

Gulf of Maine Seabird Working Group
22nd Annual Summer Meeting
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Hog Island, Bremen, Maine

Compiled by Dan Hayward - Shoals Marine Laboratory and Scott Hall – National Audubon Society's Seabird Restoration Program

INTRODUCTION

Complete Gulf of Maine tern numbers were not available in time for distribution of these minutes, however some regional trend information can be gleaned from available count information (see second paragraph). The most noteworthy event of the summer was the abandonment of the Machias Seal tern colony. After consecutive poor years of reproduction due to poor food (larval fish and Euphasiids) and other factors this colony was largely abandoned by the end of June and completely abandoned by terns by the 3rd week of July due chronic gull predation. A census of Machias Seal in early June recorded the fewest number of nesting tern pairs since 1979, indicating that the observed predation was already impacting this colony. In addition to the abandonment of MSI other noteworthy events from 2006 include a third consecutive wet summer (>24 inches of rain on Eastern Egg Rock), which affected productivity at several colonies, the presence of a mink on Petit Manan Island and the continued positive growth of Alcid colonies.

In terms of numbers, in 2006, Nova Scotia, New Brunswick, Maine, New Hampshire and Monomoy NWR supported 20,076 pairs of Common Terns (↑ 3% from 2005), 3,991 pairs of Arctic Terns (↓ 21% from 2005), and 371 pairs of roseate terns (↑ 5% from 2005). Laughing Gull numbers increased to 5,033 pairs (↑ 6% from 2005). The decline of Arctic Tern numbers via the loss of MSI, the most significant ARTE colony in the region, is particularly worrisome for this species, as it has not responded to 20-years of management efforts in the same way as other terns

Part 1 – ISLAND SYNOPSIS-from North to South

THE BROTHERS, Yarmouth County, Nova Scotia

Ted D'eon – here is the link to Ted's 2006 tern report for Lobster Bay, Nova Scotia

<http://www.geocities.com/teddeon509/tern06.html>

MACHIAS SEAL ISLAND

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Tern Census

At the request of the Canadian Wildlife Service, ACWERN conducted the biennial tern census on 12-13 June 2006. The uncorrected nest count was 910 nests, and the corrected

count was 1117 (Lincoln Index = 1.23), down 63% from 3032 nests in 2004. This is the lowest count since regular censuses began in 1979, and is due largely to gull predation. Of the 178 nests initiated at the time of the census in daily-monitored productivity plots, 66 were completely depredated, but only 13 (20%) were marked as scrapes, meaning that the 333 scrapes marked during the census represent 1665 nests that were undetected by the census, yielding an estimate of 2782 pairs which attempted to nest on MSI this year. Of 625 terns identified in grid squares, the species ratio was 506 Arctic Terns (81%) and 119 Common Terns (19%).

Arctic Terns

The tern colony on MSI abandoned on 25 June after several days of skittish behaviour, often leaving nests unattended for several hours during the day. The terns returned at night for about three weeks following diurnal abandonment, and by 18 July had completely left the colony. Mean clutch size was 1.37/nest (± 0.61), the lowest since monitoring began in 1995, and is due to the intense gull predation. Peak lay was 08 June (± 7.39), and peak hatch was 25 June (± 2.62), although only 12 chicks hatched, and none survived past 4 days. There were no feeding data collected for terns in 2006.

Common Terns

Common Terns likely left the colony much earlier than Arctic Terns, and areas where Commons most frequently nest (rocky intermediate vegetation zones) were the most intensely predated initially by gulls. During nocturnal mist-netting soon after diurnal abandonment, no Common Terns were caught near the boat landing, an area in which they heavily nest. The low sample size ($n = 10$) for productivity is not an indication of fewer Common Terns nesting, but rather the rapid loss of nests before they could be assigned to a species. Peak laying was on 08 June (± 5.31 days). Mean clutch size was 2.1 (± 1.05), but is likely biased for reasons mentioned above. No chicks hatched at all, and consequently, no diet study was conducted in 2006.

Atlantic Puffins

Peak lay was on 11 May, and peak hatch was on 20 June. See Table 3 for productivity details. Heavy rain in June (277 mm) likely contributed to relatively low hatching success of 0.56 and fledging success of 0.35. Puffin diet ($n=2438$) was mainly euphausiid shrimp (62.3%) and white hake (16.6%), with herring (13.9%) rounding out major items. After 22 July, herring dominated the diet, and euphausiids were mostly absent; all chick deaths occurred before this switch to herring. There was also a notable decrease in the number of larval fishes over last year (29.0% in 2005, 4.1% in 2006).

Razorbills

Razorbill peak lay was on 16 May, and peak hatch was 20 June. As in puffins, heavy rain flooded some burrows and resulted in the second-lowest hatching success on record (0.63 hatched/nest) Fledging success was 0.58 chicks fledged/nest. See Table 3 for further productivity details. Herring was the main Razorbill prey item (70.9%), followed by Hake (17.0%) and Sandlance (7.8%). A maximum of 911 Razorbills was counted on MSI on 12 June.

Common Murres

Murres nested on MSI successfully for the fourth consecutive year, although eggs in open nesting areas were completely depredated by gulls in late May and early June. Surviving chicks were found in sheltered nest sites, and 16 were banded in 2006. A maximum of about 200 murres was counted on MSI this year, a notable decrease from 2004 (600) and 2005 (400). One murre banded as a chick in 2004 was resighted on Matinicus Rock (S. Hall, pers. comm.)

Common Eiders

During the tern census, the number, clutch size, and location of Common Eider nests are also recorded. In 2006 there were 52 eider nests, the lowest recorded recently, and down from a high of 139 in 2004. The mean clutch size was 3.8 (± 1.2), also the lowest recorded. However, unlike the terns, an eider nest depredated by gulls is just as likely to be found during the census as a nest with eggs, so the reason for the decline is not readily apparent.

Leach's Storm-petrels

A census of Leach's Storm-petrels was initiated in May 2006, prior to tern nest initiation, and its conclusion occurred in August. The last petrel census in 1998/1999 yielded an estimate of 150 pairs. One petrel caught on the night of 31 July was banded elsewhere, but not from either Kent Island, NB, Matinicus Rock, ME or Newfoundland.

Predator Activity

Gull predation was extremely intense this year. See tern and murre sections above. A high count of 78 Herring Gulls and 75 Great Black-backed Gulls was made on 07 July, and as many as 150 (both species combined) were seen on 21 July. A total of 45 pyrotechnics were used on 40 occasions. No Laughing Gulls nested on MSI this year. Five Herring Gull nests, and two Great Black-backed Gull nests were removed from MSI and nearby Gull Rock, and two Herring Gulls with broken wings were killed after they was found walking through the colony. One nest escaped detection, and one Herring Gull fledgling was seen in late August. We do not have a permit to shoot gulls, but since the terns left, we were able to make use of noisemaker pyrotechnics on more occasions, though this met with little success.

A Peregrine Falcon pair nested on Libby Island, 10 miles from MSI, and had two chicks, the diet of which was largely Common Terns (L. Welch, pers. comm.), and one adult Peregrine was seen around the island frequently throughout the summer. Between one and four Northern Ravens were also seen regularly throughout the summer.

Other Island Notes

A wind turbine was installed by the Coastguard over the winter of 2005/2006, but the blades were taken down before May 2006 for repairs, and will not be returned until September. The tower and guy wires remained during the season, and no mortality was attributed to their presence.

One Roseate Tern (unbanded) was photographed in late May, and one was seen in early June. No nest was identified, and the birds were seen in two different locations. No Roseates were seen last year.

Alex Bond continued his M.Sc. project examining the mercury burden of the seven seabird species nesting on MSI and linking it to diet using stable isotopes. This was his second (and last) field season.

Travis Clarke began his M.Sc. project in January 2006 on the seasonal movements of Razorbills. He deployed 8 satellite transmitters and 4 data loggers to track Razorbill movements over the next 1-2 years.

Both Amie Black (Foraging locations of Arctic & Common Terns) and Laura Minich (Diet variability in Arctic & Common Terns, Atlantic Puffins & Razorbills) are in the final stages of writing their respective theses.

For a more in-depth analysis and summary of the seabird research on MSI, please consult the latest Machias Seal Island Progress Report, available online at www.unb.ca/acwern.

Table 1. Tern census counts and species ratio for Machias Seal Island 1994-2006 (data from Newell 1994, Newell 1996, Newell and Mackinnon 1998, Boyne et al. 2001, MacKinnon et al. 2002, Charette et al. 2003, Diamond 2004, Diamond 2006).

Year	Corrected Total	Species Ratio	
		% Common Terns	% Arctic Terns
1994	2787	*13% (368)	*87% (2429)
1996	2245	27% (608)	73% (1637)
1998	3272	30% (982)	70% (2290)
2000	2662	31% (825)	69% (1827)
2002	3551	38% (1420)	62% (2130)
2003	3317	40% (1327)	60% (1990)
2004	3032	32% (970)	68% (2062)
2006	1117	19% (213)	81% (904)

* Ratio has been corrected after examination of the points where the species ratios were examined (Diamond 1999).

Table 2. Observed prey items delivered to nests on Machias Seal Island in 2006.

	ATPU	RAZO
Hours of Observation	166.9	76.0
Identified items / Total	2438/2714	590/662
Percent of identified prey	(89.8%)	(89.1%)
Herring	13.9%	70.4%
Hake / Rockling	16.6%	17.0%
Euphausiid	62.3%	0.3%
Butterfish	1.4%	N/A
Sandlance	0.3%	7.8%
Larval Fish	4.1%	2.6%
Other	1.4%	1.9%

Table 3. A summary of the breeding success of Common and Arctic Terns, Atlantic Puffins and Razorbills nesting on Machias Seal Island between 2002 and 2006. Mean (SD where applicable) clutch size, number of hatchlings and fledglings per nest are listed.

	Year	n	Clutch Size	Hatching Success	Chicks/nest Alive at Day 15	Chicks/nest Alive at Day 20	Fledglings/nest*
Common Tern	2002	72	1.85 (0.522)	1.11	0.64	0.54	0.54
	2003	62	1.71 (0.457)	0.93	0.74	0.56	0.53
	2004	68	1.66 (0.640)	0.69	0.18	0.07	0.05
	2005	60	1.70 (0.497)	0.82	0.00	0.00	0.00
	2006	10	2.09 (1.045)	0.00	0.00	0.00	0.00
Arctic Tern	2002	285	1.54 (0.506)	0.91	0.57	0.50	0.50
	2003	100	1.51 (0.535)	0.94	0.70	0.56	0.50
	2004	170	1.42 (0.494)	0.84	0.38	0.30	0.05
	2005	183	1.42 (0.495)	0.57	0.09	0.09	0.06
	2006	201	1.37 (0.612)	0.06	0.00	0.00	0.00
Atlantic Puffin	2002	76	1	0.91	-	-	0.59
	2003	70	1	0.97	-	-	0.77
	2004	56	1	0.96	-	-	0.78
	2005	49	1	0.92	-	-	0.82
	2006	72	1	0.56	-	-	0.35
Razorbill	2002	57	1	0.89	-	-	0.63
	2003	55	1	0.75	-	-	0.60
	2004	58	1	0.87	-	-	0.68
	2005	42	1	0.74	-	-	0.67
	2006	40	1	0.63	-	-	0.58

* Fledglings/nest - Tern chicks found dead after day 20 were subtracted from the number of chicks fledged.

Petit Manan Island

Sarah Spencer, Island Supervisor

Census: The GOMSWG census was conducted from June 12th-13th. During the census we counted tern, Laughing Gull and Common Eider nests across the entire island. The unadjusted count for terns was 2,352 nests. We applied a Lincoln Correction factor of 1.25%, with a corrected count for terns of 2,381. This is a 48% increase from 2005, and a 6% increase from the 2004 season. Our species ratio was determined by observing incubating terns on 709 (29.8% of tern nests) nests across the island. We determined that the colony consisted of 32.7% ARTE (779 nests) and 67.3% COTE (1,602 nests). The island also supported 23 pairs of ROST and 138 pairs of Common Eiders this season.

Year	Common	Arctic	Roseate	Puffin	Laughing Gull
2002	990	671	27	20	838
2003	1213	799	31	28	1123
2004	1312	911	29	35	1042
2005	1007	595	9	51	1151
2006	1602	779	23	66	1282

Tern Productivity: As compared to 2004 and 2005, ARTE and COTE experienced increased reproductive rates during the 2006 season. Although productivity was higher than the previous two years, a rain and fog event occurred from 23rd-30th of June in which approximately 15% of the tern chicks perished.

Productivity Measure	2002	2003	2004	2005	2006
Mean Hatching Success	73.0 (COTE)	100	87.0	92.0	78.0
	86.0 (ARTE)	95.2	79.0	81.0	83.6
	67.0 (ROST)	73.0	82.0	89.0	81.8
# Chicks fledged/nest	1.57 (COTE)	1.84	0.62	0.51	1.18
	1.41 (ARTE)	1.21	0.77	0.51	0.84
	0.68 (ROST)	0.55	0.62	0.22	0.78

Diet Composition: The primary prey delivered to both ARTE and COTE chicks was Atlantic Herring (*Clupea harengus*). A chicks (first hatch) received 78% of the food deliveries while B chicks (second hatch) received 16% of the food deliveries. We followed 31 nests for a total of 906 hours, including 543 prey deliveries. Average number of food items delivered per hour for Arctic Terns was 0.56 (N=16) and 0.65 for Common Terns (N=15).

Diet Item	% COTE diet	% ARTE diet
Herring	94.53	83.97
Bluefish	1.95	1.04
Krill	0.39	5.57
Invertebrate	1.95	1.04

ARTE Metapopulation Project: We continued to participate in the ARTE Metapopulation Project in 2006. We read 329 bands this season, including 224 ARTE, 69 COTE and 36 ROST. We utilized mist nets, modified bow net traps, box traps, and raised manual bow net traps to trap ARTE and COTE on the island. We trapped 96 ARTE and 67 COTE during the 2006 season.

Alcids: Alcid use of Petit Manan Island continues to increase. This season we documented 66 pairs of puffins and over 100 pairs of Black Guillemots. Four of the artificial nest burrows were used by nesting puffins. The alcid high counts for the season were 185 Atlantic Puffins (7/14), 179 Razorbills (5/31), 19 Common Murres (7/6) and 401 Black Guillemots (5/24). We observed two pairs of nesting Razorbills this season, both of which abandoned their eggs early in the season. We banded 60 puffins (37 chicks and 23 adults), replaced bands on 8 puffins and read 89 different puffin bands this summer.

Predator Control: We removed one male mink from the island on May 26th after it had killed at least 24 Leach's Storm Petrels and 11 Common Terns. In a continued effort to minimize LAGU nesting distribution and predation on terns, we removed all LAGU nests from the north and east sides of the island during the GOMSWG census. Our permit allowed for the removal of 900 LAGU nests this season. We observed at least 89 predated tern nests. We removed 24 Laughing Gulls, 1 Herring Gull and 2 Great Black-backed Gulls from the island.

Avian Disturbance: Bald Eagles visited PMI and Green Islands at least 22 times during the nesting season, but focused their efforts on Common Eiders. Peregrine Falcons visited PMI 56 times, being observed landing in the colony vegetation for the first time. Visits from Peregrine Falcons increased when chicks began fledging. We observed a Merlin in the colony on two occasions. A female Northern Harrier was seen flying over the island on 3 occasions.

Other Important Information: We documented two Black Tern nests and a single Willet nest on the island this year. The Willet hatched 4 chicks. The first Black Tern nest was depredated by Laughing Gulls, and the second nest hatched one chick that died in a rain event and had one non-viable egg. The Black Terns continued to be seen on the island even after their chick died. Attempts were made to watch where the Black Terns were flying to forage, and it was found that they were utilizing a shallow cove between Petit Manan and Green Islands for feeding.

Penobscot and Jericho Bay

John Drury - These surveys were supported by a grant from the Maine Department of Inland Fisheries and Wildlife.

Great Cormorants:

There were a total of 97 Great Cormorant nests counted at 6 nesting sites; there were 86 counted in '05 and 150 in '04. The presence of Eagles around the nesting sites was

again the major threat to the Cormorants productivity. The eagles eat a lot of young gulls as the gulls are fledging. After mid August the gulls are more capable flyers and they disperse, the cormorants then become the focus of Eagle foraging.

Maintaining observers at Seal Island to keep the Eagles off in late August and early September will help ensure that at least one colony is productive.

This was the first year that there were no Great Cormorants nesting on the spit at Great Spoon Island since the annual survey was first made in 1983.

There was a mixed group of Great, 12 nests, and Double crested Cormorants, 20 nests, at Little Spoon island, observed June 6, that were all gone July 24. There were at least 6 great and 4 Double-crested nests that showed up late at the White Horse, I believe that this was a second attempt by some of those individuals who abandoned Little Spoon, probably because of the Eagles. 15 chicks in five nests represented this second wave of nesting at the White Horse, August 31, when the older chicks from the first wave of nesting were roosting on the shore.

The abandonment of the colony on the South eastern shore of Little Spoon in '03 coincided with the reestablishment of nesting on the White Horse for the first time in 15 years. The reestablishment of the colony on the north eastern shore of Little Spoon in '05 coincided with the reduction of nests counted on the White Horse from 37 to 7. A few Great Cormorant chicks were dispersing from their nesting sites by August 18

Little Roberts, May 30 10 GC nests seen 1 adult displaying.

June 18, 13 GC nests,

July 22, 3-4 large Great Cormorant chicks in the nests, 4th year eagle with imm Herring gull on the island,

Aug 16, 20 imm. GC of the year, not on their platforms, they are close to the water, 4 adult GC. Double crested chicks also off nest platforms,

Aug. 18, 18 GC chicks,

Aug 19, 4 eagles on Roberts.

Aug 24, 4 eagles on Roberts island, one swept over the colony scaring some cormorants off.

Aug. 29, 20 GC chicks

Sept 16, 2 imm. GC, 4 adults

Seal Island, June 5, 19 GC nests, 30 adults GC, 14 DC nests

June 18, 18 GC nests

Aug 1, many large great cormorant chicks, on their individual nesting platforms.

Aug 19, @25 immature Great Cormorants at the western head one group of GC chicks still in the nest, and 15 DC Cormorant chicks, 2 GC chicks on the Northern shore of the western head around the corner from the colony. 1 imm. GC of the year at the roost mid island southern shore,

White Horse, June 6, 13 GC nests and adult displaying, 30 adult GC, and 4 DC nests.

July 24, 32 adult great Cormorant, 16 Great Cormorant nests, some broody, some large chicks, 9 broody adults, 10 large GC chicks, 8 DC nests, Apparently some of those birds who abandoned Little Spoon set up here late.

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Aug 16, 7 large feathered GC chicks near the shore in a bunch, 8 more large feathered chicks above, 6 nests with late chicks in them @1/2 adult size, 1 DC chick, Immature Eagle

Aug 31, 15 GC of the year still in nests, 12 older GC of the year on the shore.
6 eagles, one 2 meters from a GC nest with chicks who were bowing at the eagle.

The Black Horse, June 6, fog, 0 DC nests seen,
July 24, 10 DC nests, with large chicks, west side, 2 adult and 1 imm. GC.

Great Spoon, June 6, ad. eagle on the beach, 0 GC from the east of the spit, 2 Imm GC east side, 3 ad GC west side of the spit, 0 GC nests,
July 24, 6 adult GC at the north end of the spit, 2 eagle on the beach adult and a 4th year,
Aug 16, 8 Immature eagle,

Little Spoon, June 6, 0 Corm SE shore, @20 DC nests in the NW colony, 12 GC nests, 35 adult GC,
July 24, 0 GC nests, 0 DC nests, 4 adult DC

Green ledge, (Fog Island), June 6, 3 DC nests, 2 adult GC, 0 GC nests,

Saddleback, June 6, 0 GC nests, 10 adult GC, 5 in the old nesting area,

Spirit Ledge, June 6, 1 adult GC 0 nests,

Mason Ledge, June 6, 15 DC nests, 6 adult GC 0 GC nests,
July 24, 2 adult and an Imm. Eagle, 0 DC nests, 5 adult GC.

Brimstone, (Burnt coat harbor)
June 6, 26 total GC nests, 38 adult GC all counted from the south,
June 25, 28 GC nests, 2 DC nests
July 24, 32 adult GC, 4 DC nests, @50 GC chicks,
Aug 16, 15 adult GC, one on a nest with 1/2 sized chick, 30 GC chicks mostly near the water, 3 nests with smaller chicks,
Aug 31, 6 adult and 15 imm. GC

John's Island, June 6, 1 adult GC. 0 nests southern shore,
30 DC nests on the NE corner, 0 GC nests 1 adult GC. Adult eagle.
July 24, 3 adult GC, 20 large DC chicks, NE corner, adult eagle,

Green Islands, (East of Swan's) June 6, 1 GC Imm. 0 GC nests @15 DC nests on the eastern green,

Little Duck, June 6, 40 DC nests western shore, 0 GC nests.

Egg Rock, (west of Crumple Is.) June 6 5-6 DC nests, 0 GC nests

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Freeman Rock, June 6 100 total DC nests, 0 GC seen,
June 7, 1 immature. GC.

Pulpit Rock, June 6, 2 imm. GC, 2 Geese, 40 DC nests visible, 100 DC many imm.
June 7, 7 immature and 1 adult GC, 0 GC nests seen.

Old Man, June 7, 0 GC nests,

Southern Mark, June 9, 35 DC nests, and 76 DC nests, in two bunches on eastern shore
14 GC nests and 18 Adults on the eastern shore. 3 adult GC, 0 GC nests western side,
110 DC nests west side,

July 24, 37 GC chicks, at 14 nests,

Aug 16, all cormorants are out of the nesting area, all scattered along the shore. 3 adult
GC and 10 GC chicks on the eastern shore @100 DC chicks on the east side and another
@100 DC chicks on the west side. Immature eagle

Aug 31, 5 adult and 6 imm. GC, 50 DC mostly imm. East side, 70 DC mostly imm. West
side. Adult and imm eagle.

Islands with no Great Cormorants nesting: Green Ledge (Creihaven), No Man's land,
Old Man, Freeman Rock, Pulpit Rock, Egg Rock, (west of Crumple), Green Ledge, west
of Lairies Narrows, Metinic Green, Little Duck Island, Green Islands, Saddleback
(Jericho Bay), Little Green, Spirit Ledge, Mason Ledge

Razorbills:

The Regional population of Razorbills has been growing and expanding, record high
counts of individuals were recorded at five nesting Islands this season. The regional
population excluding Machias Seal was @1,200 individuals. There have been 3 new
nesting sites established during the last several years, Pulpit Rock, Seal Island and Petit
Manan. The colony at Matinicus Rock has grown dramatically and expanded
geographically on the Island. The colonies in eastern Maine, Old Man, Freeman Rock,
Pulpit Rock and Petit Manan, provide limited room for expansion. If recent trends
continue Seal Island is likely to absorb much of the growth.

A Razorbill adult and chick were seen June 26 Southwest of Isle au Haut.

Freeman Rock, June 6, 17:09 85 total Razorbill at the island 6 off Moose peak, 9 Off
Man Island, Murre, 7 SE of Black head, 24 east of black head, that is 46 more razorbills
within 3 miles of Freeman rock.

June 7, 12:15 32 Razorbill, 2 Puffin, choppy, 10 Razorbill off Red Head.

Pulpit Rock, June 6, 18:14, Pulpit Rock, 18 Razorbill, a few come from the crack on the
NW corner,

June 7, 06:56 Pulpit Rock, 21 Razorbill, at two nesting sites,

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Old Man, June 7, 08:42 60 Razorbill west side, plus 160, puffin, 5 Geese, 2 murre, 1 Imm GC, 0 GC nests seen. Total @230 adult Razorbill

Penobscot Bay

June 25, Adult Razorbill and chick 1 ½ miles off the eastern head of Isle au Haut

Terns:

Little Green, June 16, no terns seen from the boat, ashore, 3 scrapes in the gravel between the ledges at the Northern end of the eastern beach, 5 adult Arctic terns, sailing around.

Hog island, (Metinic), June 16, 6 adult over the beach on the harbor side, 2 nests with two eggs, 8 adult over the east side in the gravel behind the berm, 3 nests with 2 eggs found.

Metinic, (Southern end) June 16, west side a pair of adults below the houses, nest not found southwest shore, @250 adult terns 6 out of 7 Common, 25 nests with one egg, 60 nests with two eggs, 22 nests with 3 eggs, 1 nest with 4 eggs, total 108 nests, dozens of scrapes, 10 broken a few of those were platforms with egg slime in them. South eastern shore, 8 adult Arctic terns, 1 nest with 3 eggs found, Hog Island facing beach, one nest found with one egg.

Wooden Ball, June 18, @100 adult terns NE of the landing, @5 Arctic to 1 common. 17 nests with 1 egg, 39 nests with 2 eggs, 4 nests with 3 eggs, one broken, total 60 nests found. NE of Mertensia Beach, 10 adult arctic terns, 1 nest with one egg, 3 nests with 2 eggs. Island total, 64 nests

July 8, 9 Arctic terns seen roosting ashore, 2 chicks seen up in the nesting area, feed coming in, one adult tern over the second nest area.

July 25, 4 fledgling terns with 85 mostly arctic terns roosting on the shore, mid island below the nesting area. Adults carrying feed in to the colony, @30 adult up over the nesting area. No Terns seen at the second nest area.

Eastern Cow pen, June 25, @100 adult Common Tern,

1 eaten egg, 9 nests with one egg, 27 nests with 2 eggs, 46 nests with 3 eggs, 2 nests with 2 eggs and a chick, 4 nests with 2 chicks, 2 nests with 1 egg 1 chick, 1 nest with 1 egg 2 chicks, 1 nest with 1 chick, one nest with 3 chicks. Total 92 nests,

July 24, 4 fledglings seen from the boat, 40 adult, you can't see all of the colony from the water, there has been some success here, but considerable disturbance as well.

Mason Ledge, June 25, @35 adult Common Terns, one nest with 1 egg, 8 nests with 2 eggs, 9 nests with 3 eggs, total 18 nests. 12 empty scrapes.

July 24, 5 adult Common Terns, 0 chicks seen, a fish carried in comes back out, this colony has not done well.

Brimstone, (Burnt Coat Harbor), June 25. 50 adult Common terns, not there June 5,

July 24 fish being carried in by terns, @50 adult Common Terns, this is a vigorous healthy colony.

Aug 16, 150 common terns @30 up over the nesting area, the rest on the shore, there were fledglings amongst the roosting flock.

Aug 31, @100 terns, many fledglings,

Dry Money Ledge, June 25, @220 adult common terns, 2 roseate, 37 nests with one egg, 48 nests with 2 eggs, 64 nests with 3 eggs, 2 nests with 4 eggs, one nest with 6 eggs, @20 nests with chicks, lumped in with those nests with equal clutch size. Total 151 nests. July 24, 34 fledglings, easily counted from the boat on anchor from the south, 250 plus total individual, 25 more fledglings from the North, total 59 Fledglings seen.

Three bush, (Marshall) June 25, @70 adult common terns, 5 nests with one egg, 12 nests with 2 eggs, 35 nests with 3 eggs, one nest with 4 eggs, 1 egg one chick, 2 chicks one egg, 2 chicks, 4 empty and 5 eaten eggs found total 57 nests.

July 24, 1 Fledgling 9 adult, this colony has been largely abandoned,

Saddleback ledge, Penobscot bay, Aug 16 @150 terns roosting, many fledglings, I did not see any Arctic terns.

Great Spoon, Aug. 16, 30 common terns with fledglings at the north end of the spit.

Islands at which no terns were seen: Large green, Little two Bush (mussel ridge) , two Bush (Matinicus), Ten pound, Green Ledge (Criehaven), Shag Rock (Criehaven), Pudding Island, High Sheriff, Crow Island (Swan's Is.) Otter, Roberts, Little Roberts, Hay, Carvers, Southern Poplestone ledge, Gooseberry (burnt coat), Great Spoon, Little Spoon, Western cow pen,

Seal Island National Wildlife Refuge

Carlos Zavalaga, Island Supervisor and Gina Mori Resident Intern, National Audubon Society SRP

Tern census

The ARTE (Arctic Tern, *Sterna paradisaea*) and COTE (Common Tern, *Sterna hirundo*) census was conducted on 14-15 June by five persons and completed in 6 hours. The unadjusted count was 2,542 nests. For the estimation of the Lincoln Index a sample of 234 nests were identified. The correction factor $[(\text{marked} + \text{unmarked}) / \text{marked}]$ was 1.0263. After adding 132 nests from the productivity and feeding plots, the adjusted total became 2,741 tern nests. The species ratio was undertaken by observations and counts of 1104 incubating terns from 8 permanent blind locations, four enclosures and five feeding plots. The proportion of ARTE and COTE nests was 0.365 and 0.635, respectively. The total number of ARTE nests was lower in 2006 than in 2005, whereas the numbers of COTE increased (Table 1).

Table 1. Total number of tern nests on SINWR 2002 to 2006.

Year	ARTE	COTE
2002	1057	1582
2003	1066	1283
2004	1172	1167
2005	1064	1219
2006	1015	1726

Tern Productivity

Productivity was assessed in 54 ARTE and 84 COTE nests distributed in four enclosures and five feeding plots (3 for ARTE and 2 for COTE). All productivity indicators for ARTE and COTE in 2006 were higher than in 2005 (Table 2 and 3). Main causes of mortality in a sample of 80 dead chicks in the enclosures were: starvation (56%), disappearance (18%), unknown (13%), injured by other adults (9%), leg paralysis (3%) and storms (1%).

Table 2. Productivity indexes for ARTE on SINWR between 2002 and 2006.

Productivity Index	2002	2003	2004	2005	2006
Mean clutch size	1.84	1.69	1.59	1.57	1.72
Mean hatching success	1.57	1.38	1.44	1.30	1.33
Mean fledging success*	1.11	1.00	0.82	0.67	0.70

Table 3. Productivity indexes for COTE on SINWR between 2002 and 2006.

Productivity Index	2002	2003	2004	2005	2006
Mean clutch size	2.11	1.97	1.70	1.77	2.01
Mean hatching success	1.78	1.69	1.39	1.29	1.57
Mean fledging success*	1.09	1.01	0.72	0.61	0.93

* A chick was considered successful if ≥ 15 days old and it was not found dead by the end of the season.

ARTE and COTE feeding studies

Between 25 June and 20 July 2006, a total of 18 ARTE and 12 COTE nests (the number of nests observed decreased as season progressed because of chick mortality) were observed in 5 feeding plots (3 for ARTE and 2 for COTE) for a total of 344 and 448 hours x nests for ARTE and COTE, respectively. The feeding rate was 1.51 and 1.75 prey delivered per hour for ARTE and COTE, respectively. The diet composition (expressed as percentage by number), calculated from 819 and 820 prey deliveries to ARTE and COTE chicks, is shown in Table 4.

Table 4. Principal prey items in the diet of ARTE and COTE on Seal Island, 2006.

	ARTE			COTE		
	Freq.	% diet	Mean size (mm)	Freq.	% diet	Mean size (mm)
Euphausids	321	38	27.2	385	47	36.0

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Herring	153	19	57.3	197	24	77.7
Hake (white hake and small 4-beard rockling)	171	20	46.1	117	14	53.6
Other prey	263	23		121	15	

Atlantic Puffins (*Fratercula arctica*)

A total of 3XX active burrows were identified in 2006, which represents an increase of X % over last year. Productivity was estimated from a sample of 40 burrows checked by direct inspection of the nest content at least 4 times from incubation to fledging. Hatching success (number of hatchlings/number of eggs) was 93%; fledging success (number of chicks > 21 days old/ number of hatched eggs) was 95%.

Predator Control/ Gull Census/Predators

A total of 60 Great Black-Backed (*Larus marinus*) and 141 Herring gull (*Larus argentatus*) nests were counted and 116 and 301 eggs for each species respectively, were destroyed on 25-27 May and 13-16 June. Tern chick predation by gulls was uncommon (10 sightings).

Other Breeders

Four breeding pairs of Razorbills (*Alca torda*) and one pair of Roseate terns (*Sterna dougallii*) laid eggs. Great (Phalacrocorax carbo) and Double-crested Cormorants (*P. auritus*) nested (15 and 5 nests, respectively) on the south-east edge of SINWR, while approximately 44 Common Eider (*Somateria mollissima*) nests and several hundred breeding Black Guillemots (*Cephus grylle*) were also observed.

Visitors/ Rare Birds/ Student Research

A Red-billed tropicbird (*Phaethon aethereus*) was sighted at SINWR on 17 June and 1 August. Two banded razorbills B17-280 and 280-41(?) were sighted on 14 July, whereas a two banded Roseate terns were sighted (54-3B and BB63). Additionally, COTE adults banded in Argentina and Brazil were also resighted. On 19 July several hundreds of Greater shearwaters (*Puffinus gravis*) and several dozens of Manx (*P. puffinus*) and Sooty shearwaters (*P. griseus*) were seen feeding within 300 m from the Seal Island shores.

Matinicus Rock

Island Supervisor: Paula Shannon
Resident Research Assistant: Frank Mayer

Tern and Laughing Gull Census We conducted the tern and Laughing Gull nest census on 16-17 June. The total (unadjusted) tern nest count was 1289. To determine species ratio, a direct count of Common Tern nests was conducted, yielding 292 nests. Common Tern nests were subtracted from the nests counted, and the Lincoln Index was applied to Arctic Tern nests only, yielding an adjusted total of 1059 Arctic Tern nests. The total adjusted nest count was 1351. The species ratio was 78% Arctic and 22% Common Terns.

We counted 842 Laughing Gull nests, which is an increase of 218 nests over last year. Population estimates for Arctic Terns, Common Terns, and Laughing Gulls from the past five years are shown in Table 1.

Table 1. Estimated number of breeding pairs of Arctic Terns, Common Terns, and Laughing Gulls at Matinicus Rock from 2002 to 2006.

Year	Arctic Tern	Common Tern	Laughing Gull
2002	999	198	624
2003	1022	188	597
2004	830	116	524
2005	963	243	624
2006	1059	292	842

Tern Productivity We followed 55 Arctic Tern nests and calculated productivity of 0.56 chicks per nest, and we followed 40 Common Tern nests and calculated productivity of 0.70 chicks per nest (Table 2). Several factors influenced productivity this year. Herring Gulls were observed taking tern chicks in the colony, and a prolonged rainy period when chicks were hatching also affected productivity.

Table 2. Productivity (chicks per nest) of Arctic and Common Terns at Matinicus Rock from 2002 to 2006.

Year	Arctic Terns	Common Terns
2002	1.31	1.22
2003	0.85	0.88
2004	0.38	0.31
2005	0.43	0.61
2006	0.56	0.70

Predator Observations and Control At least three Herring Gulls were observed preying on tern chicks. We found no large gull nests on the island this year and we shot three Herring Gulls. We also destroyed 270 Laughing Gull nests in an effort to decrease Laughing Gull productivity.

Tern Feeding Studies We observed feedings at 16 Arctic Tern nests this year, with 1146 feedings in 576 hours of nest observation (feeding rate 1.84 prey items/hour), and at 13 Common Tern nests, with 1035 feedings in 546 hours of nest observation (feeding rate 1.89 prey items/hour). The diet of Arctic Tern chicks was 56% fish and the diet of Common Tern chicks was 57% fish. The diet composition of Arctic and Common Terns is shown in Table 2.

Table 2. Prey items fed to Arctic Tern chicks (a), and Common Tern chicks (b) at Matinicus Rock, 2006.

a. Arctic Terns

Prey item	Total Items	Percent of Diet
Hake	477	41.6

b. Common Terns

Prey Item	Total Items	Percent of Diet
Hake	406	39.2

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Amphipod	312	27.2	Euphasiid	339	32.8
Euphasiid	126	11.0	Amphipod	70	6.8
Unknown Fish	50	4.4	Butterfish	33	3.2
Herring	34	2.9	Unknown Fish	33	3.2
Atlantic Saury	29	2.5	Atlantic Saury	27	2.6
Butterfish	18	1.6	Herring	25	2.4
Other Fish	17	1.5	Other fish	54	5.2
Other inverts	48	4.2	Other Inverts	24	2.3
Unknown	35	3.1	Unknown	24	2.3

Atlantic Puffins We conducted a census of breeding puffins this year and estimated a minimum of 310 active nests, an increase of 53 nests over the last census in 2003. We calculated puffin productivity by following 62 burrows. Hatching success was 87%, fledging success was 78% and productivity was 0.68 chicks per nest. We also banded 93 puffin chicks for the continuing juvenile survival study.

Razorbills We counted 291 active razorbill nests this year. We also estimated Razorbill hatching success by following 55 nests, and hatch success was 87%. The high count of Razorbills was 630 on 6 June.

Common Murres We continued the Common Murre Attraction Project this year by setting up murre decoys and continuously broadcasting murre colony sounds. Up to 49 murres were observed on the island this year.

Leach's Storm Petrels We estimated hatching success for Leach's Storm Petrels by following 29 burrows this year. Twenty-four of 29 eggs hatched, yielding a hatch rate of 83%

Manx Shearwaters Up to eleven Manx Shearwaters were observed near the island in late May and early June, and the season high count was 18 individuals on the water on 12 July. At least four individuals were distinguished calling at night.

Other Species A Red-billed Tropicbird was observed on the island on 18 days between 5 July and 9 August.

Metinic Island

Susan Elliott, Island Supervisor; Alex Champagne and Carmen Lindsly, Island Interns.

Census

The Gulf of Maine Seabird Working Group (GOMSWG) Census was conducted on the 20th of June this year and a total of 462 nests were documented and no new nests were discovered during transects for the Lincoln Index. We had 240 more nests than last year and we confirmed species for 133 of our nests. The species ratio estimated from those 133 nests was 70% common tern, 30% Arctic tern. In addition two roseate tern nests were discovered this year. The total number of tern nests by species for the last five years is summarized below in Table 1.

Table 1. Estimated number of breeding pairs of Arctic, Common and Roseate Terns at Metinic Island from 2002 to 2006.

Year	Common	Arctic	Roseate	Total
2002	126	104	0	230
2003	138	99	3	240
2004	332	392	1	725
2005	88	134	0	222
2006	322	138	2	462

Productivity

We followed 11 Arctic tern nests and calculated productivity of 1.0 chicks/nest, 11 common tern nests and calculated productivity of 1.73 chicks per nest and two roseate tern nests with a calculated productivity of .50 chicks per nest (Table 2). Weather events combined with poor food also affected productivity regardless of the successful season.

Table 2. Productivity (chicks per nest) of Arctic, Common and Roseate Terns at Metinic Island for 2006.

Productivity Measures	Arctic	Common	Roseate
Mean Clutch Size	2.0	2.3	1.5
Mean Hatch Success	66%	93%	67%
Fledging Success	63%	73%	50%
# Chicks Fledged/Nest	1.0	1.73	.50

Provisioning

A total of 27 nests were observed throughout the season; 12 were COTE and 15 were ARTE. The total number of observation hours amounted to 59 with a total of 389 observed feedings. “A” chicks received 66% of the food deliveries, “B” chicks (second hatch) 34%. The percent diet composition is given for each species in Table 3. Food availability seemed a little scarce this year with an increase of “difficult to swallow” food items such as; Butterfish and Bluefish. Herring was clearly the principal prey species for both Arctic and common terns. One noteworthy food item this season was the Northern Puffer, a new species of prey never before observed being fed on Metinic.

Table 3. Prey items fed to Arctic and Common Tern chicks at Metinic Island.

Species	H.	Bu.	Bl.	N. P.	R. H.	P.	I.	S.	U.
COTE	54%	15%	6%	4%	0%	1%	12%	0%	8%
ARTE	66%	15%	2%	0%	1%	0%	3%	1%	12%

H= Herring, Bu=Butterfish, Bl=Bluefish, NP=Northern Puffer, RH=Red Hake, P=Pollock, I=Insects/Marine Inverts, S=Sandlance, U=Unknown.

We experienced a much lower incidence of predation this year; however, we experienced a significant loss of chicks in mid-July. The cause remains uncertain, but we believe it is a combination of severe weather and lack of food. Thirteen herring gulls and one great black-backed gull were shot this year. We also expanded our “gull free zone” to the tree line. Numerous gull eggs in the “gull free zone” were poked throughout the season. We poked a total of 473 eggs in 272 nests.

Misc. Counts and Incidental Sightings

A total of 89 species were documented for the island this year. Some of the species highlights included: Red Phalarope, Razorbill, Turkey Vulture, Sandwich Tern, Northern Mockingbird, Yellow-billed Cuckoo, Lincoln’s Sparrow and Snow Goose.

Eastern Egg Rock

Christina Donehower, Island Supervisor, National Audubon Society SRP

GOMSWG Census

A complete tern, Common Eider, and Laughing Gull nest count was conducted on 17-18 June in 66 person hours. A total of 661 Common Tern nests was found. After correcting for observer error (Lincoln index = 1.04) and adding 76 nests located in productivity plots and feeding studies, the adjusted total became 763 Common Tern nests. Eighty Arctic and 113 Roseate tern nests were identified and flagged prior to the census, making species differentiation during the count unnecessary.

Nest counts for Common and Arctic terns were similar to those recorded in 2005, while Roseate Tern nests decreased by 16% (22 nests) (Table 1). A total of 1486 Laughing Gull nests was found, a 9% (152 nests) decrease from 2005 (Table 1). Only 123 Common Eider nests were found; this is considerably lower than usual (2004: 369; 2005: 295), and many (20%) of these nests were abandoned.

Table 1. Number of larid nests found on Eastern Egg Rock from 2001-2006

Year	COTE	ARTE	ROST	LAGU
2006	763	80	113	1486
2005	758	81	135	1638
2004	872	84	110	1420
2003	992	77	163	1466
2002	1004	81	160	1176
2001	1514	92	145	1252

Tern Productivity

Common Tern productivity (fledglings/nest) was estimated from a sample of 84 nests in four fenced enclosures and two unfenced feeding plots, while 26 Arctic and 96 Roseate tern nests were monitored in unfenced habitat. Common and Arctic tern chicks surviving 15 days were considered “fledged”, and any chicks later found dead were subtracted from this value. Roseate Tern productivity was calculated using methods developed by the Roseate Tern Recovery Team.

Compared to 2005, breeding parameters were similar for all three tern species. Mean clutch sizes and hatching and fledging success are summarized in Table 2. Common Tern productivity increased slightly to 0.64 fledglings/nest, up from 0.59 fledglings/nest in 2005. Arctic Tern fledging success also improved to 0.62 fledglings/nest, up from 0.58 fledglings/nest in 2005. Roseate Tern fledging success was 0.95 fledglings/nest, exceeding the 2005 estimate of 0.90 fledglings/nest.

Common and Arctic terns experienced heavy gull predation in the egg-laying and incubation periods in early June, with many nests depredated at the southern and northeastern portions of the island. Several nests were depredated by Ruddy Turnstones. Most affected terns successfully relayed before the census, and little predation occurred from early to mid July. In late July, Herring Gull predation again increased, and many fledglings were taken.

The season was exceptionally wet, with >60 cm of rainfall recorded from 1 June to 8 August. At least 13% of Common Tern chicks died of exposure following a severe rainstorm on July 22-23; most chicks were 12-15 days old. Several nests containing eggs were flooded.

Table 2. Tern productivity estimates for Eastern Egg Rock from 2001-2006

		2001	2002	2003	2004	2005	2006
COTE							
	Mean clutch	1.92	2.4	1.98	1.9	2.01	2.11
	Mean hatch	1.31	1.87	0.81	1.36	1.33	1.33
	Mean fledge	0.4	0.85	0.98	0.64	0.59	0.64
ARTE							
	Mean clutch	1.72	1.92	1.77	1.6	1.77	1.58
	Mean hatch	0.88	1.11	0.7	1.15	1.04	1.23
	Mean fledge	0.3	1.2	0.64	0.58	0.58	0.62
ROST							
	Mean clutch	1.57	2.04	1.6	1.30	1.69	1.58
	Mean hatch	1.05	1.15	0.84	1.09	1.34	1.15
	Mean fledge	0.4	1.1	0.92	0.76	0.90	0.95

Tern Provisioning

Fourteen Common, 14 Roseate, and 7 Arctic tern nests were included in a chick provisioning study. Observers spent 1096 hours watching chicks (COTE: 591 chick

hours, ARTE: 129 chick hours, ROST: 376 chick hours). Feeding rates (items delivered/hour) were 1.1, 2.0, and 1.0 for Common, Arctic, and Roseate terns, respectively. Hake was the principal prey item delivered to all three species. Herring ranked second for Common and Roseate terns and third for Arctic Terns. Invertebrates comprised nearly one third of the diet of Arctic Terns. Refer to Table 3 for an overview of diet composition by tern species.

Table 3. Principal prey items (percent) in tern chick diet on Eastern Egg Rock in 2006

	Hake	Herring	Invertebrates
COTE	41	14	4
ARTE	35	4	28
ROST	43	9	0

Predator Activities and Control Efforts

One Great Black-backed Gull and one Herring Gull nest were destroyed. Two predatory Great Black-backed Gulls and five predatory Herring Gulls were shot. Several predatory Herring Gulls could not be removed. To reduce competition for nesting habitat with terns, 869 Laughing Gull nests were destroyed in a “buffer zone” around the island’s perimeter.

Alcids

The Atlantic Puffin colony expanded to approximately 80* nests. Ten new burrows were identified. Though breeding numbers were higher than ever before, there was a noticeable lack of loafing birds around the island. Researchers conducted 222 observation stints (625 hours) and re-sighted 184 individuals. Seventy-eight traps were set (186 trap hours), and 21 adults and three chicks were captured. All adults were captured using box traps, and all puffins received “second-generation” ridged metal field readable bands. As in 2005, Razorbills were often seen on land, and occasionally, prospecting in the boulders.

Other Island Notes

- 1) Few Common Eiders were observed on or around the island. No large ducklings (above Class Ib) nor rafts of (hundreds to thousands) of flightless adults were seen.
- 2) Manx Shearwaters were never sighted. However, possible vocalizations of one individual were heard on the evening of 28 June.
- 3) Eastern Egg Rock welcomed many visitors. More than 60 potential contributors and media personnel landed on the island and toured the cabin and blinds.

*Preliminary estimate- final nest count may differ slightly following a more thorough review of these data

Kennebec Point Report (POND ISLAND)

July 28, 2006

Greetings to everyone at GOMSWG,

We are sorry we cannot be with you today, but felt impelled to send this report from Kennebec Point.

We have seen a number of peculiar events in our area. For the past few days we have observed a visitor, small, furry, brown, and sinuous. This was first seen circumventing our vegetable garden. Nothing was taken, and we guessed it was a scouting mission, locating supplies, etc. It disappeared into some vegetation before we could achieve photographic documentation.

Next we noticed a small “V” wake in the ocean, rapidly circulating about Kennebec Point. On further investigation by boat, we were able to confirm that it was the same type of creature, making headway for some rocks offshore, in the direction of Pond Island. It cleverly hid itself among the rock, and was well camouflaged.

It is apparent to us that this small creature is laying the groundwork for a naval attack on Pond Island, presumably for next summer. We feel this warning is in order, that you might get out your mink traps and prepare for an exciting all out warfare next season on Pond Island.

We look forward to seeing you then!

Anne and Walter Gamble

Pond Island National Wildlife Refuge

Island Supervisor: Noel Dodge

Population Estimates

GOMSWG tern census was carried out on the 16th of June. 423 Common tern nests were counted and using the Lincoln index the total number of nests was calculated at 444. This was the second consecutive year Artic terns have nested on Pond Island. There were a number of Roseate Terns seen loafing on the island, however only 1 nest was found.

Table 1: GOMSWG Census Results 2002 - 2006

Year	COTE	ARTE	ROST
2002	109		
2003	310		2
2004	429		12
2005	277	1	1
2006	444	5	1

Tern Productivity

The hatching success for COTE this year was 1.17 (SD=1.16) chicks per nest. Fledging success was 0.40 (SD=0.69) chicks per nest. There was a lot of nocturnal abandonment all season mostly due to the owl and heavy pressure by the Peregrine Falcon. The combination of the wetter than average year and heavy predator pressure resulted in low productivity. This season ‘funk’ was not prevalent, but since most nests failed before chicks could show symptoms it may still be an issue. The ROST nest was abandoned very early. All but one ARTE nest failed due to severe storms. The remaining nest washed down slope but still hatched 2 chicks, which then perished due to a second round of severe weather.

Table 2: COTE Productivity 2001 - 2006

Year	Average clutch size	Hatching Success	Fledging Success
2001	2.80	1.74	0.44
2002	2.80	2.43	1.55
2003	2.20	1.67	1.10
2004	2.04	1.20	0.71
2005	2.47	2.28	1.09
2006	2.28	1.17	0.40

Tern Feeding Studies

This season 3 blind windows watching 17 nests were used for feeding studies on Common terns. 248 hours were spent observing from 2 blinds, with two windows active from one blind. When it was possible, 2 studies were observed from the same blind at the same time i.e. only one chick in each study. 403 feedings were observed at a rate of 1.63 feedings per hour of observation. The predominant prey species was Herring, followed by Sand lance.

Table 3: Prey Deliveries on Pond Island 2005

Species	Count of prey item	% of diet
Hake	147	36.48
Sand lance	138	34.24
Unknown Fish	57	14.14
Hake	31	7.69

Predators

This season the terns were abandoning all season. On the 13th June a feather spread was found and that night a Great horned owl was trapped. This was the only one for the season, which is lower than 2003 and 2004, but the same as last season. The main disturbance this season was caused by at least two Peregrine falcons. The first Falcon was a juvenile female who was seen every day for 15 days, and was observed taking 2 adult terns. Peregrine feather spreads were also found indicating another 3 kills. The second peregrine was a Male of uncertain age, who was observed taking a COTE fledgling late in the season. Both falcons made multiple passes on the colony each day often around sunset, causing the terns much dismay.

There were no Great Blue Herons or Black Crowned Night Herons seen hunting on the island this season.

Eider Productivity

28 Common eider nests were found while conducting the GOMSWG tern census on June 16th. Of those nests 42% were hatched, 46% were active and 7% were abandoned. The abandoned nests only contained 1 and 2 eggs with the rest probably depredated. The majority of the eiders nested in dense Poison Ivy again this year preventing researchers from accurately censusing the population. However, many depredated eggshells were found around the island in gull loafing areas. Despite the gull pressure chicks were seen on the water almost every day after June 6th with a high count of 27 on June 9th. Gulls

were seen harassing eider crèches on only two occasions and were not observed taking any chicks.

Other Island Notes

- ◆ Student research projects on the island included the collection of feathers for carbon and nitrogen isotope analysis for Jeff Kimmons.
- ◆ The two Guillemots nested on the island this season, but the egg did not hatch.

Jenny Island

Island Supervisor: Noel Dodge

Population Estimates

GOMSWG tern census was carried out on the 14th of June. 589 Common tern nests were counted and using the Lincoln index the total number of nests was calculated at 642. 14 Roseate nests were found.

Table 1: GOMSWG Census Results 2003 - 2006

Year	COTE	ARTE	ROST
2003	468	0	0
2004	213	1	2
2005	532	0	11
2006	699	1	15

Tern Productivity

The hatching success for COTE this year was 2.02 (SD=0.89) chicks per nest. Fledging success was 1.05 (SD=0.82) chicks per nest. The feeding study plots had better fledging success than the productivity plots. The hatching success for ROST the 15 nests this year was 1.36 chicks per nest. Fledging success was 1.00 chicks per nest.

Table 2: COTE Productivity 2003 - 2006

Year	Average clutch size	Hatching Success	Fledging Success
2003	2.3	1.92	1.5
2004	2.35	1.13	1.13
2005	2.2	1.88	1
2006	2.47	2.02	1.05

Tern Feeding Studies

This season 385 hours of observations for feeding studies were carried out from two blinds. 681 feedings were observed at a rate of 1.76 feedings per hour of observation. The predominant prey species was Herring, which is a change from 2005 when it was Hake.

Table 3: Prey Deliveries on Jenny Island 2006

Species	Count of prey item	% of diet
Herring	286	42

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Unknown	55	8
Hake	233	34

Predators

This season there were multiple predators sighted on Jenny Island. Upon opening the island a single mink cash was discovered but no other sign was seen all season. An *Accipiter* spp. hawk was observed multiple times, once taking an adult tern. Also a Herring Gull was seen eating a COTE fledger late in the season. A Peregrine Falcon was also seen chased off by the terns late in the season. However, the terns were not observed abandoning this season while researchers were on the island.

Outer Green Island

Supervisor Matthew D. Martinkovic

Census

Common Tern

Sterna hirundo was 732 nests (a corrected total of 657 nests plus 75 study nests in productivity and feeding plots). This is a decrease from 971 nests in 2005. The following table shows the population from the past 5 years.

Common Tern GOMSWG census from 2002 – 2006.

Year	2002	2003	2004	2005	2006
GOMSWG	1	94	497	971	752

Roseate Tern

We conducted a direct count on 20 June and had a total count of 6 nests, which is a significant decrease from 36 in 2005. The following table shows the population estimate from the past 3 years.

Roseate Tern GOMSWG census from 2004 – 2005.

Year	2004	2005	2006
GOMSWG	19	36	6

Tern Productivity

Common Tern

The fledging success was 1.13 fledgers/nest for 75 study nests in 2006. This was an increase from 0.67 in 2005. The mean hatch was 1.92 chicks/nest in 2006, which was an increase from 1.68 chicks/nest in 2005. The average clutch size was 2.3 eggs/nest, which was an increase from 2.2 eggs/nest in 2005. The following table shows the reproductive success from the past 5 years.

	2002	2003	2004	2005	2006

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Clutch Size	n/a	2.64	2.26	2.22	2.23
Hatching Success	n/a	2.45	1.92	1.69	1.92
Fledging Success	n/a	2.09	1.45	0.67	1.13

Roseate Tern

The fledging success was 1.16 fledgers/nest for 6 study nests in 2006. This was an increase from 0.64 fl/nests in 2005.

Tern Feeding

There were 24 Common Tern *S. hirundo* study nests in 4 different plots in 2006. There were 895 hours of observations this season. There were 1777 feedings observed at a rate of 1.99 feedings/hour. The prominent prey item was Hake at 37.7 % and Herring at 35.3%. The following table shows the major food items observed in 2006.

2006 Common Tern Diet

Prey Item	Percent
Hake	37.7
Herring	35.3
Lumpfish	8.5
Unknown Fish	5.8
Ant	5.2
Other	7.5

Gull Management

There were 23 Herring Gull nests containing 36 eggs and 9 Great Black-backed Gull nests containing 15 eggs removed from the island in 2006. There were 4 Herring and 4 Great Black-backed Gulls shot on the island. The following table shows the number of nests, eggs and adults removed from the island in 2006.

Species	Eggs destroyed	Nests destroyed	Gulls shot
Herring Gull	36	23	4
Great Black-backed Gull	9	15	4
Season	45	38	8

Common Eider

There were 13 total eider nests found on the island throughout the season. There were six that successfully hatched and 6 that were predated by gulls. During the season we observed a high count of 27 eider ducklings on the water around the island.

Black Guillemot

There were 7 total guillemot burrows found on the island. All hatched with success but fledging was unknown.

Other Birds

Once again the island continues to be a stopover for migrants. There were 149 birds captured in the mist nets (36 species). Also the island had several rare birds such as Bridled Tern, Magnificent Frigate bird and Sooty Tern.

Western Casco Bay, Maine

Survey by Bob Houston (USFWS) & Scott Hall (NAS); Survey date: June 19, 2006

Clapboard Island Ledge, south, Falmouth (55-330)

Nest survey by boat revealed no terns present. Last year's survey on ground showed no terns nesting.

The Nubbin, Yarmouth (55-223)

Nest survey on ground revealed 8 common tern nests (two 1-egg; two 2-egg and four 3-egg nests). The island was revisited once on July 6; 3 fledglings were present along with one active 3-egg nest. One dead chick was seen. Nest survey on ground last year revealed no tern nests.

French Island Ledges, Freeport (55-268, 55-269, 55-270)

Survey by boat, no terns seen. No terns on these ledges for the past 20+ years. Osprey nest present with chicks.

Sister Island Ledge, Freeport (55-237)

Nest survey on ground revealed two 3-egg common tern nests. The island was revisited July 6; there was no sign of nests or any terns. All nests are assumed unsuccessful. Nest survey on ground last year revealed 3 common tern nests.

Grassy Ledge, Harpswell (55-259)

Nest survey by boat revealed no tern nests. Nest survey on ground last year also revealed no nests.

Black Rock, Harpswell (55-252)

Survey by boat, no terns seen. No terns on this ledge for 20+ years.

Stratton Island

Island Supervisor- Suzanne Sanborn Resident Intern- Robby Lambert

Census

Our Tern census was conducted on June 15. Our COTE unadjusted count was 603 with a Lincoln Index adjustment of 1.033, leaving an adjusted count of 622. With the addition of 14 feeding study nests and 36 productivity nests, our total COTE census count was 672 nests. 84 ROST and 9 ARTE nests were identified and flagged before the census date. COTE nests were up from 2005 by 156 nests, ARTE nests were up by six nests and ROST nests were up 82 nesting pairs. This was the second year LETE nested on the island. There were 58 nests counted on June 21. A second count was conducted on June 27 because of a noticeable increase in numbers, an additional 40 nests were found and on the 12th of July we had a season high count of 103 nests. The second and third wave of

nesting terns were probably due to two mainland colony predation events that occurred the week prior to Stratton's increase in nests.

Population estimate 2002-2006

Year	COTE	ROST	ARTE	LETE
2002	1279	98	8	-----
2003	305	40	4	-----
2004	231	11	9	-----
2005	156	2	3	19
2006	672	84	9	58

Productivity

Following a total of thirty-six nests in three fenced enclosures and 14 provisioning study nests assessed COTE productivity. Chicks/pair were up slightly from 2005 despite a noticeably high occurrence of kleptoparasitism. ROST productivity was down from 2005, due to the high number of nests, a different formula was used to determine survival. The mean hatch for COTE was 2.38 and ROST was 1.44 hatched/nest. There were two weather events, one in June and one in July that had an impact on COTE productivity. Also, during a late season colony check, fifteen COTE fledgers were found newly dead. They were very thin and apparently died of starvation. Seven of these birds were sent to National Wildlife Health Center in Madison, Wisconsin for analysis.

Fledgers/nest 2002-2006

Year	COTE	ROST	ARTE
2002	0.1	0.6	-
2003	0.2	0.05	-
2004	0.3	1	-
2005	0.98	1.5	0.6
2006	1.0	0.96	-

Feeding

COTE provisioning studies were conducted from June 22 to July 19, ROST were conducted between June 25-July 18 and for the first time we conducted a LETE provisioning study with seven nests. There were 14 study nests for COTE and ROST.

	Hrs/nest	rate/hr	Prey	% diet
COTE :	43	1.5	Unidentified Invert	41.5
ROST :	34	0.72	Herring	38.5
LETE :	18	1.26	Unidentified fish	40.1

Predator Control

This season all GBBG and HERG nests in Gull Meadow were destroyed twice daily from May 6- June 23. Bluff Island was actively managed by poking all gull eggs during the May 23 and 24 census and returning on June 20 to poke all new nests. This season 617 HERG nests and 240 GBBG nests were destroyed and 20 HERG chicks were removed. No evidence of predation or night abandonment was observed in the tern colony.

With past predation on COEI ducklings, this season we broke up predation events by either shooting the gull or shooting near the event to break it up. We kept a daily count of COEI ducklings and this season there seemed to be many older ducklings surviving.

Wading Birds

The wading bird census was conducted on May 22-24. All species nest numbers were up except BCNH. Christina Donehower and Jeff Kimmons conducted the COEI census from May 20-24. COEI nest numbers were down by 635 from 2005. Many late nests were discovered in late June and July. During the Wading bird census Christina noted 19 GLIB, 2 SNEG, and 3 COEI kills. During the season several GBBG were observed with SNEG kills in the pond.

Black Guillemot

There were three pairs observed. Two nests were found in the South rocks on Gull Meadow where later three chicks were found. A third nest was found in the southeast rocks on Bluff Island.

American Oystercatcher

There were several pairs observed in May. A nest on Little Stratton fledged one chick and there was a nest on the south beach on Bluff Island.

Other notes

This season there were 312 visitors up from 265 in 2005. There were three rare birds observed this season. In May a forked-tailed Flycatcher, in June a Sandwich tern and, in July a Yellow-nosed Albatross was seen flying over the island and two days later it landed and spent the night on the 'No Landing' beach. Feathers were collected for a second season from productivity and feeding plots for Jeff Kimmons' PhD isotope study.

White and Seavey Islands, NH

Shoals Marine Lab, Cornell University

Project Coordinator-Dan Hayward

Field Biologists- Melissa Hayward and Susie Burbidge

Census: Four Shoals Marine Laboratory (SML) biologists, one New Hampshire Fish and Game (NHF&G) biologist and one volunteer conducted the Common Tern (COTE) census on June 13, 2006. COTE numbers were down this year from 2033 pairs in 2005 to 1736 pairs. Roseate (ROST) and Arctic Tern (ARTE) nests were all marked and confirmed visually on or before June 20, 2006. ROST pairs declined from 61 pairs in 2005 down to 33 pairs in 2006 and ARTE numbers declined from 8 to 6 pairs. On White Island, there was a significant increase in the number of nests from 2 COTE in 2005 to 62 COTE, 1 ROST and 1 ARTE in 2006. On July 11, a B-Wave census was conducted on White and Seavey Islands. On White Island, 86 new nests were counted. On Seavey Island, an estimate of 641 nests was based on new nests in productivity plots. The B-Wave totaled 727 new nests.

Census (6/13-6/20)

Species	COTE	ROST	ARTE
Date	6/13/06	6/20/06	6/20
A-Wave (ground count)=	1518	33	6
+ Lincoln's Index(340m,5um)=	1540		
+ White(62) + Plots(134)=Total	1736		
B-Wave (July 11)	727	5	2
Season Total Nests	2463	38	8

Year-by-Year Comparison (Census)

Species/Year	2002	2003	2004	2005	2006
COTE (prs)	1273	2414	2582	2033	1736
ROST	8	42	107	61	33
ARTE	1	4	5	8	6

Year-by-Year Comparison (Season Totals)

Species/Year	2002	2003	2004	2005	2006
COTE (prs)	1687	2414	2582	2478	2463
ROST	26	63	112	67	38
ARTE	1	6	7	9	8

Tern Productivity: COTE productivity decreased from 0.75 in 2005 to 0.60 in 2006, whereas the clutch size increased from 1.93 eggs per nest in 2005 to 2.38 in 2006. ROST productivity increased from 0.70, in 2005, to 0.97 fledglings per nest, in 2006. ARTE productivity decreased in 2006 to 0.50 from 0.83 chicks per nest in 2005. The weather was milder during nest initiation than in the past few years. These conditions may have contributed to the larger clutch size and increased hatch per nest. The feeding rate was higher this year, even with the small Amphipod category removed. The habitat on Seavey has continued its shift from leafy plants to dense grass. This year there were large areas of the island that were completely unused, whereas five years ago the areas were prime rock/vegetation interface habitat. The productivity is the lowest we have seen and we believe it is primarily due to spatial competition. Many chicks observed were removed from the productivity plots by neighbors and deposited out on the perimeter or in the water. We are looking at options to reopen the overgrown areas to create more suitable nesting habitat.

Predation on COTE eggs was observed in concentrated areas on the edge of the colony and it appears that many of the birds successfully re-nested. Gull predation was high during the early part of the field season as a number of "specialist" gulls hunted the colony, eating eggs, during the storms in late May and early June. Similar to last year, it was not possible to document the number of eggs taken during the storms. The weather was too severe to warrant spending time in and around the colony and in blinds. During the fledging period there was no documented predation on fledglings. This has typically been the time of the breeding chronology in which we have seen the most significant amount of predation.

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This year the majority of the COTE A-Wave hatched between June 23 and 27, peaking on the 24th. In 2005, the majority of the eggs hatched between June 24 and June 30, peaking on June 25. The majority of the B-wave hatched between July 9 and 18, peaking on the 10th. The productivity for the B-Wave was 0.14 as 42 of the 49 monitored nests either abandoned or failed.

Tern Productivity

COTE A-Wave Totals [Season Totals]

Year	2002	2003	2004	2005	2006
Nests Monitored	184	163	138	120	114 [163]
Mean Clutch Size	2.52	1.96	1.84	1.93	2.38 [2.17]
Mean Hatch	2.09	1.61	1.67	1.14	1.87 [1.48]
Fledglings/Nest	1.63	1.33	0.75	0.76	0.60 [0.47]
Total Fledglings	2075	3212	1936	1523	1041 [1158]
Total Population	5449	8040	7100	5585	4513 [6084]

ROST A-Wave Totals [Season Totals]

Year	2002	2003	2004	2005	2006
Nests Monitored	8	30	55	56	33 [38]
Mean Clutch Size	1.38	1.40	1.21	1.23	1.48 [1.42]
Mean Hatch	1	1.07	1.13	0.82	1.24 [1.11]
Fledglings/Nest	0.88	0.87	0.95	0.70	0.97 [0.87]
Total Fledglings	7	26 [55]	52 [106]	46	32 [33]

ARTE A-Wave Totals [Season Totals]

Year	2002	2003	2004	2005	2006
Nests Monitored	1	4	5	6	6 [8]
Mean Clutch Size	2	1.5	1.20	1.83	1.67 [1.75]
Mean Hatch	2	1.5	0.50	1.67	0.67 [1.0]
Fledglings/Nest	0	1	0.60	0.83	0.5 [0.75]
Total Fledglings	0	4	3	5	3 [5]

Tern Feeding Study

# Of Nests	Nest Hours	Feeding Rate w/Amphipods	w/o Amphipods
40	236.3	1.88	1.44

Species	Hake	Amphipod	Unknown Item	Unknown Fish	Butterfish	Sandlance
% of Diet	39.59	23.30	9.95	7.47	4.75	3.62

Note: There was a noticeable shift to Mackerel around July 30 but it is not represented in the feeding study, as the majority of the chicks were mobile and flying.

Predator Control: Biologists arrived on island on April 28. No gulls were nesting during the initial census of the islands. One GBBG nest with 2 eggs was located and destroyed on May 17. On May 27 one HERG nest, with 1 egg, was destroyed. Two days later an attempted re-nest was located and the egg appeared to have been predated by another gull. Pyrotechnics and regular sweeps of the island continued from April 28 through the field season. Five GBBG and two HERG were taken as a result of predation and non-response to all other control methods. Gull predation, on eggs, was heaviest during storms in late May and early June. With winds around 25kn, the gulls barely landed to predate a nest. Other than during these early storms, little predation was observed.

Predator Control

Species	Nests Destroyed	Eggs Destroyed	Adults Taken
GBBG	1	2	5(+3 relief kills)
HERG	1	1	2(+2 relief kills)

Gull Control (Apr29-Aug6)

Control Method	Avg/Day	Control Method	Avg/Day
Human Control	2.42	Relief Kill	0.06
Screamer	1.88	Cap	0.03
.17 Cal. Rifle	0.25	Nest/Egg Destruction	0.02
Banger	0.17	Shotgun	0.01
Problem Gull	0.06		

Other Nesting Species

Species	COEI	SPSA	MALL	SOSP
# Of Nests	~15	~15	2	4

Other Tern Sightings, Rare Birds, and Interesting Observations

ATPU-5/30, 6/3-6/5, 6/8, 6/13, 7/1, 7/3, 7/6, 7/8, 7/27	RAZO-5/29, 6/9, 6/12, 7/8
PEFA-4/28-4/30, 5/6, 5/19, 7/3	BLTE-6/2
AMOY-5/5, 5/7, 5/8, 5/19, 5/25, 6/8, 6/17, 7/3	LAGU-observed on 17 days
SOSH-6/1, 6/3	MASH- 7/6, 7/13

MONOMOY ISLANDS

Monica Williams, U. S. Fish and Wildlife Service, Monomoy NWR

North Monomoy Island

Common Tern:

Census: On 18 June, one observer counted 1 Common Tern nest with 2 eggs, a nearby Common Tern egg depredated by gull, and 4 scrapes in the historic nesting area on the island.

Productivity: Productivity was not monitored. However, small numbers of common terns were observed throughout the season attempting to nest on the island, but they were unsuccessful due to predation and flooding of the nesting area during high tides.

South Monomoy Island

Common Tern:

Census: On June 16 and 17, a total of 9,167 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 9,310 nests. This is a 2.6% increase from the 8,834 nests counted in 2005. A second census was not conducted, but an additional 25 nests (13.9% of the total 179 nests) were initiated in productivity enclosures after the census window, indicating an additional 1,294 nests in the colony after 17 June.

Productivity: Productivity was estimated based on 179 A-count nests in 18 fenced productivity enclosures located throughout the colony. Three additional productivity plots were placed in the colony, but these remained unoccupied by Common Terns during the season.

Average clutch size: 2.32 eggs/nest (SD = 0.63, N = 179 nests)	2.36 in 2005
Hatching success: 1.88 eggs/nest (SD = 0.88, N = 179 nests)	2.10 in 2005
Reproductive success: 0.85 chicks/nest (SD = 0.714, N = 179 nests)	1.44 in 2005

Number of pairs and Productivity of Common Terns on South Monomoy Island

2000-2004

	2002	2003	2004	2005	2006
Number Pairs	8032	8727	8864	8834	9310
Productivity	0.70	1.26	1.59	1.44	0.85

Salmonellosis: Salmonella occurred again in the tern colony on South Monomoy Island from July 20-August 18. Approximately 540 common tern fledgers (15-23+ days in age) were found dead. Birds expressed a variety of symptoms. Generally, the outward appearance was healthy with no visible signs of injury or wounds, but their behavior was strange. Prior to dying, birds were sometimes observed spinning in circles and showed signs of imbalance and lethargy. They appeared droopy, were unable to open their wings and fly, and some had stained vents. Samples of dead birds were collected and sent to the National Wildlife Health Center (NWHC) in Madison, Wisconsin and Tufts University School of Veterinary Medicine in North Grafton, MA for analyses. Salmonella is a common finding in colonial nesting birds, but it is uncertain what the source of the Salmonella into the colony was. The first outbreak of Salmonella occurred in the colony in 2004 and 2,026 common tern fledglings died; in 2005 a total of 1,737 fledglings died from Salmonella.

Roseate Tern:

Census: Two Roseate Tern nests were counted during the census on June 16-17. Observers continued to search for Roseate Tern nests throughout the season, but no additional nests were found.

Productivity: The nests were checked every other day. One nest was contained in a productivity plot. One chick hatched on July 5. This chick was observed regularly until it fledged. Two chicks were hatched on June 26 and June 30 from a second nest, but were not found after July 2. Adult Roseate Terns were seen flying in and out of the nest area periodically. Staff searched, but were unable to locate the chicks in the vast, densely vegetated area.

Average clutch size: 1.5 eggs/nest (N = 2 nests) 2.00 in 2005
 Hatching success: 1.5 eggs/nest (N = 2 nests) 2.00 in 2005
 Reproductive success: 0.33 chicks/nest (N = 2 nests) 0 in 2005

Numbers of pairs and Productivity of Roseate Terns on South Monomoy Island 2000-2004

	2002	2003	2004	2005	2006
Number Pairs	3	3	1	1	2
Productivity	1.00	1.33	1.00	0	0.33

Least Tern:

Census: On 21 June, 57 Least Tern nests were counted on the south tip of the island and along Powder Hole. A second census was not conducted.

Productivity: Productivity was not quantitatively monitored, but was estimated to be poor. The colony gull and coyote predation, as well as overwash from rainstorms during the nesting season.

Laughing Gull:

Census: On 16 and 17 June, 1492 active Laughing Gull nests were counted, an increase from the 1312 nests counted in 2005.

Productivity: Productivity was not monitored, but it was estimated to be qualitatively good based on the number of fledgers seen at the end of the season. Nest destruction efforts were implemented to reduce the increasing Laughing Gull population that is encroaching on the tern colony. However, due to poor weather and inaccurate timing, a total of only 434 nests were destroyed in nine 60m x 60m grids during June 30-July 2.

Minimoy Island

Common Tern:

Census: On 19 June, 711 Common Tern nests were counted. No Lincoln Index was conducted to minimize disturbance. In 2005, 913 nests were counted during the census window.

Productivity: Productivity was not monitored. However, based on the number of chicks produced and survival to fledging, productivity was estimated to be qualitatively good.

Roseate Tern:

Census: On 19 June, a total of 24 Roseate Tern nests were counted. Four of the 24 nests were abandoned by early July. Three B-count nests were found later in the season. In 2005, 26 Roseate Tern nests were counted on Minimoy during the census window.

Productivity: Productivity was estimated based on 20 A-count nests. The 4 abandoned nests were not included in the productivity estimate.

Average clutch size: 1.50 eggs/nest (SD = 0.51, N = 20)	1.52 in 2005
Hatching success: 1.32 eggs/nest (SD = 0.48, N = 20)	1.36 in 2005
Reproductive success: 1.21 chicks/nest (SD = 0.59, N = 20)	1.28 in 2005

Black Skimmer:

Census: On 23 June, 4 Black Skimmer nests were counted. One B-count nest was found on 22 July and a late re-nest was found on 14 August. Minimoy has been the only nesting site in Massachusetts for Black Skimmers since 2003.

Productivity: Productivity estimates were determined based on 4 A-count nests.

Average clutch size: 3.75 eggs/nest (SD = 0.50, N = 4)	3.40 in 2005
Hatching success: 3.5 eggs/nest (SD = 0.58, N = 4)	1.00 in 2005
Reproductive success: 1.25 chicks/nest (SD = 0.5, N = 4)	0.40 in 2005

Predators

Great Black-backed Gull (GBBG) and Herring Gull (HERG): Gull harassment in area A was initiated 30 May. One harassment was conducted in May, 8 in June, and 3 in July. A census was conducted on 17 May; 15 nests (12 GBBG and 3 HERG and 43 empty nests) were counted in Area B and 2 nests were found in Area A. The nests in Area A were destroyed the day of the census and eggs in Area B were punctured to suppress productivity. GBBG and HERG nests in areas A and B were censused for a second time on 9 June. In area B, 17 GBBG nests and 40 HERG nests were counted. Some nests were not new. A total of 50 GBBG eggs and 105 HERG eggs were punctured. Gulls were present in the tern colony mid June through August. HERG were seen in the tern colony a minimum of 2 times and GBBG were seen in the colony at least 11 times. Gulls were responsible for taking at least 35 tern eggs and at least 5 common tern chicks. A total of 12 GBBG and 4 HERG were removed from the colony this season.

Northern Harrier: One pair of Northern Harrier nested on South Monomoy Island near Hospital Pond this season. The nest was hatched around 7 July and four successful fledglings were produced from this pair. Northern Harriers were seen in the tern colony a minimum of 13 times between 3 June and 7 August. At least 1 adult common tern, 13 common tern chicks, and 19 Laughing Gull fledglers were found dead in the colony likely killed by Northern Harrier.

Coyote: A total of 9 coyotes (all adults) were removed this season: 4 in April, 2 in May, 1 in June, and 2 in July. Coyotes were seen in and around nesting areas on at least 1 night and once during the day. Evidence of coyote (scat, tracks – often seen in pairs) was found in or around the tern colony a minimum of 17 times 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. Stomachs were removed from all coyotes, and three have been examined. One stomach removed from a coyote that was sighted in the colony prior to being removed on 24 July contained at least 69 common tern chicks ranging in age from 1-18 days. In addition, common tern egg shells and yolks were found in the stomach.

Black-crowned Night-Heron: Black-crowned Night Herons were censused on 20 May as part of the Wading Bird census. On South Monomoy Island, 152 pairs were counted, along with 6 pairs on North Monomoy Island. Black-crowned Night Herons were first seen in the colony on the night of 7 July, and were observed three additional times at night during the remainder of the season. There was evidence of Black-crowned Night Heron predation on Common Tern eggs and chicks throughout the season. In addition, one American Oystercatcher chick was taken by a Black-crowned Night Heron on North Monomoy.

Laughing Gull: Laughing gull kleptoparasitism on common tern stints were continued this year. A total of 77 one-hour-long stints were conducted. Data results are still preliminary, but approximately, 2793 kleptoparasitism attempts were observed and recorded for an average of 36.27 attempts per hour. Laughing Gulls were successful in 42% of the attempts, common terns were successful 16 % of the time, the outcome was unclear or undetermined 30.6% of the time, and prey items were dropped in about 11.2% of the attempts.

Least Terns in Maine

Reported by Kate O'Brien, Refuge Biologist
USFWS - Rachel Carson National Wildlife Refuge

Overall, 2006 was not a productive year for Least Terns nesting in Maine. Terns arrived on site later than in previous years and predation was high at all mainland sites.

Stratton Island was used again extensively for nesting, with a minimum of 103 nesting pairs documented and a minimum of 15 fledglings produced. Least terns were also documented nesting at Goose Rocks beach and at Crescent Surf beach. The colony at

Goose Rocks was predated and largely abandoned. One nesting pair remained and reared one fledgling. Crescent Surf also had major predation issues throughout the season, hosted about 30 pairs and produced 10 fledglings. Limited nesting was reported at Wells Beach and Reid State Park, however those birds did not remain at either site for very long. Overall, population estimation was difficult due to colony disturbance. We estimate a minimum of 134 nesting pairs within the State produced a minimum 26 fledglings.

Site Summaries for Least Terns

Wells Beach

Least terns were also observed at Wells Beach in late June after the colony at Goose Rocks had been predated a week earlier and largely abandoned. A volunteer monitor reported a Least Tern nest in front of #409 Atlantic Ave., during the week of June 25th. By June 28th the nest could not be located by biologists. This is a very active pedestrian area.

Crescent Surf Beach

Least terns were first documented at Crescent Surf beach on May 18th in small numbers and were documented using the site early in the season (3-60 individuals). Crow sign was evident throughout sandy nesting habitat. Nesting behavior was later in the season and initially the terns did not settle into the site. We assume this is due to the presence of nest predated crows.

An electric net fence was installed around the main nesting area on May 31st and one crow was removed from the site. Crow effigies were hung around the colony. Three Least Tern nests and approximately 50 adults were documented during the June 21st survey. A walk through nest survey was conducted on July 12, and 30 nests total and 2 chicks were counted. On July 19th, coyote tracks were found within the electric net fence and approximately ½ of the nests were predated. It was not apparent how the coyote breached the fence, as its tracks made it appear like the fence was simply walked through and the animal did not receive a shock. When the predation event was discovered the fence was operating at full charge.

A follow up nest count was conducted on July 24th. Twenty-two nests (4 of which had chicks in the nest cup) were counted. Finally, at the end of the season, crows predated nests which were outside of the electric net fence (see photographs). There were no successful nests outside of the electric net fence. Problem predators included crow, coyote, fox and a weasel or a mink. A critter camera was installed in an attempt to photo-document predation events, however it was not successful.

Fledgling Counts

We completed one dusk survey on August 9th at Crescent Surf beach. 60 adults were counted in addition to 4 fledglings, and 5 chicks of varying ages. Observers were stationed counting at Laudholm and Crescent Surf.

We continued to monitor the site and observe small numbers of chicks throughout late August. On August 29th we documented a high count of six fledglers. These six were added to the total fledglings produced based on a mean fledgling residency time of 2 weeks. Residency time decreased later in the season. The addition of six fledglings appears consistent with our late season chick observations.

Goose Rocks Beach

Least terns colonized the extensive sand spit at the Batson River this year, however were predated by skunk and likely other nest predators. Only one pair remained to one fledgling. The spit area was much larger in 2006 than in 2005, and landowners allowed extensive symbolic fencing to be erected to divert foot traffic into the area.

Terns were first recorded on May 30th and the population grew to approximately 60 individuals by the 6th of June. The a perimeter count of incubating pairs conducted by Jordan Bailey and Nicole Munkwitz during the Window Count on June 13th, yielded 50 active nests and an estimated 120 adults. An additional count one week later yielded 25 nests and an estimated 30 adults on June 21st, however it was evident during that count that massive predation by skunks and possibly mink was occurring. Numerous cracked egg shells and disturbed or empty nest scrapes were documented. By June 27th no nests were found and only seven adults were present

Dana Johnson, the *Creature Catcher* was hired immediately after the nest decimation detected during the June 21st nest count. He successfully trapped and removed one skunk in a week's time; unfortunately the skunk's predation had caused the colony to abandon. Tern numbers increased at both Stratton Island just off of Prout's Neck and Crescent Surf in Kennebunk at this time.

Western/Ferry Beach—Scarborough

A few least terns were first observed on Western Beach on June 5 and continued to be present in low numbers (1-6 individuals) through July 4. On one occasion, dive-bombing behavior was observed. No nests were located.

Stratton Island

Peak nesting was documented on July 12th with a count of 206 adults and 103 nests. 15 fledglings were observed.

Boat landing traffic redirected from Least Tern nesting area and nesting colony symbolically roped off.

A die-off of approximately (Number) 2 week old chicks was documented on the island.

Reid State Park

Least terns were first recorded on June 22 when 10 adults were counted and 1 nest was found. However the nest was abandoned by June and the small colony abandoned the site soon after.

Part 2-Research Abstracts

Contaminant Assessment of Common Terns in the Gulf of Maine - Steve Mierzykowski and Linda Welch, USFWS; Scott Hall and Stephen Kress, NAS; and Brad Allen, MDIFW.

In 2001, developmental problems affected 20% to 30% of the COTE eggs and chicks on three coastal Maine islands: Pond Island, Jenny Island and Stratton Island. Young terns were too weak to hatch, or unable to completely emerge from their eggshell. Others birds that were able to hatch quickly develop combinations of the following symptoms: swollen or encrusted eyes, bloody nares, patchy feather development, and necrotic skin at the base of the bill and legs. Chicks shook involuntarily or were extremely lethargic. Most affected tern chicks died within 5 to 7 days of hatching. In 2003, a proposal was submitted to USFWS to examine contaminant burdens in eggs and moribund chicks from the affected islands and two reference islands - Petit Manan Island and Eastern Egg Rock. Funding for the 2-year study was authorized in 2004.

Egg and chicks samples collected from the five study islands in 2004 and 2005 were examined at USFWS laboratories for organochlorine pesticides and inorganics. Composite egg samples from Stratton, Pond, and Petit Manan Islands were also examined for dioxins and furans, and PCB congeners.

Preliminary analyses of the laboratory data do not indicate highly elevated levels of contaminants in COTE eggs or chicks. Dioxins and furans in egg composites were below detection levels. Dioxin toxic equivalents for planar PCB congeners in egg composites ranged from 21 to 74 pg/g fresh wet weight (fww). Mean Total PCB concentration for all eggs in 2004 was 0.40 µg/g fww. Low levels of HCB, dieldrin, oxychlorane and p,p'-DDE were also detected in eggs. Mean levels of inorganics (µg/g fww; geomeans 2004/2005) in eggs were: arsenic 0.07/0.06, copper 0.61/0.59, mercury 0.115/0.096, selenium 0.59/0.59, and zinc 12.8/13.8. Cadmium, chromium, nickel, and lead were below detection limits.

Wholebody COTE chicks in 2004 had a mean Total PCB level of 0.57 µg/g. Several other organochlorine compounds were detected in chicks in the low ng/g range. Mean levels of inorganics (µg/g; geomeans 2004/2005) in chicks were: arsenic 0.17/0.12, copper 1.39/1.22, mercury 0.164/0.139, selenium 0.66/0.59, and zinc 23.43/23.07. As in the case of eggs, cadmium, chromium, nickel, and lead in chick samples were below

detection limits. The organics analytical package for 2005 samples should be received by September 2006 and a final report for the project prepared by May 2007.

Seasonal Mercury Burdens in the Seabird Community of Machias Seal Island

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Mercury is a pervasive environmental contaminant, produced mainly anthropogenically and transported great distances atmospherically. It bioaccumulates, and is biomagnified through seabird food, resulting in reproductive and embryonic failure or malformation, sterility, and reduced hatching success and growth of chicks. Mercury levels have remained relatively constant in recent times in some Atlantic seabirds, while increasing in others, and some remain unevaluated. Since input of mercury must come from the diet, stable isotope ratios help to pinpoint the sources of mercury. Nitrogen stable isotope ratios can determine at what level in the food web an organism is feeding, while carbon stable isotopes reflect the source of nutrients as inshore carbon sources are enriched in ^{13}C when compared to offshore sources. The major excretory pathway for mercury is via feather growth, and stable isotope ratios reflect the diet when the feathers were grown on the wintering grounds. Conversely, blood reflects the local diet while breeding. We measured mercury in feathers and blood in six species nesting on Machias Seal Island, Bay of Fundy, Canada. Each species has slightly different feeding habits, which permits sampling most of the marine food web. Razorbills dive deepest for fish, followed by Atlantic Puffins, which also have a higher proportion of invertebrates in their diet. Common and Arctic Terns feed on shrimp and small fish near the surface, Leach's Storm-petrels are surface plankton feeders, and Common Eiders dive for benthic mussels and echinoderms. While both tern species forage similarly during the breeding season, they segregate geographically and by trophic level during the winter. Since each of these species has different feeding habits and distributions, they are subject to differing mercury burdens throughout their annual cycle. Using stable isotopes to reconstruct the diet of these seabirds at different periods, we provide insight into how these species obtain and manage their mercury burden.

Seasonal Movements of the Razorbill (*Alca torda*) at Machias Seal Island as determined by Satellite Telemetry

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It is virtually impossible to follow most seabirds at sea and direct observations are often not feasible because of the great distances and isolated locations. As such, wintering

areas of the Razorbill like most Auk species are generally much less studied than those of the breeding season and most knowledge of seabird migration routes are rough descriptions or arrows on maps. In order to assess Razorbill movements we have implanted eight razorbills with satellite transmitters in June of 2006 and have attached data loggers to four additional birds. Through the use of these devices we will have access to an aspect of Razorbill ecology that would otherwise be unavailable.

Machias Seal Island Tern Census 2006

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This year's census was conducted on 12 and 13 June, covering 92 grid squares (30m x 30m) in 60 person-hours. We detected 910 nests, corrected to 1117 after applying the Lincoln Index of 1.23. The species ratio counts in 86 grid squares identified 506 Arctic and 119 Common Terns; applying these to the census totals gave estimated totals of 904 Arctic and 213 Common Terns. This compares with 2062 pairs of Arctic and 970 pairs of Common Terns in 2004 (there was no census in 2005). However, our monitoring plots showed considerable losses of eggs to gull predation before the time of the census. We were able to use these data to estimate how many nests had been depredated before the census. On monitoring plots, 66 nests had been cleared of eggs before the census; but of these, only 13 (20%) were detected as "scrapes" on the census. This implies that the 333 scrapes counted on the census (not included in the above totals) represented only 20% of all the nests that had been laid in. Adding this number ($5 \times 333 = 1665$) to the number of nests still with eggs (1117) gives an estimate of 2782 pairs of terns laying on MSI in 2006. The colony was abandoned entirely on 25 June. I stress the significance of this event as involving the first abandonment of this colony – which survived through decades of human exploitation, and the occupation of the island by light keepers with families, cattle and dogs – and was the largest tern colony in the Gulf of Maine and the largest Arctic Tern colony in North America. The importance of resighting Arctic Terns banded on MSI on other islands, to track the movements of individuals in this large-scale re-adjustment of a Gulf-wide metapopulation, is also emphasized.

Gull Predation and Breeding Success of Common Eiders on Stratton Island, Maine -

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Nest success, duckling survival, and habitat use of Common Eiders (*Somateria mollissima dresseri*) were studied on Stratton Island, Maine in 2004-2005. Eiders nested primarily in raspberry (*Rubus idaeus*), bittersweet (*Celastrus orbiculata*), and forest (*Malus pumila* and *Prunus virginiana*) habitats, with highest densities achieved in bittersweet. Predation by Herring (*Larus argentatus*) and Great Black-backed (*L. marinus*) gulls was the principal cause of nest failure and duckling mortality. Logistic regression analyses indicated that habitat type, nest location, and vertical nest cover were the best predictors of nest survival. Nest success was positively associated with

bittersweet and raspberry as well as increased vertical nest cover, presumably because gulls had difficulty locating nests in these areas and/or penetrating dense vegetation. Observations of gull-eider interactions and surveillance camera photos revealed heavy, opportunistic predation by Great Black-backed Gulls on ducklings. Many banded, nape-tagged hens lost ducklings to gulls within hours of departing the nest site. Few, if any, ducklings survived to fledging. In 2006, frequent gull “walks” to disturb loafing gulls, egg-poking at a nearby Herring and Great Black-backed gull colony on Bluff Island, and shooting of gulls seen harassing crèches were implemented and show promise for improving duckling survival at Stratton Island in the future.

Roseate Terns In Maine: Status, Recovery And Research. - C. Scott Hall National Audubon Society SRP 41 Northport Ave, Belfast, ME 04915

Since the formation of GOMTWG (Gulf of Maine Tern Working Group) in 1984, the Roseate Tern population in Maine has increased 160%, but remains below target population levels. Two colonies supported greater than 50 pairs in 2006, yet only one site (Eastern Egg Rock) has consistently supported a population of greater than 50 pairs. In general, productivity at the three most consistently used Maine colonies (PMI, EER and STI) is good (0.84-1.05 chicks/pair; 8 year average), but may not reflect recent trends. While some limited research has been conducted in Maine on chick provisioning and habitat competition with LAGU – there are numerous data gaps for ROST in Maine that, if answered, could help with the conservation and management of this species in the Northern Gulf of Maine. The principal limiting factors in Maine appear to be predation and nesting habitat on island with LAGU.

Foraging Locations of Common and Arctic terns in the Gulf of Maine: a stable isotope approach. - Jeff Kimmons, University of Arkansas and Scott Hall NAS.

Life history variations have been observed for Common Terns between islands in the Gulf of Maine with terns having lower clutch size, lower asymptotic weight, and slower growth rates on islands farther from the coast than those nesting on islands closer to the mainland. These variations have been attributed to differences in foraging locations. To determine foraging locations of adult terns we measured stable isotopes of carbon and nitrogen within fledgling Common and Arctic tern feathers. Isotope signatures reported for fledgling terns are very similar to signatures in adult feathers, therefore fledgling feathers were analyzed because they are easier to capture. Arctic Terns were included because they nest on outer islands and are believed to be feeding in pelagic environments. Feather analysis showed that Common Terns on outer islands had depleted carbon signatures relative to terns nesting closer to the mainland. Depleted carbon signatures can come from feeding in plankton based food webs. Nitrogen values also varied between islands with outer island Common Terns belonging to a lower trophic level than inner island terns. Comparisons between species showed that Common and Arctic Terns on outer islands had very similar carbon and nitrogen signatures showing similarities in pelagic foraging.

Monitoring Nocturnal Migrant Flight Calls on Outer Green Island-Matthew D. Martinkovic, State University of New York at Cortland

References to flight calls have appeared in the ornithological literature since the 1890's, but most information still remains unknown. Previous work has studied flight calls on the mainland at different monitoring stations. This study monitors the flight call on a seabird island 5 miles east of Portland, Maine. The flight calls were recorded with special designed microphones and MP3 players. This new design allows microphones to be more portable for remote areas. I placed 3 separate microphones on the islands across the middle of the island. These microphones recorded flight calls from 2100 – 0300 hours for 1 week. Each recording was analyzed with software that was downloaded from www.oldbird.org. The software detected 279 flight calls over the 1 week period. I believe this technology can be used for further research of migration patterns on islands of Maine. It also can be modified for research on calls of Common Terns *Sterna hirundo* and other seabirds.

Sexing Common Terns by Head Length – Ian Nisbet

We trapped 656 Common Terns (*Sterna hirundo*) at Bird Island, Massachusetts, and measured five body dimensions and body mass for each bird; 313 birds were of known age, and 229 were sexed by DNA. Males were larger than females in all five dimensions, but were smaller in body mass. Early-nesting birds were larger than late-nesting birds in all five dimensions: at least for wing length, this difference was related to both laying date and age. Head length (from back of skull to tip of bill) was the most useful measure for sexing Common Terns in the field. Discriminant functions indicated that 75.9% of single birds and 84.5% of pairs could be correctly sexed by head length alone. We present rules and nomograms for field sexing of Common Terns; these provide trade-offs between sensitivity (proportion of birds classified) and specificity (proportion of birds correctly sexed). Within pairs, tarsus lengths were negatively correlated; we found no evidence for positive assortative mating by linear dimensions or body mass. This study confirms some previous reports of sexual dimorphism in this species based on less reliable methods of sexing, but fails to confirm other reports of sexual dimorphism and assortative mating.

The Effect of Habitat Manipulation on the Roseate Tern (*Sterna dougallii*) on Seavey Island, Isles of Shoals, New Hampshire.

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On Seavey Island, New Hampshire, suitable Roseate Tern (*Sterna dougallii*) nesting habitat is disappearing and parts of the island have become unusable by the terns

because the vegetation has become too dense. Habitat manipulation was a necessary step to potentially provide additional nesting habitat and possibly increase productivity of the Roseate Terns. Results gathered from this project can be used at other tern colonies in the Gulf of Maine for future management strategies that will help protect the viability of an endangered species.

Eighteen plots measuring 2x2 meters were established in areas that historically supported Roseate Terns but in more recent years inhibited their nesting due to the increase in vegetation density. The treatment methods selected were weed-whacking and hand pulling the vegetation around the rocks within each plot and the application of an herbicide to clear up to 50% of the plot. The two treatments and the control were randomly assigned to the plots with a total of six replicates of each treatment. Vegetation characteristics were measured at each nest site within the plot during nest initiation, following chick hatching and at the end of the season.

I am a graduate student at Antioch University New England working in collaboration with the New Hampshire Audubon Society, Shoals Marine Lab and New Hampshire Fish & Game. This research is part of my master's thesis for a degree in Environmental Studies-Conservation Biology.

Poster

The Recolonization by Roseate Terns of Penikese Island, Massachusetts in 2005.

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In 2003 in Buzzards Bay, Massachusetts (BBMA), more than 250 pairs of Roseate Terns colonized Penikese Island (and a similar number of pairs moved to Bird Island) as a result of hazing done at Ram Island to try to prevent the terns from becoming oiled following the Bouchard Barge oil spill in April. About 350 adults were colorbanded at all three BBMA colony sites in 2004, but less than 10 pairs of Roseates nested at Penikese that year and most of the translocated adults that survived from 2003 were thought to have returned to Ram. More than 100 Roseate nests were found at Penikese in 2005 and a preliminary analysis of just the 20 previously colorbanded adults trapped or resighted there suggests that our initial hypothesis as to the source of the birds that recolonized this site will not be supported as most of the colorbanded birds from 2004 appear to have come from Bird, rather than Ram Island. This poster will determine the extent to which the Roseate Terns that colonized Penikese in 2003 returned in 2005 and also will determine the degree to which the recolonization in 2005 was done by "new" birds that had not been part of the earlier colonization from Ram Island.