Bay Tern Census Numbers, 2010

	COTE	ROST	ARTE
BIRD ISLAND	1,945	735	0
% CHANGE from 2009	+7	+4	—
RAM ISLAND	3,466	583	0
% CHANGE from 2009	-12	-1	—
PENIKESE ISLAND	1,069.5	37	0.5
% CHANGE from 2009	-6	-14	-67
BUZZARDS BAY total	6,480	1,355	0.5
% CHANGE from 2009	-6	+1	-67

Buzzards Bay is outside the GOM, but is traditionally reported on at GOMSWG meetings because it is the site of intensive management and monitoring programs by MNHESP, and is the core breeding area for Roseate Terns, from which some birds emigrate to the GOM (and to which a few birds return from the GOM). Common Terns had increased at an average rate of about 7% per year from 1976 until 2009, but declined by about 6% in 2010. This decline resulted from about 1,200 pairs that apparently moved back from Ram Island to Monomoy, after about 1,700 pairs moved from Monomoy to Ram Island in 2009. Roseate Terns may have leveled off after 9 years of decline. A habitat restoration project at Ram Island was conducted by MNHESP. This project involved filling a low-lying area that had become unsuitable for terns with gravel and revegetating it with seaside goldenrod. This project was successful in enlarging the tern nesting area on the island, and the filled area was occupied by large numbers of terns: mostly Common Terns early in the season but later by many Roseate Terns as the goldenrod grew thicker.

Maine Coastal Islands NWR News:

- A new Island blog was started this year with posts from Petit Manan and Metinic Islands: <http://mainecoastalislands.wordpress.com/>
- New visitor center purchased in Rockland! Please make note of new address for Maine Coastal Island NWR. Maine Coastal Islands National Wildlife Refuge Complex, P.O. Box 1735, 9 Water Street, Rockland, ME 04841-1735. PHONE: 207-594-0600, FAX: 207-594-0605
- The Refuge deployed 7 satellite transmitters on Greater Shearwaters on August 10, 2010 to track their movements within the Gulf of Maine.
- Laura Kennedy (UMaine, Orono MS student) completed her project collecting pelagic seabird data from Bar Harbor Whale Watching vessels (2009 & 2010).
- A black guillemot longevity record will be received by the Refuge this year. Chelsea D'Antonio (SCEP student) recaptured a BLGU banded on PMI as a local in 1993. The current longevity record of 12 years and 1 month is from New Brunswick. The new record is 16 years, 11 months from Petit Manan Island.
- GOMSWG website will be created this winter (Sub-committee is Sara Williams, Scott Hall, Mao Lin, and Kelsey Sullivan). Address will be www.gomswg.org
- In 2010, the Refuge completed a three year Adaptive Management Study to study the efficacy of sheep grazing, prescribed fire, and mowing to maintain tern habitat on Eastern Brothers, Petit Manan, and Metinic Islands. Permanent vegetation plots on were sampled three times during the growing season.

Abstracts

Northwest Atlantic Roseate Tern Recovery: the Massachusetts and Nova Scotia Connection

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The post-breeding dispersal period for Roseate Terns (i.e., from the time they leave their colony sites to the time they migrate from North America to South America) is a critical period for fledgling terns that must both build energy reserves for migration and start the transition to becoming fully independent of their parent(s) for food. In 2009, 15 Roseate Tern chicks were colorbanded for the purposes of productivity estimation on Country Island, Nova Scotia, a major Canadian breeding site. Of these 15, one died and only four were observed as fledglings at the colony site. Coincidentally, a massive resighting study of post-breeding colorbanded adults from Buzzards Bay, MA was underway throughout the "Cape & Islands" area of southeastern MA (approximately 778 km [483 miles] from Country Island), and 13 of the 14 remaining young were positively identified one or more times at one or more locations between 14 August and 21 September. This suggests that most - if not all - of the HY Roseate Terns from Country Island, and thus their care-providing parent(s) as well, staged in Cape Cod, MA during the first leg of their post-breeding migration. The high resighting rate-particularly on Outer Cape Cod and Nantucket Island- of individuals from both Canadian and US populations indicates that a substantial proportion, if not the entire population, of Northwest Atlantic-breeding Roseate Terns use coastal and marine areas throughout southeastern MA during the post-breeding dispersal period. This information has significant management implications, given that such a high proportion of the entire population, although present during a relatively narrow time period annually, can be affected by actions taken throughout the year that impact the coastal habitats of southeastern MA.

What Makes a Healthy Breeding Puffin?

Kevin Kelly, University of New Brunswick, kg.kelly@unb.ca

Atlantic Puffin (*Fratercula arctica*) breeding has been well studied in the Gulf of Maine, but almost exclusively from the outside and mostly with observational data. Measurements of fitness and body condition are limited to what we can see and measure in the field with minimal handling and disturbance to the birds. However, morphometric data from these methods gives only a snapshot of the bird's condition. To truly understand the bird's long and short term health physiological factors must be considered and measured to see how their condition is trending. Another possible indicator of puffin health is the colouration of the bill plates and feet. These parts of the birds vary, and may be an outward signal to potential mates/competitors of the fitness of the bird. By measuring the intensity of colouration with a spectrophotometer we may be able to quantify the differences in puffins. Combining morphometric, physiological, and colouration data, along with breeding success we aim to get a greater overall picture of puffin health and possibly relate this to outside factors such as weather and food quality.

Foraging Behavior of Atlantic Puffins at Petit Manan Island

Sarah Spencer, University of Massachusetts

We quantified foraging behavior of adult Atlantic puffins (*Fratercula arctica*) during 2008-2009 by deploying temperature depth recorders (TDRs) on 18 adults nesting on Petit Manan Island, Maine. Dive data were successfully retrieved from 5 birds in 2008, and 8 birds in 2009. Of the 7,802 dives recorded, 61.9% occurred during 0400-0800 and 1600-2000, while no dives were made between midnight and 0400. Mean (\pm SD) dives per day, pooled across years, was 276.4 (\pm 84.7), with bouts of diving separated by 59.46 (\pm 14.8) seconds and consisting of 8.87 (\pm 3.4) dives per bout. Dive depth was less than 9 m for 55% of the dives, and less than 15 m for 86% of the dives. Mean maximum dive depth was 9.9 (\pm 1.7) m, with the deepest dive being 40.7 m. Sea-surface temperature at foraging sites was 10.98 (\pm 0.92) °C. Few differences in dive behavior were found between males and females, yet time of day and distribution of dive depths were not independent of sex. During 2009, we observed the departure of 26 puffins from their burrows, followed by their subsequent return with food. Based on a mean foraging trip length of 60.1 (\pm 38.3) minutes, and flight speeds reported in the literature, we estimate that birds were foraging within 25 km of the colony.

Managing Vegetation To Restore Tern Nesting Habitat

Juliet Lamb, National Audubon Society SRP and University of Massachusetts Amherst

2010 was the second season of a Master's project designed to experimentally test and compare different methods for managing overgrowth of vegetation in Common and Roseate tern nesting habitat on two islands, Eastern Egg Rock in Muscongus Bay and Outer Green Island in Casco Bay. As part of the project, two treatments (burning, weed barriers) were applied to ten-by-ten meter plots on each island pre-season, and researchers then monitored both regrowth of vegetation and use by nesting terns in treated plots, untreated control plots, and existing tern habitat. As in 2009, burning created usable habitat only through the first month of the season, but re-grew in mid-June to greater height and density than before the treatment. However, the weed barrier treatment used in 2010-- artificial grass turf donated by miniature golf courses-- was effective at replicating preferred nesting habitat and provided within-season habitat for seventy-five successful Common tern nests. This treatment, being both inexpensive and effective, represents a promising step in island vegetation management.

Movements of breeding Atlantic Puffins in Maine

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Fourteen micro GPS (GiPSy-2; Technosmart) were deployed on nesting puffins on four Gulf of Maine islands in July 2010 to gather information about foraging movements and locations. Each 8.3g unit was “waterproofed” before deployment using “finger cots” and tape: total package weight was 11.5g. Units were attached to puffins dorsally, between the wings, on the upper back with tape. Five GPS units were deployed on Machias Seal Island, four on Petit Manan Island, two on Seal Island NWR and three on Matinicus Rock – puffins were either captured in burrows or trapped using noose carpets or box traps. Recapture attempts began 1-4 days post deployment. One puffin was successfully recaptured in its burrow, but no data were recorded on the GPS. Only one puffin was seen feeding, otherwise, after GPS were attached puffins with GPS were absent from burrows and colonies. Nine days after initial deployment two puffins were recaptured in burrows, both had lost their GPS units, but one weighed more at recapture than during the initial deployment. Although, Gipsy-2 GPS units have previously been successfully deployed on diving seabirds in Alaska and Peru, our experience suggests that the units or combination of unit, attachment and weight were unsuitable for puffins. Further, the Gipsy-2 units are poorly supported, difficult to program and temperamental at best.

Gulf of Maine Seabird Working Group 2010 Tern Census

NOVA SCOTIA																
ISLAND NAME	GIS ID	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
The Brothers	131&132	6/12	N	*686		28			14 fledgers				1.6			J. McKnight
Grassy Island		6/12		56									1.7	56	0.65	J. McKnight
Country Island (not in GOI)	97	6/9 and 6/10	N	707					1.18	40	0.68	1,3	2.2	40	0.56	J. McKnight
Country Island (not in GOI)	97	6/9 and 6/10	N		578				1.00	27	0.55	1,3	1.86	27	0.35	J. McKnight
Country Island (not in GOI)	97	6/9 and 6/10	N			14			0.86	21	0.57	1,3	1.35	21	0.49	J. McKnight

2010 NS COAST TOTAL				1,106	921	42			The Brothers; COTE & ARTE not separated; totals are 50:50							
2009 NS COAST TOTAL				515		31										
2008 NS COAST TOTAL				527	28	55										
2007 NS COAST TOTAL				637	0	69	0	0								
2006 NS COAST TOTAL				528	28	67	0	0								
2005 NS COAST TOTAL				584	35	68	0	0								
2004 NS COAST TOTAL				913	82	76										
2003 NS COAST TOTAL				999	60	86										

NEW BRUNSWICK																
ISLAND NAME	CIR #	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
Machias Seal	79-367								0.00							Kevin Kelly
2010 NB COAST				0	0	0										
2009 NB COAST TOTAL				0	0	0										
2008 NB COAST TOTAL				0	0	0	0	0								
2007 NB COAST TOTAL				0	0	0	0	0								
2006 NB COAST TOTAL				213	904	0	0	0								
2005 NB COAST TOTAL				1,066	2,158	0	0	0								
2004 NB COAST TOTAL				1,064	2,158	0	0	2								
2003 NB COAST TOTAL				1,347	1,994	0	0	1								

MAINE																
ISLAND NAME	CIR #	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
Eastern Brothers	79-573	6/18	N	1					1.00	1			2	1		Kelly Young
Petit Manan	79-933	6/16 & 6/18	N	912					0.43	58	0.50	1,2	1.70	58	0.62	Amanda
Petit Manan	79-933	6/16 & 6/18	N		688				0.21	38	0.39	1,2	1.60	38	0.63	
Petit Manan	79-933	6/16 & 6/18	N			1			0.00	1		3	3	1		
Petit Manan	79-933	6/16 & 6/18	N					270								
Ship Island	59-341	6/21	N	41					1.11	36	1.12	3	2	41	0.89	Aubrey Albrecht
Dry Money Ledge	59-449			75					1 fledger							John Drury
Mason Ledge	59-481			10					0.00							John Drury
Green Island	59-478			60					0.00							John Drury
High Sheriff	59-397			0					2 fledgers							John Drury
East Cowpen	63-284			45					12 fledgers							John Drury
Wooden Ball Island	63-917				13				1 fledger							John Drury
Eaton Island Ledge	59-716	6/15	N	5												Kelsey Sullivan
Hardhead	59-782	6/15	N	0												Kelsey Sullivan
Grass Ledge East	59-802	6/15	N	60												Kelsey Sullivan
Seal Island NWR	63-923	6/15	N	1,788					0.53	60	0.54	1,2	2.03	60	0.45	Matt Klostermann
Seal Island NWR	63-923	6/15	N		1,238				0.53	60	0.54	1,2	1.73	60	0.48	Matt Klostermann
Seal Island NWR	63-923	6/15	N			2			0.50	2		1,2	1	2		Matt Klostermann

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ISLAND NAME	GIS ID	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
Matinicus Rock	63-940	6/15&16	N	253					0.61	38	0.59	1,2	2.21	38	0.47	N. Banfield & C. Poli
Matinicus Rock	63-940	6/15&16	N		674				0.38	56	0.49	1,2	1.77	56	0.43	N. Banfield & C. Poli
Matinicus Rock	63-940	6/15&16	N					958								N. Banfield & C. Poli
Metinic (s. end)	63-584	6/15&16	N													Brette Soucie
Metinic (n. end)	63-584	6/16	N		352				0.32	34	0.68	1,2	1.55	34	0.60	Brette Soucie
Metinic (n. end)	63-584	6/16	N	406					0.87	47	0.68	1,2	2.32	47	0.50	Brette Soucie
Metinic (n. end)	63-584	6/16	N					1	0.00							Brette Soucie
Eastern Egg Rock	63-860	6/14-6/15	N	714					1.09	56	0.67	1,3	2.36	56	0.59	Juliet Lamb
Eastern Egg Rock	63-860	6/14-6/15	N		83				0.64	36	0.54	1,2	1.83	36	0.38	Juliet Lamb
Eastern Egg Rock	63-860	6/14-6/15	N			82			0.72	73		1,3	1.89	73	0.54	Juliet Lamb
Eastern Egg Rock	63-860	6/14-6/15	N					1,553	0.87	23	0.76	2	2.5	23	0.63	Juliet Lamb
Pond Island NWR	73-282	6/15	N	590					2.08	48	0.90	1,2	2.71	48	0.50	Elizabeth Zinsser
Pond Island NWR	73-282	6/15	N		3				1.33	3		3	1.33	3	0.58	Elizabeth Zinsser
Pond Island NWR	73-282	6/15	N			3			0.00	3			1.67	3	0.58	Elizabeth Zinsser
Hen Island	73-178	6/14	N	0												Yvan Satge & S. Hall
Jenny Island	55-159	6/14	N	854					1.90	48	0.66	2	2.77	48	0.47	Yvan Satge & S. Hall
Jenny Island	55-159	6/14	N			32			1.25	32		3	1.75	32	0.44	Yvan Satge & S. Hall
Jenny Island	55-159	6/14	N					38								Yvan Satge & S. Hall
Outer Green Island	55-386	6/15	N	1,151					2.09	68	0.82	1,2	2.81	68	0.41	G. Humphries & E. Weiser
Outer Green Island	55-386	6/15	N			15			1.32	15		3	1.73	15	0.49	G. Humphries & E. Weiser
Stratton Island	81-002	6/12	N	857					1.67	55	1.10		2.64	55	0.68	Rich Stanton
Stratton Island	81-002	6/12	N		12				0.92	12	1.40		2.00	12		Rich Stanton
Stratton Island	81-002	6/12	N			35			0.98	32			2.06	32	0.50	Rich Stanton
Stratton Island	81-002	6/15	N				76		0.04	75	0.04		2.05	75	0.54	Wayne MacCabe
Wells Beach	363															Maine Audubon
Crescent Surf	342	6/22	N				136									Rachel Carson
Goose Rocks Beach	138	7/23	N				18		0.00				1.78			Maine Audubon
Reid Beach	364															Maine Audubon
Western Beach	343															Maine Audubon
Higgins Beach	139															Maine Audubon
Laudholm Farm							1									Maine Audubon
Seawall Beach																Maine Audubon
Ram Island																Maine Audubon
2010 ME COAST TOTAL				7,822	3,063	170	231									
2009 ME COAST TOTAL				7,997	4,069	184	176	4,467								
2008 ME COAST TOTAL				7677	4250	200	162	4477								
2007 ME COAST TOTAL				7675	4227	225	158	4175								
2006 ME COAST TOTAL				7817	3152	243	136	3541								
2005 ME COAST TOTAL				5671	2875	195	156	3414								
2004 ME COAST TOTAL				5547	3445	170	123	2992								
2003 ME COAST TOTAL				5632	3225	239	189	3186								

NEW HAMPSHIRE

ISLAND NAME	GIS ID	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
White & Seavey Islands	1&133	6/12	N	2,251					1.81	157	0.83	3	2.67	157	0.58	
White & Seavey Islands	1&33	6/12	N		6				1.50	6	0.55	3	2.00	6	0.00	
White & Seavey Islands	1&33	6/20	N			48			1.33	48	0.80	3	1.90	48	0.63	
2010 NH Total				2,251	6	48										
2009 NH Total				2,251	6	48	0	0								
2008 NH Total				2,011	6	40	0	0								

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ISLAND NAME	GIS ID	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
2007 NH Total				2,121	5	52	0	0								
2006 NH Total				1,736	6	33	0	0								
2005 NH Total				2,063	8	64	0	0								
2004 NH Total				2,582	5	107	0	0								
2003 NH Total				2,446	4	42	0	0								

MASSACHUSETTS

ISLAND NAME	GIS ID	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
North Monomoy	47	6/15-6/17	N	3	0	0										
Minimoy	34	6/15-6/17	N	194	0	1										
South Monomoy	0	6/15-6/17	N	6,450	0	8	38	355	(1.0 -1.3) COT	201						
Bird Island (Buzzards Bay)	62			1,945	0	735										
Ram Island (Buzzards Bay)	63			3,466	0	583										
Penikese Island (Buzzards)	61			1,069.5	0.5	37										
2010 MASSACHUSETTS Totals (GOM only)				6,647.0	0	9	38	355								
2009 MASSACHUSETTS Totals (GOM only)				8,862	4	0	1,846	1,618								
2008 MASSACHUSETTS Totals				10,690	2	31	1,242	1,816								
2007 MASSACHUSETTS Totals				9,953	1	45	1,769	1,512								
2006 MASSACHUSETTS Totals				11,040	2	28	1,475	1,492								
2005 MASSACHUSETTS Totals				10,165	3	27	1,195	1,312								
2004 MASSACHUSETTS Totals				10,676	4	26	1,133	1,322								
2003 MASSACHUSETTS Totals				10,973	4	13	1,055	1,201								

	COTE	ARTE	ROST	LETE	LAGU
2010 GULF OF MAINE TERN TOTALS	17,119	3,412	255		3,184
2009 GULF OF MAINE TERN TOTALS	19,625	4,079	263	2,022	6,085
2008 GULF OF MAINE TERN TOTALS	20,905	4,286	326	1,404	6,293
2007 GULF OF MAINE TERN TOTALS	20,386	4,233	391	1,927	5,687
2006 GULF OF MAINE TERN TOTALS	21,334	4,092	371	1,611	5,033
2005 GULF OF MAINE TERN TOTALS	19,549	5,079	354	1,351	4,726
2004 GULF OF MAINE TERN TOTALS	20,782	5,694	379	1,256	4,316
2003 GULF OF MAINE TERN TOTALS	21,397	5,287	380	1,244	4,388

Methods: N=nest count, NE=partial nest count & extrapolation NP=nesting pairs (visual estimate), VE=individual birds (visual estimate from island), VEB=individual birds (estimate from boat)

Productivity Methods: 1=feeding study, 2=fenced plot, 3=unfenced plot

Note: Productivity is expressed as the number of fledglings/nest, N=sample size, SD=standard deviation, 15-day old COTE and ARTE chicks are considered fledglings, study chicks found dead after fledge date are subtracted from productivity estimate. ROST chicks were considered fledged based on survival to 10 days and weights during the first few days of life.