

Gulf of Maine Seabird Working Group
19th Annual Summer Meeting
August 11, 2005
Hog Island, Bremen, Maine

Compiled by Wing Goodale: BioDiversity Research Institute

INTRODUCTION

Since the first meeting of the Gulf of Maine Tern Working Group¹ in 1984, ten tern restoration programs have been initiated in the Gulf of Maine and four additional sites are actively managed for terns. In 2005, terns (not including LETE) nested at a minimum of 50 sites; 96% of terns nested at managed sites including 98% of Arctic Terns, 94% of Common Tern and 99% of Roseate Tern. Initiation dates were 1-2 weeks late because of May storms and productivity at some sites was lower due to the remains of tropical storm Cindy on July 9th.

Although managed sites can provide continuously safe nesting opportunities for terns, mammalian and avian predators continue to plague some sites thus forcing terns to redistribute to more suitable predator free sites. Despite continued predator problems at some sites tern numbers remain stable or continue to increase - the success of tern restoration is likely due to a regional rather than local approach to management of terns, where multiple sites are managed for predators and visitations – permitting terns to move to alternate sites when one becomes unsuitable.

The Gulf of Maine now supports 19,549 pairs of Common Terns (↓ 6% from 2004), 5,079 pairs of Arctic Terns (↓10% from 2004), and 354 pairs of roseate terns (↓ 7% from 2004). In addition, 1,351 pairs of least terns nest along the beaches of Maine and Massachusetts (↑ 8% from 2004). Laughing Gull numbers increased to 4,726 (↑10% from 2004). Atlantic puffin and razorbill numbers also continue to increase and the Gulf of Maine (GOM) now supports over 4,000 pairs of puffins and close to 900 pairs of razorbills.

Part 1 – ISLAND SYNOPSIS

MONOMOY ISLANDS – 2005

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

North Monomoy Island

Common Tern:

Census: On 18 June, two observers counted 8 Common Tern nests (1 1-egg, 6 2-egg, 1 3-egg) and 6 scrapes.

Productivity: One chick hatched, but did not survive. On 5 July, 7 eggs were found in the nesting area depredated by coyote. The small colony was also unsuccessful due to flooding of the nesting area during spring high tides.

¹ Renamed the Gulf of Maine Seabird Working Group (GOMSWG) in 1997.

South Monomoy Island

Common Tern:

Census: On 15 and 16 June, a total of 8695 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 8834 nests. This is similar to the 8864 nests counted in 2004. A second census was not conducted, but an additional 48 nests (11.6% of the total 413 nests) were initiated in productivity enclosures after the census window, indicating an additional 1165 nests in the colony after 20 June.

Productivity: Productivity was estimated based on 364 A-count nests in 38 fenced productivity enclosures located throughout the colony.

Average clutch size: 2.36 eggs/nest (SD = 0.57, N = 364 nests) *2.30 in 2004*
 Hatching success: 2.10 eggs/nest (SD = 0.83, N = 364 nests) *1.98 in 2004*
 Reproductive success: 1.44 chicks/nest (SD = 0.82, N = 364 nests) *1.59 in 2004*

Number of pairs and Productivity of Common Terns on South Monomoy Island 2001-2005

	2001	2002	2003	2004	2005
Number Pairs	7807	8032	8727	8864	8834
Productivity	1.20	0.70	1.26	1.59	1.44

Research: Monomoy NWR participated in a follow-up study investigating the effects of the Bouchard Oil Spill (27 April 2003) in Buzzards Bay, Massachusetts. Hematological data was collected from 20 Common Terns nesting on South Monomoy on 22 June to determine if there were differences in hematological parameters between birds at Monomoy, an unoiled site, and birds at oiled sites in Buzzards Bay as part of a natural resource damage assessment.

Red Tide:

Shellfishing areas around Monomoy National Wildlife Refuge were closed from June 2 – July 1 due to an outbreak of Red Tide that impacted areas from Maine to Cape Cod. A total of 36 adult Common Terns were found dead on 10 and 11 June. These terns likely died from Paralytic Shellfish Poisoning caused by Red Tide. At least 5 terns of the 36 dead birds were females in the egg-laying process. Egg-laying females also suffered the greatest mortality during the last Paralytic Shellfish Poisoning incident on the refuge in 1978, as documented by Dr. Ian Nisbet. Several abnormal soft-shelled eggs were also found this year. At least 32 regurgitated food piles were also found throughout tern and gull nesting areas on South Monomoy, North Monomoy, and Minimoy. Samples of dead terns, regurgitated food piles, and abnormal eggs were submitted to Tufts School of Veterinary Medicine (North Grafton, MA) and the National Wildlife Health Center (Madison, WI) for analysis. High level of the saxitoxin that causes Red Tide was confirmed in one tern. Other results from the analyses are pending.

Salmonellosis: This summer another outbreak of Salmonellosis occurred in the tern colony on South Monomoy Island from 23 July 23 - present (25 August). Approximately 1737 Common Tern fledglings were found dead. Birds expressed a variety of symptoms. Generally, the outward appearance was healthy with no visible signs of injury or wounds, but strange behavior characteristic

of a neurological disorder was exhibited. Prior to dying, birds were observed spinning in circles and stumbling. They were lethargic, appeared droopy, and some were unable to open their wings and fly. Staff from the U. S. Geological Survey, National Wildlife Health Center (Madison, WI) and Tufts University School of Veterinary Medicine (North Grafton, MA) conducted three visits to South Monomoy in July and August to collect Common Tern chicks and fledglings of various age classes. They performed necropsies and tested for Salmonella and potential viruses that are impacting the health of terns nesting on the refuge. Results from the National Wildlife Health Center showed two Common Tern fledglings were positive for *Salmonella typhimurium*. In 2004, a Salmonella outbreak occurred in the tern colony for the first known time in refuge history.

Roseate Tern:

Census: One Roseate Tern nest was counted during the census on 15 and 16 June. Observers continued to search for Roseate Tern nests throughout the season, but no additional nests were found.

Productivity: The nest was checked every other day. Two chicks hatched on 28 and 29 June, unfortunately, the chicks were not found after day 7. Staff spent several hours searching the nest area and conducting stints to locate adults bringing food to the young, but the observations were unsuccessful. This nest was in close vicinity to a gull loafing area and an area where Black-crowned Night-Heron often entered the colony. The chicks were likely depredated.

Average clutch size: 2.00 eggs/nest (N = 1 nest) 1.00 in 2004
 Hatching success: 2.00 eggs/nest (N = 1 nest) 1.00 in 2004
 Reproductive success: 0 chicks/nest (N = 1 nest) 1.00 in 2004

Numbers of pairs and Productivity of Roseate Terns on South Monomoy Island 2001-2005

	2001	2002	2003	2004	2005
Number Pairs	6	3	3	1	1
Productivity	0.83	1.00	1.33	1.00	0

Least Tern:

Census: On 20 June, 93 Least Tern nests were counted on the south tip of South Monomoy. On 11 July, a second census was conducted. Thirty-nine nests were found in another area on the southwest side of the island.

Productivity: Productivity was not quantitatively monitored, but was estimated to be poor. The nesting areas experienced gull and coyote predation. Some nests were also lost to overwash during very high tides.

Black Skimmer:

Census: On 20 July, 1 Black Skimmer nest was found in the tern colony on South Monomoy. This late nest is likely a reneest of a pair from Minimoy. Black Skimmers have not nested on South Monomoy since 2000. Three chicks hatched from the nest in early to mid August. Productivity data collection is still ongoing.

Laughing Gull:

Census: On 15 and 16 June, 1312 active Laughing Gull nests were counted, similar to the 1321 nests counted in 2004.

Productivity: Productivity was not monitored, but it was estimated to be qualitatively poor. Nest destruction efforts were implemented this season to reduce the increasing Laughing Gull population that is encroaching on the tern colony. A total of 744 nests were destroyed in 9 60m x 60m grids during June 25-27. The grids were revisited to check for renests and 55 additional nests were destroyed in 2 grids on 22 July.

Minimoy Island

Common Tern:

Census: On 20 June, 913 Common Tern nests were counted. No Lincoln Index was conducted to minimize disturbance. In 2004, 1432 nests were counted during the census. The decrease in the number of nesting pairs in 2005 may be due to the winter erosion that Minimoy experienced on the west side of the island this winter. Less habitat and nesting space was likely available for common terns.

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 20 June, a total of 25 Roseate Tern nests were counted. Four additional nests that were found prior to the census were abandoned by 20 June. One B-count nest was found on 15 July. Twenty six pairs of Roseate Terns nested on Minimoy in 2004.

Productivity: Productivity was estimated based on 25 A-count nests.

Average clutch size: 1.52 eggs/nest (SD = 0.51, N = 25)	<i>1.50 in 2004</i>
Hatching success: 1.36 eggs/nest (SD = 0.70, N = 25)	<i>1.32 in 2004</i>
Reproductive success: 1.28 chicks/nest (SD = 0.79, N = 25)	<i>1.21 in 2004</i>

Black Skimmer:

Census: On 20 June, 5 Black Skimmer nests were counted. One new nest, which was a likely renest, was found on 25 June. A total of 6 Black Skimmer nests were found on Minimoy in 2004. Minimoy was the only nesting site in Massachusetts for Black Skimmers in 2004 and 2005.

Productivity: Productivity estimates were determined based on 5 A-count nests.

Average clutch size: 3.40 eggs/nest (SD = 0.55, N = 5)	<i>3.67 in 2004</i>
Hatching success: 1.00 eggs/nest (SD = 0.71, N = 5)	<i>2.50 in 2004</i>
Reproductive success: 0.40 chicks/nest (SD = 0.55, N = 5)	<i>1.50 in 2004</i>

Predators

Great Black-backed Gull (GBBG) and Herring Gull (HERG): Gull harassment in area A was initiated 1 April. Three harassments were conducted in April, 8 in May, 11 in June, and 1 in July. A census was conducted in Area B on 14 May and 57 nests (39 GBBG and 18 HERG) were counted. Ninety-eight GBBG eggs and 32 HERG eggs were punctured to suppress productivity. Area B was

censused for a second time on 4 June. Twenty-one new GBBG nests and 36 new HERG nests were counted. A total of 31 GBBG eggs and 80 HERG eggs were punctured during the second census. Gulls were present in the tern colony a minimum of 32 times from early June through August. Nineteen GBBG and 4 HERG were removed from the colony this season.

Northern Harrier: Northern Harrier were seen in the tern colony a minimum of 25 times during the season. At least 3 adult terns and 2 chicks were found dead in the colony likely killed by Northern Harrier.

Coyote: A total of 5 adult coyotes (4 males and 1 female) were removed this season. Coyotes were seen in and around common tern nesting areas on three nights and seven times during the day. Evidence of coyote (scat, tracks) was found in or around the tern colony a minimum of thirty-seven 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.

Black-crowned Night-Heron: Black-crowned Night Heron were censused on South Monomoy Island during the Wading Bird Census on 20 May. One hundred sixty-seven nests were counted. Seven additional nests were found on North Monomoy on 23 June. Black crowned Night-Heron were first seen in the colony 4 June and were present on some nights late June - July. There was evidence of heron predation on tern eggs and chicks. One Black-crowned Night-Heron was removed from the colony this season.

Laughing Gull: Laughing gull kleptoparasitism on Common Tern stints were continued this year. A total of 61 one-hour-long stints were conducted. Data results are still preliminary, but approximately, 1149 kleptoparasitism attempts were observed and recorded for an average of 18.8 attempts per hour. Laughing Gulls were successful in 40.3% of the attempts, common terns were successful 26.5% of the time, the outcome was unclear or undetermined 20.1% of the time, and prey items were dropped in about 13.1% of the attempts.

White and Seavey Islands, NH

Senior Biologist-Diane De Luca, Dan Hayward, Melissa Barney and Miles Waniga, New Hampshire Audubon (NHA)

Introduction: White and Seavey Islands are a 3-hectare island complex located nine miles from the mouth of the Piscataqua River. In 1997, the New Hampshire Fish and Game Department and the Audubon Society of New Hampshire began a tern restoration project at this site using non-lethal gull control techniques.

Census: Five NHA biologists conducted the census. The common tern census was conducted on June 12. Nests within the productivity plots were added to the adjusted census total. Roseate and arctic tern nests were all marked and confirmed visually, during the census period. Common tern numbers were down this year from 2582 pairs in 2004 to 2031. There were 4 nests initiated on White Island. Roseate pairs declined significantly from 107 pairs in 2004 down to 64 in 2005, possibly due to the hazing in Buzzard's Bay in 2004 and their subsequent return. In 2005 there were a total of 9 Arctic tern nests initiated.

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Census

Species	COTE	ROST	ARTE
Date	6/12/05	6/12-22/05	6/12/05
	1873(2033)	64	8
Additional Nests After Census	445	3	1 + 1 renest
Season Total Nests	2478	67	9

Year-by-Year Comparison (Census)

Species/Year	1998 (pairs)	1999	2000	2001	2002	2003	2004	2005
COTE	18	80	318	460	1273	2414	2582	2033
ROST	0	0	0	1	8	42	107	64
ARTE	0	0	0	0	1	4	5	7

Year-by-Year Comparison (Season Totals)

Species/Year	1998 (pairs)	1999	2000	2001	2002	2003	2004	2005
COTE	45	140	446	809	1687	2414	2582	2478
ROST	0	0	0	1	26	63	112	67
ARTE	0	0	0	0	1	6	7	9

Tern Productivity: Productivity remained low for COTE at 0.76 chicks per nest, almost matching the 2004 rate of 0.75. For the third consecutive year the mean clutch size remained low at 1.87, based on the 1878 nests counted during the census, up slightly from 1.84 in 2004. Again the cold weather and rough seas may be directly impacting the terns and influencing prey availability. ROST productivity declined from 0.95, in 2004, to 0.65 fledglings per nest, in 2005. There were only 3 documented roseate nests after the census period. One of the factors influencing the success of the ROST is the islands shift to a more dense grass habitat. Some of the nests were literally buried under the grass during the June 15 storm. ARTE productivity rose in 2005 to 0.83 chicks per nest. Two of the original nests were predated.

Weather seemed to play the largest role in affecting the terns during nest initiation in May. Just 2 days after discovering the first nests the first of two nor'easters settled in. With up to 17+ foot seas and winds gusting over 50 mph, the terns all but halted nesting. During the storm, a number of "specialist" gulls constantly hunted the colony, eating what eggs had been laid. After the second storm died out, over 50 percent of the colony left the island for a number of days before returning to the colony to nest. There was another storm that peaked on June 15, during which more eggs predated. It was not possible to document the number of eggs taken during the 3 storms as the weather was too severe to warrant spending time in the colony and blinds. A noticeable difference this year, with regards to predation, came during the fledging period. We have not documented any predation on fledglings to this point. This has typically been the time of the breeding chronology in which we have seen the most significant predation.

The majority of eggs that hatched did so between June 24 and June 30, peaking on June 25. In 2004 the colony was a bit more asynchronous with 3 waves of birds, one peaking on June 19, the 2nd on June 25 and the 3rd on July 4.

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Tern Productivity

COTE [Observed Totals]

Year	1998	1999	2000	2001	2002	2003	2004	2005(a)
Nests Monitored	45	25[140]	43	73	184	163	138	120
Mean Clutch	[?]	2.84	2.60	2.44	2.52	1.96	1.84	1.93
Mean Hatch	2.02	2.48	2.33	2.18	2.09	1.61	1.67	1.14
Fledglings/Nest	1.6	2.24[1.71]	1.58	1.68	1.63	1.33	0.75	0.76
Total Fledglings	72	314[240]	502	773	2075	3212	1936	1543
Total Population	162	520	1394	2669	5449	8040	7100	5606

ROST [Observed Season Totals]

Total Fledges based on Census Productivity applied to Season Total Nests*

Total Fledges based on Season Productivity applied to Season Total Nests**

Year	2000	2001	2002	2003	2004	2005
Nests Monitored	-	1	8	30[47]	55	65
Mean Clutch Size	-	1	1.38	1.40[1.34]	1.21	1.18
Mean Hatch	-	1	1	1.07[1.06]	1.13	0.83
Fledglings/Nest	-	1	0.88	0.87[.89]	0.95	0.65
Total Fledglings	-	1	7	26[42] *55, **56	52 *106	42

ARTE [Season Totals]

Year	2000	2001	2002	2003	2004	2005
Nests Monitored	-	-	1	4[6]	5 [7]	6
Mean Clutch Size	-	-	2	1.5[1.5]	1.20[1.29]	1.83
Mean Hatch	-	-	2	1.5[1.5]	0.50[0.43]	1.67
Fledglings/Nest	-	-	0	1[1]	0.60[0.43]	0.83
Total Fledglings	-	-	0	4[6]	3[3]	5

Tern Feeding Study

COTE

# Of Nests	Observer Hours	Feeding Rate
84	111.13	0.97/hr

Species	Hake	Euphasid (Shrimp)	Butterfish	Unknown Fish	Lumpfish	Herring
% of Diet	55.76	12.12	6.46	5.45	4.85	4.04

Note: There was a noticeable shift to Mackerel around July 26, but with the majority of chicks mobile and flying, it is not represented in the feeding study.

ROST

# Of Nests	Observer Hours	Feeding Rate
19	27.35	1.00

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Species	Hake	Sand Lance	Unknown Fish	Unknown Item
% of Diet	44.00	17.33	17.33	16.00

Predator Control: Biologists arrived on island on April 22. There were no gulls nesting during the initial census of the islands. Two pair of herring gulls nested late in May and early June, one of which attempted to renest. Pyrotechnics and regular sweeps of the island continued from April 22 through the field season. Eight GBBG and one HERG were taken as a result of predation and non-response to pyrotechnics and other control methods. The number of tern eggs predated by gulls was not documented due to the severe weather conditions at the time of predation. It would be hard to quantify the predation as it was heaviest during nest initiation and nests were destroyed before being documented.

Predator Control

Species	Nests Destroyed	Eggs Destroyed	Adults Taken
GBBG	0	0	8(+5 relief kills)
HERG	2(+1 renest)	3	1(+2 relief kills)

Gull Control (Apr29-Aug6)

Control Method	Ave/Day	Control Method	Ave/Day
Human Control	2.38	Shotgun	0.09
Screamer	2.10	Relief Kill	0.07
Banger	0.37	.22 Cal. Rifle	0.06
.17 Cal. Rifle	0.30	Nest/Egg Destruction	0.03
Problem Gull	0.09	Cap	0.02

Other Nesting Species

Species	COEI	SPSA	MALL	SOSP	CAGO
# Of Nests	~15	~15	2	1	1

Other Tern Sightings, Rare Birds, and Interesting Observations

- AMOY-5/28, 6/23, 7/26
- ATPU-5/27, 5/29, 6/14, 6/17, 7/4
- BLTE-6/24, 7/6
- COMU-5/26, 6/15, 6/29
- RAZO-6/16
- SOSH-6/14, 6/16, 6/17
- PEFA-4/28, 5/9, 5/19, 5/21, 8/2
- LAGU-Adults and juveniles observed on more than 30 days

Stratton Island

Island Supervisor- Suzanne Sanborn Resident Intern- Robby Lambert

Census

An unusually stormy May caused an eleven to fourteen day delay in nesting. Our Tern census was conducted on June 20. Our COTE unadjusted count was 128 with a Lincoln Index adjustment of 1, leaving an adjusted count of 128. With the addition of 12 feeding study nests and 39 productivity nests, our total COTE census count was 156 nests. 2 ROST and 3 ARTE nests were identified and flagged before the census date. Both ROST pairs first nesting attempt was abandoned and their relay nests were used to determine productivity. COTE nests were down from 2004 by 75 nests, ARTE nests were down by six nests and ROST nests were down by 9. This was the first year LETE nested on the island. There were 19 nests counted on July 3.

Population estimate 2001-2005

Year	COTE	ROST	ARTE
2001	1881	127	10
2002	1279	98	8
2003	305	40	4
2004	231	11	9
2005	156	2	3

Productivity

All three tern species had increased productivity compared to the past couple of years with the lack of predation by Gulls and Black-crowned Night Heron this season. COTE had a mean hatch of .69 and there were 1.5 chicks per pair, ARTE had a mean hatch of 0.5 with .75 chicks per pair, and ROST had a mean hatch of 1.5 chicks per pair. We followed LETE productivity with direct nest observations from blinds. LETE had an average of 1 chick per pair.

Fledgers/nest 2001-2005

Year	COTE	ROST	ARTE
2001	1.2	1.4	0.3
2002	0.1	0.6	-
2003	0.2	0.05	-
2004	0.3	1	-
2005	0.98	1.5	0.6

Feeding

COTE feeding studies were conducted from June 30 to July 26. There were no ROST or ARTE feeding studies conducted this season due to the low number of nests. There were two sites with five study nests. Each nest was observed for twelve hours per week. There were a total of 336 observer hours and 250 feedings with an average feeding rate of 0.74 feedings per hour. Hake was the primary prey species fed at 61 %, Pollack at 8 %, Sand Lance at 7 %, and Butterfish at 5 %.

Predator Control

This season all Gull eggs and nests were destroyed. Gull Meadow was actively managed from May 30 to August 8 with weekly walkthroughs destroying renests and discouraging loafing gulls. This season 93 HERG nests and 74 GBBG nests were destroyed and 4 HERG chicks and 1 GBBG were removed.

Black-crowned Night Herons visited the colony during a high tide in June; no evidence of predation or night abandonment was observed.

Wading Birds

The wading bird census was conducted on May 20-21. All species nest numbers were down slightly except BCNH, possibly due to the severe weather events in May. A post storm nest damage assessment was done June 8, revealing a number of new or renests. Christina Donehower conducted the COEI census from May 17-June 23. COEI nest numbers were down by 250 from 2004. During the Wading bird census Christina noted 24 GLIB kills. During the season several GBBG were observed and videotaped taking GLIB from the air.

Black Guillemot

There were five pairs observed around the island and two nests found in the South rocks on Gull Meadow.

American Oystercatcher

There were several pairs observed in May. A nest on Bluff was found on June 17 and a nest on Little Stratton fledged two young.

Other notes

This season there were 265 visitors up from 181 in 2004. There were two Yellow-crowned Night Heron seen in late July and early August. An intern noted the presence of a Sabine's Gull and Forster's Tern in June. Feathers were collected from productivity and feeding plots for Jeff Kimmons' PhD isotope study.

Western Casco Bay

Survey by Bob Houston & Jean Fujikawa, USFWS; 21 June 2005)

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

Nest survey on ground revealed no tern nests and 7 common eider nests. One pair of common terns present. Last year's survey by boat showed one pair of common terns present with one probable nest.

The Nubbin, Yarmouth (55-223)

Nest survey on ground revealed no tern nests. One pair of common terns present. Last year's survey by boat showed one pair of common terns present with one probable nest.

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.

Sister Island Ledge, Freeport (55-237)

Nest survey on ground revealed 3 common tern nests (two with 3 eggs and one with 2 eggs) and four pairs of common terns. Revisit on 7/20/05 revealed one 2-egg nest, 4 empty nest bowls and one egg destroyed by predation. No further site visits to estimate productivity. Survey by boat last year revealed 13 pairs of common terns with a probable 13 nests.

Grassy Ledge, Harpswell (55-259)

Nest survey on ground revealed no tern nests. Nest survey on ground last year revealed one pair of common terns and their nest.

Black Rock, Harpswell (55-252)

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

Submitted by Bob Houston, USFWS.

Outer Green Island

Island Supervisor: Matthew D. Martinkovic

Census

The GOMSWG census was completed on the 20th of June but continued to the 22nd because of the poor weather conditions. In 2005, Common Tern population increased from 497 in 2004 to 971 pairs. Also Roseate Tern numbers increased from 8 to 36 this season. Table 1 indicates the amount of COTE and ROST populations over the past 4 years.

Table 1: GOMSWG census numbers 2002-2005.

Year	2002	2003	2004	2005
COTE	1	94	497	891/971
ROST	0	0	8	36

Tern Productivity

COTE

In 2005 there was a sample size of 54 nests watched throughout the season. There was an average clutch size of 2.15 eggs/nest and a hatching success of 2.72 chicks/nest. The productivity was .65 fledgers/nest. This was down from 1.45 fl/nest in 2004. Table 2 indicates the productivity and clutch size from 2002-2005.

Table 2: Productivity and hatching success from 2002-2005.

	2002	2003	2004	2005
Hatching success	0.33	2.45	1.92	2.72
Productivity	0.33	2.09	1.45	0.65(.73)

The major reason for the dramatic decrease in productivity was due to mink predation and inclement weather. From July 14th till the end of the season the mink predated over 200 terns on the island.

ROST

In 2005 there was a dramatic increase in Roseate Tern numbers on the island. There was an increase from 8 in to 2004 to 36 in 2005. The productivity was 0.64 fledgers/nest and an average clutch size of 1.47 eggs/nest. The major factor for the low productivity was due to the predation by a mink.

Tern Feeding Study

In 2005 there was a sample size of 18 nests monitored for a feeding study. There was 524 hours observing the study nests. The feeding rate was 1.28 items/hour. The principal diet was mostly White Hake (54%). Table 3 indicates the principal diet for 2005.

Table 3: Principal diet in 2005

Prey Item	Percent
White Hake	54%
Atlantic Herring	19%
Unknown Fish	12
Other	10%
Butterfish	5%

Predator Control

Gull

In 2005 there were 44 total gull nests destroyed on the island. Researchers shot 6 gulls on the island. Table 4 indicates the number of gulls nests destroyed from 2002-2005.

Table 4: Number of gull nests destroyed 2002-2005

Species	2002	2003	2004	2005
HERG	164	25	30	30
GBBG	79	13	3	14
Total	243	38	33	44

Mink

On July 14th, researchers found mink scat on the middle trail near camp. The scat contained what looked like tern feathers. Throughout the next 2 weeks there was 200+ kills found around the island. Kills included COTE, ROST, BLGU, BASW, SOSP, LESP.

LESP Social Attraction

This is the second year of the Leach’s Storm Petrel attraction program and there were 4+ found on the island. No burrows were found, but researchers found 4 adults by the south speaker. All 4 adults were found predated by the mink.

Other Notables

This was the first season of mist netting on the island. There were 304 birds captured in 91.25 hours. In those 304 birds there were 39 different species captured. The hours were low due to inclement weather in the month of May.

Jenny Island: 2005

Island Supervisor: Jo Hiscock

Population Estimates

GOMSWG tern census was carried out on the 19th of June. 480 Common tern nests were counted and using the Lincoln index the total number of nests was calculated at 532. 11 Roseate nests were found.

Table 1: GOMSWG Census Results 2001 - 2005

Year	COTE	ARTE	ROST
2002	397	0	0
2003	468	0	0
2004	213	1	2
2005	532	0	11

Tern Productivity

The hatching success for COTE this year was 1.88 (SD=0.93) chicks per nest. Fledging success was 1.0 (SD=0.65) chicks per nest. The feeding study plots had better fledging success than the productivity plots. The remains of tropical depression Cindy on the 8-9th July brought heavy rain and a lot of chicks died of exposure in that event.

The hatching success for ROST the 11 nests this year was 1.27 chicks per nest. Fledging success was 1.18 chicks per nest.

Table 2: COTE Productivity 2001 - 2005

Year	Average clutch size	Hatching Success	Fledging Success
2002	2.53	1.53	0.31
2003	2.3	1.92	1.5
2004	2.35	1.13	1.13
2005	2.2	1.88	1.0

Tern Feeding Studies

This season 434 hours of observations for feeding studies were carried out from two blinds. 523 feedings were observed at a rate of 1.21 feedings per hour of observation. The predominant prey species was Hake.

Table 3: Prey Deliveries on Pond Island 2005

Species	Count of prey item	% of diet
Hake	279	53
Unknown	66	13
Herring	56	11

Predators

This season there were no signs of predation on Jenny Island. Researchers spent several nights on the island at the start of the season and during peak hatch and the terns were not abandoning at all.

Pond Island National Wildlife Refuge: 2005

Island Supervisor: Jo Hiscock

Population Estimates

GOMSWG tern census was carried out on the 20th of June. 263 Common tern nests were counted and using the Lincoln index the total number of nests was calculated at 277. This was the first 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 2001 - 2005

Year	COTE	ARTE	ROST
2001	135		
2002	109		
2003	310		2
2004	429		12
2005	277	1	1

Tern Productivity

The hatching success for COTE this year was 2.28 (SD=0.77) chicks per nest. Fledging success was 1.09 (SD=0.69) chicks per nest. The feeding study plots had better fledging success than the productivity plots. There was a lot of nocturnal abandonment especially late in the season. The remains of tropical depression Cindy on the 8-9th July brought heavy rain and a lot of chicks died of exposure in that event. This season ‘funk’ was not prevalent, with 2 (3%) of study chicks being seen with the symptoms – both of which died.

The ROST nest hatched one chick from a single egg but it did not fledge. The single ARTE nest hatched two chicks, and both were seen over 15 days old.

Table 2: COTE Productivity 2001 - 2005

Year	Average clutch size	Hatching Success	Fledging Success
2001	2.8	1.74	0.44
2002	2.8	2.43	1.55
2003	2.2	1.67	1.1
2004	2.04	1.2	0.71
2005	2.47	2.28	1.09

Tern Feeding Studies

This season 3 blind windows watching 19 nests were used for feeding studies on Common terns. 588 hours were spent observing from 2 blinds, with two windows active from one blind. Only one window was observed from during any one stint. 915 feedings were observed at a rate of 1.56 feedings per hour of observation. The predominant prey species was Hake, followed by Sand lance.

Table 3: Prey Deliveries on Pond Island 2005

Species	Count of prey item	% of diet
Hake	301	33

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Sand lance	181	20
Euphausid	107	12
Herring	86	9

Predators

This season the terns were abandoning early in the season and no predators were seen. On the 10th July a feather spread was found and 2 days later a Great horned owl was trapped. This was the only one for the season, which is lower than the previous two seasons with three being caught in 2004 and four in 2003. After this the terns were abandoning at night and continued to do so until the island closed. An unidentified raptor was seen flying off with a fledger late in the season, as it was on dusk and flying into the setting sun we could not get a good description. It was not seen again. A lot of hours were put into night stints to see what was causing the abandonment, but nothing was seen. There were no Great Blue Herons on the island this year, and only 2 black crowned night herons were heard flying over early in the season with no lasting effect on the terns behavior.

Eider Productivity

40 Common eider nests were monitored this season to assess productivity. The results are consistent with previous years. The main egg predation was by a group of up to 12 American Crows who were seen regularly raiding nests. There was also some chick and egg predation by at least 2 Great Black Back Gulls.

Table 4: Eider Productivity 2003 - 2005

Year	Hatched	Depredated	Abandoned	Unknown
2003	54%	24%	12%	4%
2004	51%	35%	8%	7%
2005	52%	34%	2%	11%

Other Island Notes

- ◆ Eggs and chicks were again collected for the USF&W contaminant study
- ◆ Student research projects on the island included the collection of feathers for carbon and nitrogen isotope analysis for Jeff Kimmons. Fish from Common terns were collected for a heavy metal contaminant study for Stacey Hollis.
- ◆ Highlight was the sighting of a male King eider in breeding plumage on two occasions cruising with the common eiders.

Kennebec Point Report (POND ISLAND)

Ann And Walter Gamble

It has been a quiet season at Kennebec Point.

Or has it? Our star predator removal expert, Matt, did so well last year on Pond Island that it seemed the predators were determined to challenge him again this season, but their efforts were frustrated because Matt was posted to Outer Green. However one very determined MINK followed him all the way down to Casco Bay and on to Outer Green. That was a fatal mistake. Matt's expertise made it a permanent resident of the island. Whether other predators will follow suit has yet to be determined.

One lazy owl decided that Outer Green was too far away, and that Pond was too good a food source to pass up. This owl was caught in a recently devised mechanism, a TOE HOLD TRAP. After spending time in rehab, it was released in the deep woods in Jackson Maine, confident that it would find sufficient food there and not return.

A curious functioning of Pond Island's fog horn was observed. On some crystal clear days, as well as nights, it sounded at its usual 120 decibels. However on some foggy days the horn appeared to be silent or possibly operating at a supersonic frequency. One can speculate that the CIA was testing some new technology and were concerned that the Pond Island crew might be spying on their new system.

In fact there were a number of activities that could have aroused their suspicions further. Sophisticated communication systems were often seen in use. For example cell phones, radio, and computers were found to be employed frequently. Further, it was noted that infrared observation instruments were present and utilized for night time surveillance by the crew. Many mysterious trips were made to unknown destinations on the mainland, occasionally as often as every other day. To further their suspicions, some curious square structures sprouted on the island. Crew members were noted making frequent entrances into these elevated structures and remaining there for hours at a time. The island was obviously well provided with CUSHY living quarters, refrigeration, stove, water tight tents, and electricity. This all suggested that a well funded covert group might be living on the island.

Apparently all these activities raised concerns within the FBI and CIA of possible terrorist activities, and a helicopter was sent to the island and landed at a time when our crew was absent. It seems that there may be a provision in the Patriot Act that permits such investigations without a search warrant. We do not know what was found, but apparently insufficient evidence was obtained to issue arrest warrants. Following this investigation frequent fly-overs continued in an attempt to find criminal or terrorist activities, but only succeeded in causing massive abandonment of nests and potential failure of the entire breeding season.

So, this has not been a quiet season at Kennebec Point.

Eastern Egg Rock

Ellen Peterson, Island Supervisor, National Audubon Society SRP

Population Estimates

The GOMSWG nest count was conducted on the 19th thru the 21st of June. Six hundred and ninety-one COTE nests were found and adjusted by a Lincoln index of 1.028. The additional 48 nests in the productivity plots brought the total to 758 Common Terns for the 2005 season on Eastern Egg Rock. The population was subject to intense predation and wet weather prior to the count. Up to 90 nests were predated the day before the count. This may account for the decrease in the population since last season. Before the nest count 81 Arctic Tern and 135 Roseate Terns were flagged to eliminate the need for species differentiation during census. This is a slight decrease for the ARTE population. However the population has averaged 84 nesting pairs since the peak of 94 pairs in 1997 fluctuating by a few pairs each year. The Roseate Terns increased by 25 pairs this season after the significant decline last season. The colony was very late to set up, due to prolonged wet weather and the constant presence of a GBBG near one of the largest ROST sub-colony sites. The ROST nested in areas that they have occupied in the past but also moved into some new areas – perhaps due to GBBG pressure on the north end. Laughing Gulls and Common Eiders were also censused at this time. The Laughing Gull population increased dramatically this season to 1638 nesting pairs from 1420 last season. The Common Eider Population decreased to 295 from 369 nests in 2004.

Table 1: Eastern Egg Rock Larid Populations 2001-2005

	COTE	ARTE	ROST	LAGU
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

The mean clutch, hatch and fledge of COTE, ARTE and ROST are summarized in Table 2. Overall the clutch size for all three species increased since last season. The mean hatch decreased for both COTE and ARTE but increased for ROST nests. The COTE productivity decreased from 0.64 in 2004 to 0.59 in 2005. About 40% of our chicks were lost during the storm on June 8th and 9th. ARTE fledge success was 0.58 for the last two seasons. ROST productivity was conducted using methods developed by the Roseate Recovery Team on EER this season. Roseate Tern fledging success this season increased from 0.76 in 2004 to 0.9 in 2005.

Table 2: Tern Productivity EER 2001-2005

		2001	2002	2003	2004	2005
COTE						
	Mean clutch	1.92	2.4	1.98	1.9	2.01
	Mean hatch	1.31	1.87	0.81	1.36	1.33
	Mean fledge	0.4	0.85	0.98	0.64	0.59

ARTE						
	Mean clutch	1.72	1.92	1.77	1.6	1.77
	Mean hatch	0.88	1.11	0.7	1.15	1.04
	Mean fledge	0.3	1.2	0.64	0.58	0.58
ROST						
	Mean clutch	1.57	2.04	1.6	1.30	1.69
	Mean hatch	1.05	1.15	0.84	1.09	1.34
	Mean fledge	0.4	1.1	0.92	0.76	0.9

Tern Provisioning

Twelve COTE, 12 ROST and 6 ARTE nests were monitored. One set of 6 COTE nests were predated early on and our effort was stunted compared to past seasons. Two hundred and sixty-one, 302 and 314 hours were spent observing COTE, ARTE and ROST respectively. Common terns feed their chicks an average of 1.02 times an hour compared with 1.63 in 2004. The 2005 ARTE feeding rate of 1.33 feedings/hr was higher than 1.24 in 2004. The Roseate feeding rate decreased from 1.19 in 2004 to 1.04 in 2005. Hake was the leading prey item delivered to all three species in 2005. Herring ranked second in COTE and ROST deliveries and third in ARTE deliveries to Invertebrates. The principal components are summarized in Table 3.

Table 3: Principal Prey Items in Tern Diet 2005

	Hake	Herring	Invertebrates
COTE	58.3	9.4	0.75
ARTE	59.5	3.98	5.72
ROST	69.9	9.8	0

Predator Activities and Control Efforts

Only 3 GBBG nests had to be removed from Egg Rock this season. No HERG initiated nests on EER. GBBG predation and presence early in the season affected the COTE nest count and delayed ROST nest initiation. Throughout the season the EER tern colony experience predation pressures from GBBG, HERG and LAGU. Unlike in the past, the GBBG and HERG began using high perches (the day marker, blinds and signs). We were able to shoot 3 GBBG predators, 1 HERG predator, one LAGU tern chick specialist (color-marked and recorded eating 18 chicks) and 2 injured HERG for a total of 7 gulls shot. Christina Donehower collected data pertaining to Gull predation again this season. She was able to videotape predators catching and eating tern adults, fledgers and chicks, adult and chick LAGU, and adult and fledger BLGU. We were unable to shoot at least one major HERG predator and one GBBG before leaving the island.

Alcids

The population of breeding puffins on Egg Rock did not increase as in the past. We observed 71 active burrows (this number may change as we evaluate our data) and resighted 124 individuals over 720

hours. Perhaps the spring storms flooded the burrows with rain or by waves resulting in some abandonment. Three of the 7 adopt-a-puffins did not return to breed. In 211 hours we set 80 traps and were able to increase our trapping efficiency trapping 52 adults and 2 puffin chicks. Box traps were used exclusively when trapping adults. The new Ridged-Metal Field Readable bands were used for all puffins. Unfortunately these bands became virtually unreadable within days.

Over 100 BLGU burrows were marked this season to enable BLGU productivity in 2006. Many nests are located in front of blinds for possible feeding studies.

Razorbills were sighted often prospecting and interacting with puffins. Two were caught on camera copulating in the inter-tidal zone.

Other Island Notes

Along with the decrease in the COEI breeding population we did not see the large rafts to the East of Egg Rock. Usually near the end of the season we see thousands of COEI rafting.

The Manx Shearwater was seen only twice off the Southwestern side and never heard at night.

Many visited EER. Potential contributors, Barbara’s Bakery contest winners, Hog Island Ornithology Campers, The Boston Globe, and Hwy 51 video crew all came for a few hours to observe the island up close.

Metinic Island

Adrienne Leppold, Island Supervisor; Jessica Despres, Island Intern/GOMSWG presenter, USFWS

Census

The Gulf of Maine Seabird Working Group (GOMSWG) Census was conducted on the 22nd of June this year and a total of 214 nests were documented with a Lincoln Index correction total of 222. We had 514 fewer nests than last year and we confirmed species for 156 of our nests. The species ratio estimated from those 156 nests was 62.8% Arctic Tern and 37.2% Common Tern. While our largest sub-colony species ratio was about 50/50, the two smaller sub-colonies were predominantly ARTE. The total number of tern nests by species for the last five years is summarized below in Table 1.

Year	Common	Arctic	Roseate
2001	32	79	0
2002	126	104	0
2003	317	229	3
2004	320	403	1
2005	58	98	0

Productivity

While the number of chicks fledged per nest was higher than last year, overall fledging/reproductive success was the low. We believe the inclement weather experienced during the latter part of May this year had significant negative effects on nest site initiation and settling of the tern population on Metinic Island. Productivity values are summarized below in Table 2.

Productivity Measures	Common Tern	Arctic Tern
Mean Clutch Size	1.75 ± .71	2 ± 0

Mean Hatch Success	80%	73%
Fledging Success	20%	23%
# Chicks Fledged/Nest	0.33	0.45

Provisioning

A total of 17 nests were observed throughout the season; 11 were ARTE and 6 were COTE. The total number of observation hours amounted to 111 with a total of 607 observed feedings. The percent diet composition is given for each species in Table 3. Food availability appeared better this year, as there was a much lower incidence of “difficult to swallow” food items such as Butterfish and Bluefish and Herring was clearly the principal prey species for both Arctic and Common Terns. One noteworthy food item this season was Lumpfish, a new species of prey never before observed being fed.

Species	Herring	Insect/ Marine Inv.	Butterfish	Sandlance	Stickleback	Lumpfish	BlueFish	Unknown	Pre dat ors
COTE	71.7	2.6	0.0	3.8	0.0	4.3	0.0	16.4	
ARTE	58.9	13.0	2.0	5.9	0.4	2.9	1.0	15.9	

Compared to last year, there was a lower incidence of predation, however, we experienced significant losses this year, especially in our productivity plots. Unfortunately, the cause remains uncertain for many of these. Only one gull predation of an egg was witnessed this summer, Merlins predated three chicks, we found ten chicks and ten eggs that had been squashed by sheep, one depredated egg found appeared to have been by a European Starling, and four chicks were found dead on July 10th, most likely from weather related events caused by the passing of Hurricane Cindy. Two Herring Gulls and two Greater Black-backed Gulls were shot this year, attempts were again made to exclude sheep from the northeast end by means of an electric fence, and we expanded our “gull free zone” 200 meters south of the Hill Colony. Numerous gull nests in the “gull free zone” were destroyed throughout the season and we poked eggs in a total of 123 HERG and 9 GBBG nests during the gull census.

Misc. Counts and Incidental Sightings

Common Eiders seemed to experience a poor breeding year as well with numbers hundreds below historic counts for the island. We observed only 39 creches/broods this summer in comparison to 185 recorded last year.

97 species were documented for the island this year with 30 being confirmed breeders. Some of the species highlights included: A Little Gull and Red-necked Phalaropes (both of which were observed during the wind and rain storm at the end of May), Razorbill, nesting (failed) Bald Eagles, nesting Osprey and Merlin, Northern Gannet, Great Cormorant, and Northern Harrier.

Matinicus Rock

Island Supervisor: Paula Shannon
Resident Research Assistant: Frank Mayer

Census. We conducted the tern and Laughing Gull nest census on 20-21 June. The total (unadjusted) tern nest count was 1090. To determine species ratio, a direct count of Common Tern nests was conducted, yielding 243 COTE nests. COTE nests were subtracted from the nests counted, and the

Lincoln Index was applied to ARTE nests only, yielding an adjusted total of 963 ARTE nests. Thus the species ratio was 243 COTE/963ARTE. The total adjusted nest count was 1206.

We counted 624 Laughing Gull nests during the census, which is similar to the number of nests counted in the last three years. 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 2000 to 2005.

Year	Arctic Terns	Common Terns	Laughing Gulls
2000	1030	176	355
2001	1014	147	417
2002	999	198	624
2003	1022	188	597
2004	830	116	524
2005	963	243	624

Tern Productivity. We followed 51 Arctic Tern nests and calculated productivity of 0.43 chicks/nest, and we followed 44 Common Tern nests and calculated productivity of 0.61 chicks per nest (Table 2). Several factors influenced the low productivity this year. Several Herring Gulls were observed taking tern chicks in the colony, and weather events combined with poor food also affected productivity.

Table 2. Productivity (chicks per nest) of Arctic and Common Terns at Matinicus Rock from 2002 to 2005.

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

Predator Observations and Control. At least four Herring Gulls and one Laughing Gull were observed preying on tern chicks. Large gull control efforts included the destruction of five Herring Gulls and one Great Black-backed Gull. We found no large gull nests on the island. We also destroyed 200 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 934 feedings in 336 hours of nest observation, and at 11 Common Tern nests, with 709 feedings in 441 hours of nest observation. Similar to last year, there was an increased number of Euphasiids fed to chicks this year, and invertebrates comprised the majority of feedings to Arctic tern chicks. 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, 2004.

a. Arctic Terns

Prey item	Total Items	Percent of Diet

b. Common Terns

Prey Item	Total Items	Percent of Diet

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Euphasiid	343	36.7	Hake	271	38.2
Hake	241	25.8	Euphasid	217	30.6
Amphipod	174	18.6	Unknown Fish	48	6.8
Unknown Fish	35	3.7	Stickleback	27	3.8
Butterfish	26	2.8	Amphipod	25	3.5
Other fish	26	2.8	Other fish	77	10.9
Other inverts	30	3.2	Other Inverts	11	1.6
Unknown	59	6.3	Unknown	33	4.7

Atlantic Puffins. We calculated puffin productivity by following 44 burrows. We checked burrows for eggs in late May and early June, and for chicks in July. Hatching success was 84%, Fledging Success was 92% and productivity was 0.77 chicks per nest. We also banded 67 puffin chicks for the continuing juvenile survival study.

Razorbills. We counted 212 active razorbill nests this year, which is a decrease of 25 nests over last year's 237 nests. However, we conducted our census after a gale destroyed most Razorbill nests. From a sample of 20 burrows that we know had eggs before the storm, 60% re-nested. Therefore, we believe the estimate of breeding Razorbills is an underestimate. We also estimated Razorbill hatching success by following 47 nests, and hatch success was 43%.

Common Murres. We continued the Common Murre Attraction Project this year by setting up murre decoys and continuously broadcasting murre colony sounds. Up to 32 murres were observed on the island this year, a decrease from recent years.

Leach's Storm Petrels. We estimated hatching success for Leach's Storm Petrels by following 28 burrows this year. Twenty-three of the 28 eggs hatched, yielding a hatch rate of 82%.

Manx Shearwaters. Up to eight Manx Shearwaters were observed near the island in late May and early June. One Manx was heard calling at night throughout the season, and two were heard calling on several occasions. We checked the Manx burrow on 6 June and felt an egg and heard an adult in the burrow.

Seal Island National Wildlife Refuge

Carlos Zavalaga, Island Supervisor and Stacey Hollis Resident Intern, National Audubon Society SRP

Tern census

The ARTE (Arctic Tern, *Sterna paradisica*) and COTE (Common Tern, *Sterna hirundo*) census was conducted on 20 June by nine persons and completed in 1.5 hours. The unadjusted count was 2,088 nests. For the estimation of the Lincoln Index a sample of 120 nests were identified. The correction factor $[(\text{marked} + \text{unmarked}) / \text{marked}]$ was 1.052. After adding 86 nests from the productivity plots, the adjusted total became 2,283 tern nests. The species ratio was undertaken by observations and counts of 612 incubating terns from seven permanent blind locations and four enclosures. The proportion of ARTE and COTE nests was 0.4722 and 0.5273, respectively. The total number of ARTE nests was higher in 2004 than in 2005, whereas the numbers of COTE increased (Table 1).

Table 1. Total number of tern nests on SINWR 2001 to 2005.

Year	ARTE	COTE
2001	860	1197
2002	1057	1582
2003	1066	1283
2004	1172	1167
2005	1064	1219

Tern Productivity

Productivity was assessed in 46 ARTE and 56 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 2005 were lower than in previous years (Table 2 and 3). Main causes of mortality in a sample of 81 dead chicks in the enclosures were: starvation (28%), injured by other adults (5%), predation (19%), unknown (12%), storm (35%) and others (1%).

Table 2. Productivity indexes for ARTE on SINWR between 2001 and 2005.

Productivity Index	2001	2002	2003	2004	2005
Mean clutch size	1.86	1.84	1.69	1.59	1.57
Mean hatching success	1.64	1.57	1.38	1.44	1.30
Mean fledging success*	0.95	1.11	1.00	0.82	0.67

Table 3. Productivity indexes for COTE on SINWR between 2001 and 2005.

Productivity Index	2001	2002	2003	2004	2005
Mean clutch size	2.06	2.11	1.97	1.70	1.77
Mean hatching success	1.94	1.78	1.69	1.39	1.29
Mean fledging success*	1.00	1.09	1.01	0.72	0.61

* A chick was considered successful if it fledged.

ARTE and COTE feeding studies

Between 26 June and 23 July 2005, 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 832 hours x nests. The feeding rate was 2.10 and 3.68 prey delivered per hour for ARTE and COTE, respectively. The diet composition (expressed as percentage by number) is shown in Table 4.

Table 4. Principal prey items in the diet of ARTE and COTE in Seal Island, 2005.

	ARTE			COTE		
	Freq.	% diet	Mean size (mm)	Freq.	% diet	Mean size (mm)
Euphausids	522	50.14	26.5	1103	73.00	33.12
Hake (white hake and small 4-beard rockling)	359	34.49	39.7	206	13.63	50.04
Other prey	160	15.37		202	13.37	

Atlantic Puffins (*Fratercula arctica*)

A total of 281 active burrows were identified in 2005, which represents a decrease of 3% over last year. Productivity was estimated for a sample of 111 burrows located in areas where the observation effort was the highest. Eight-seven percent of the nests were considered successful (chick fed at least for 21 consecutive days). This index of reproductive success was higher than in 2004 (80%). Direct nest checks of accessible burrows (the nest content could be observed) were monitored for first time on SINWR this year. Hatching and fledging success was 0.81 (N=21) and 0.95 (N=22), respectively.

Predator Control/ Gull Census/Predators

A total of 63 Great Black-Backed (*Larus marinus*) and 121 Herring gull (*Larus argentatus*) nests were counted and destroyed on 25-27 May and 12-16 June. Tern chick predation by gulls was common on July (at least 18 sightings) and only three sightings of a juvenile Peregrine Falcon (*Falco peregrinus*) were reported.

Other Breeders

Two breeding pairs of Razorbills (*Alca torda*) and one pair of Roseate terns (*Sterna dougallii*) laid eggs, but breeding success was unknown. Great (*Phalacrocorax carbo*) and Double-crested Cormorants (*P. auritus*) nested (17 and 2 nests, respectively) on the south-east edge of SINWR, while approximately 20 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 12 July. Two banded razorbills E17-243 and 17-082 were sighted on 4 and 11 July, respectively, whereas a banded pair of Roseate terns were sighted copulating (9V16 male and 8Y77 female).

East Penobscot Bay

Brad Allen, Maine Department of Inland Fisheries and Wildlife

Only one island in East Penobscot Bay had nesting Common Terns in 2005: Hardhead Island. 27 nests were counted on June 19th and on August 5th fledglings were observed. No other islands in East Penobscot Bay had nesting terns this year.

Penobscot and Jericho Bay

John Drury - Working with a grant from the Maine Department of Inland Fisheries and Wildlife.

Great Cormorants:

Island/Date	# Nests	Other
Metinic Green		
June 18	1 nest	First time recorded nesting at this site
Little Roberts		
June 13	12 nests	
Aug. 6	18 chicks at 7 nests 25 adult.	

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	Aug 18	6 Eagle	GC chicks clumped
	Aug 20	six Eagle.	
	Sept 22	one GC imm.	
Seal Island			
	June 23	17 nests	
	Aug 18	25 GC chicks	
	Aug 19	Eagle	
	Aug 23	3 eagle Western head	
	Aug 27	25-30 GC chicks	3 eagle
	Sept. 22	one GC chick seen	
White Horse			
	June 19	7 nests	
	July 25	no Cormorants	
Great Spoon			
	June 19	6 nests	
	July 25	no Cormorants	5 Eagle.
Little Spoon NW			
	June 19	11 GC nests	24 DC nests
	July 25	10 ad GC 0 nests	2 Eagle.
Brimstone (Burnt coat Harbor)			
	June 19	17 nests	
	July 25	20 GC chicks	
	Aug 6	21 GC chicks at 8 nests	9 adult
	AD Eagle at colony.		
Southern Mark Island			
	June 19	10 nests	
	July 25	5 nests	8 adult.
	Aug. 6	5 nests 12 chicks	7 adult.
John's Island			
	June 19	5 nests	
	July 25	0 nests	5 Eagle

Total 86 Great Cormorant nests, Down from 150 last year.

The Eagles got onto the Cormorant chicks earlier than they did in '04, by late July the Cormorants had been cleared off of the White Horse, Little Spoon, Great Spoon and John's Island. On August 6 an adult was seen on Brimstone, there were 6 adult Eagles on Little Roberts for several days at the end of August, there were three Eagles on the western head of Seal island above the Cormorant colony in late August, it is unlikely that more than ten individual Great Cormorant survived from the 86 nests counted.

In recent years the eagles have eaten a very high percentage of the young birds before fledging, as the older birds die off this population will decrease quickly.

This population is in danger of extirpation from the US. It will be most important to keep someone on Seal Island until late September next year to keep the Eagles off thus protecting at least one of the Great Cormorants colonies.

Terns:

Wooden Ball, June 13, 30 adult,

June 23, 19 Arctic tern nests found in two groups, 6 w/1egg, 12 w/2 eggs, 1 w/3 eggs.

July 16, 50 adult tern roosting, 7 attending nest area

Little Green, June 20, 31 tern nests found, @3/4 Arctic, 9w/1 egg, 21 w/2 eggs, 1 w/ 3eggs.

July 20, limited success, 0 fledglings seen, 30 adult terns attending

Metinic, Southern end, June 20, 150 adult, 48 tern nests found @90% Arctic. 18 w/ 1egg, 30

w/ 2eggs,

July 20, 140 adult, 110 roosting, @30 from the nesting area, the colony was active indicating some success.

Eastern Cow Pen, June 19, 96 Common tern nests found, 25 w/1egg, 63 w/ 2 eggs, 8 w/ 3eggs.

July 25, 30 adult terns attending, one large chick seen, most of the colony is gone.

Mason ledge, June 19, 14 Common Tern nests, 5 w/ 1egg, 6 w/ 2 eggs, 3 w/ 3eggs.

July 25, 30 adult, one large chick seen

Aug 6, 55 adult 5 fledgling seen.

Dry Money ledge, June 19, 123 common tern nests found, 31 w/ 1 egg, 75 w/ 2 eggs, 16 w/ 3 eggs, 1 w/ 4 eggs.

July 25, 8 chicks seen,

Aug. 6, 140 adult, 20 fledgling seen, the colony was relaxed.

High Sheriff, June 19, 20 adult common terns, 15 nests found, 9 w/2 eggs, 6 w/ 3 eggs,

July 25, 16 adult, 6 large chicks seen

Three Bush, June 19, 75 Common Tern nests found, 15 w/ 1egg, 49 w/ 2 eggs, 11 w/ 3 eggs, one eaten adult seen.

July 25, few adults seen, the colony was gone.

Manx Shearwater on Matinicus Rock:

There were at least two individual Manx shearwater heard calling at night during late May, there was a High count of 7 individuals seen near the island in the evening before the end of May.

The diurnal overland displays performed over the island since '97 were not seen this May, twice a Manx was seen approaching the island directly but it turned away from the shore.

An arm was stuck into the burrow the first week of June an egg was noted with adult.

On September 22, a dead egg was seen near the cobwebbed burrow mouth.

Here we have researchers working for the National Audubon's seabird program again disturbing, these pioneer shearwaters, this was the Second Manx egg known laid in the US. The burrow was disturbed by the Audubon Society and the egg failed to hatch, cause and effect? Maybe! the refuge puts up signs to keep Picnicers and Kayakers from disturbing the gulls and Eiders.

Tower:

There was a tower erected on Matinicus rock to beam live images to an interpretive center in Rockland. It is @15' tall with three guy wires to stabilize it. The tower is a crime against the aesthetic of the barren end of the island and it is a hazard to bird life on a 20 acre seabird island. That tower should never have been permitted and it should not be raised in the spring.

You can have a perfectly fine interpretive center without this gimmick. It would have been better to spend that \$20,000 keeping observers in the field.

Keep observers out longer:

The Puffins on Seal Island were brining in 5" herring during the last week of August, there were no resident observers recording this, some years the later nesting individuals may do better. There were small Eider chicks around some islands in late August, ducklings reared later in the season may survive better, as there is other fodder for the Eagles then, young gulls and cormorants. To learn the complete story of a season you have to stay till the end of it and by leaving the islands in the first week of August a month of important information is missed. Next year someone needs to stay on Seal Island to protect the Great Cormorant colony from Eagles.

Reports of observations should not be due until mid October, after the season is over, there is much relevant activity after August 30.

Petit Manan Island

Stephen Agius, Island Supervisor

The GOMSWG census was conducted on June 20th-21st. During the census we counted tern, Laughing Gull and Common Eider nests across the entire island. The unadjusted count for terns was 1,521 nests. We applied a Lincoln Correction factor of 6%, with an adjusted count for terns of 1,612. This is 28% lower than the 2004 season. Our species ratio was determined by observing incubating terns on 654 nests, across the island. We determined that the colony consisted of 37% ARTE (595 nests) and 63% COTE (1,007 nests). The island also supported 9 pairs of ROST this season.

Year	Common	Arctic	Roseate	Puffin	Laughing Gull
2001	859	622	16	17	961
2002	990	671	27	20	838
2003	1213	799	31	28	1123
2004	1312	911	29	35	1042
2005	1007	595	9	51	1151

Tern Productivity:

As compared to the prior five years, ARTE and COTE experienced significantly reduced reproductive rates during the 2005 season. Although a combination of weather and food availability both contributed to this decline a cold rain storm between July 7-9th resulted in the death of over 35% of the tern chicks.

Arctic, Common and Roseate Tern Productivity

Productivity Measure	2001	2002	2003	2004	2005
Mean Hatching Success	85.2 (COTE) 60.3 (ARTE)	73.0 86.0	100 95.2	87.0 79.0	92.0 81.0

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	92.6 ROST	67.0	73.0	82.0	89.0
# chicks fledged/ nest	1.07(COTE)	1.57	1.84	0.62	0.51
(GOMSWG)	0.70(ARTE)	1.41	1.21	0.77	0.51
	1.10(ROST)	0.68	0.55	0.62	0.22

*GOMSWG fledge= chicks surviving to 15 days

Diet Composition:

The primary prey delivered to both Arctic and Common Tern chicks were Atlantic Herring (*Clupea harengus*) and invertebrates. A chicks (first hatch) received 87% of the food deliveries, B chicks (second hatch) 7%. We followed 25 nests for a total of 615 hours, including 444 prey deliveries. Throughout the month of July large numbers of ants were observed being brought in by both ARTE and COTE. The average number of food items delivered per hour for Arctic Terns was 0.72 (N=6) and 0.71 for Common Terns (N=19)

Diet Item	% COTE diet	% ARTE diet
Herring	65.5	29.2
Invertebrate	18.7	50
Krill	4.6	6.6
Larval Fish	3.7	7.5
Sand lance	0.9	3.7

ARTE Metapopulation Study:

We continued to participate in the ARTE metapopulation study in 2005. We read 124 bands this season, including 96 ARTE, 29 COTE and 9 ROST. We utilized the modified bow net to trap nesting ARTE and COTE on PMI. We trapped 32 ARTE and 33 COTE during our nine days of trapping.

Alcids:

Alcid use of Petit Manan Island continues to increase, and this season we documented 51 pairs of puffins and over 150 pairs of Black Guillemots. One of the artificial nest burrows (15 gallon Rubbermaid totes) placed on the island in early May was used by a nesting puffin, unfortunately the nest was not successful. The alcid high counts for the season were 160 Atlantic Puffins (6/30), 67 Razorbills (6/10), 31 Common Murres (7/7) and 531 Black Guillemots (6/02). The one pair of nesting Razorbills laid an egg in the same burrow as last year and the egg failed while it was hatching. We banded 17 puffins (14 chicks and 3 adults) and read 33 different puffin bands this summer.

Predator Control:

In an 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. Despite our efforts to minimize interactions between the LAGU and nesting terns, we documented at least 118 predated nests and 5 chicks. In addition, we observed at least 100 kleptoparasitism events per week in July. We removed 30 Laughing Gulls, 3 Herring Gulls and 3 Great Black-backed Gulls from the island.

Bald Eagles visited PMI and Green Island 79 times during the nesting season, but focused their predation efforts on Common Eiders and Laughing Gulls. Peregrine Falcons visited PMI 82 times and we observed the Merlin a minimum of 15 times. A female Northern Harrier was seen flying over the island on three occasions.

Machias Seal Island

Alexander L. Bond, ACWERN, University of New Brunswick

Census

No tern census was conducted this year. One will be conducted in June 2006.

Arctic Terns

Peak lay was on 15 June (± 9.11 days) and peak hatch was on 04 July (± 4.53 days). Productivity was 0.03 compared to 0.38 in 2004 (see Table 2). Of known food types, euphausiid shrimp were most common (29.06%) followed by hake (13.68%) and larval fishes (7.75%). Fifteen nests were watched for a total of 125 hours with 0.83 feedings/hour.

Cold, wet weather near peak hatch time, combined with low hatching success, poor diet and gull predation likely contributed to low productivity for both tern species. Growth rates were half that of normal seasons.

Common Terns

Peak lay was on 17 June (± 7.56 days), and peak hatch was on 07 July (± 5.10 days). Productivity was 0.00, as no COTE chicks in our plots survived to fledge, compared to 0.19 in 2004 (see Table 2). Euphausiid shrimp and butterfish dominated the COTE diet (38.46% and 30.77% respectively), although it should be noted that because of the rapid loss of chicks, only 13 feedings occurred in 25 hours of observation on 5 nests. The feeding rate was 0.55 feedings/hour.

Atlantic Puffins

Peak lay was 21 May (± 9.13 days) for puffins this year, peak hatch was on 01 July (± 7.30 days) and the first fledgling was caught at the lighthouse on 04 August, all within one day of last year. See Table 2 for productivity details. Euphausiid shrimp (30.74%) and larval fishes (24.97%) were dominant prey types, followed by hake (18.58%).

Razorbills

Peak laying was on 21 May (± 7.39 days), slightly earlier than last year, and peak hatch was on 30 June (± 8.00), slightly later than the year before. See Table 2 for productivity details. Hake (32.67%) and herring (32.08%) were the main prey types, followed by larval fishes (17.82%).

Predator Activity

Many Great Black-backed Gulls and Herring Gulls were seen loafing on the island, and breeding on nearby Gull Rock. On a visit to Gull Rock on 07 August, however, no tern bands could be found. Two Laughing Gull nests were identified on the island (see *Other Island Notes* below). No gull nests were destroyed, and no gulls were shot this season. A startling pistol was used on 13 occasions in May and early June, however this often resulted in scarring the terns and alcids for longer periods than the gulls, and use was discontinued until early August, and only when there were few alcid and tern adults present at the colony. A Merlin and up to two Peregrine Falcons were present almost daily until 21 May and 27 May respectively. One Peregrine Falcon was seen sporadically through June and July.

Other Island Notes

Growth rates of all four monitored species (ATPU, RAZO, ARTE, COTE) were approximately half of that in a normal year. This was most evident in puffins, where chicks could be found in the burrows frequently as old as day 50 or 60, when in a typical year, fledging occurs at approximately day 40. This resulted in very few puffins being caught at the lighthouse when fledging (slightly over 150), and with no discernable peak.

We had at least 2 Laughing Gull nests on MSI this year, initiated around 08 July. A maximum of 14 Laughing Gulls were seen over the island. One egg hatched, but the chick was not seen after day 2. One nest was abandoned.

Two Black Tern nests were found, both with one egg. One was abandoned early in incubation, while the other was defended into late July, and abandoned in early August.

Common Murres nested this year with lower success compared to previous years. Severe gull predation early in the egg-laying phase (over 50 depredated eggs were found) likely contributed to lower numbers (high count of 407 on 04 June). The first egg was seen on 16 May. A total of 8 Adults and 4 chicks were banded from two areas protected from predation by rock ledges on the west side of the island. Our high count of murre eggs was 85, compared to approximately 148 last year.

We continued the Roseate Tern Attraction System this year, with sound recordings, decoys and stand-up mirrors in two locations, but no Roseates were seen near the island. This program will likely be discontinued next year.

One banded Razorbill (895-13653) was observed by Canadian Wildlife Service technician Julie Paquet on 27 June, and sighted again on 29 June covered in oil. This was documented through several photographs, although the body was not found.

On 11 July a Red-billed Tropicbird was seen around and over the island by all four research staff, and several tourists aboard a charter boat. It appeared the next morning at Seal Island according to reports. Photographs were taken by a tour boat passenger.

Amie Black continued her M.Sc. project radio tracking adult Common and Arctic Terns while foraging, and Alex Bond began a M.Sc. project looking at mercury burden in six nesting seabird species, and linking it to trophic level using stable isotope analysis.

Table 1. *Tern diet summary of percentage of identified prey for Machias Seal Island 2005*

Species	Euphausiid	Hake	Larval Fish	Butterfish	Stickleback	Invertebrates
ARTE	29.06	13.68	7.75	0.00	3.42	5.12
COTE	38.46	7.69	0.00	30.77	0.00	7.69

Table 2. A summary of the breeding success of Common and Arctic Terns, Atlantic Puffins and Razorbills nesting on Machias Seal Island between 2001 and 2005. 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	2001	74	1.77 (0.562)	0.92	0.65	0.50	0.50
	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
Arctic Tern	2001	125	1.53 (0.501)	0.91	0.74	0.63	0.58
	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
Atlantic Puffin	2001	78	1	0.81	-	-	0.71
	2002	76	1	0.91	-	-	0.59
	2003	70	1	0.97	-	-	0.77
	2004	56	1	0.96	-	-	0.78
	2005	80	1	0.70	-	-	0.68
Razorbill	2001	62	1	0.82	-	-	0.65
	2002	57	1	0.89	-	-	0.63
	2003	55	1	0.75	-	-	0.60
	2004	58	1	0.87	-	-	0.68
	2005	45	1	0.71	-	-	0.55

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

THE BROTHERS, Yarmouth County, Nova Scotia

Ted D'eon

SUMMARY OF OBSERVATIONS AND ACTIVITIES:

The following is a synopsis of the tern status in southwest Nova Scotia for the 2005 nesting season. My "tern" work and observations deal primarily with the tern colony on The Brothers. These two tiny islands are located about 1 km offshore from Lower West Pubnico in Yarmouth County.

• The Roseate Terns did well on The Brothers in 2005. 68 Roseate Tern nests were identified. This compares to 76 nests in 2004 and 86 in 2003. This is after two successive years of Mink predation on the islands. During the 2003 and 2004 seasons, there was no Roseate Tern fledgeling success and even the loss of some adult Roseate Terns. The only type of tern predation on The Brothers in 2005 appears

to be avian (likely owl) and this involved only a few Common and Arctic Terns. The Roseates were spared. There was also very little Roseate Tern chick mortality, however, too many Roseate Tern eggs failed to hatch; I don't know the reason why. 19 Roseate Tern chicks were banded on July 13 by Canadian Wildlife Service. A hybrid Roseate Tern chick was first seen when 2 or 3 days of age and again at about 10 days old. It could not be located again for banding on July 13 (see photos below).

• Paul Tufts, a retired Department of Natural Resources biologist and expert trapper, visited N. Brother three times in 2005. 1) On April 23, for an overview of the island and to plan the Mink trapping strategy. 2) On May 3, to place two wire fences where Mink traps could be set in the event Mink arrive on the island during tern nesting season. The fences were placed in a zig-zag fashion so as to make funnel-like points where traps would be placed if required, at a later date. It was expected a Mink on the island would try to get through the fence at these locations. 3) On June 27, three Mink traps were set under the overhanging bank at the south end of N. Brother. No traps were set into the fences, and no Mink visited the island during the 2005 nesting season. The mink traps did cause some fatalities, however. Three Common Tern chicks and one Common Crow were found dead in the traps. Also, one Common Tern chick was found dead, stuck into the mink fence.

• 18 new 16 inch x 16 inch Roseate Tern nest boxes were placed on N. Brother.

• The first terns arrived in Lobster Bay on May 4, 2005.

• One cripple Herring Gull was removed from N. Brother on May 29. One Great Black-backed gull nest containing one egg was destroyed on South Brother.

• A total number of 445 tern nests on The Brothers, showed another decrease in 2005. This compares with 526 in 2004, and 750 in 2003. This is not surprising, after the two years of no success. No terns nested on S. Brother in 2004 or in 2005.

• Other tern colonies of the area:

Green Rock (also shown as "Green Island" on the charts) again had a small amount of Arctic Tern Nests (perhaps 10 pairs).

Little Half Bald Tusket Island (a.k.a. Inner Bald and Mossy Bald) appeared to have had a small tern colony in 2003 and in 2004, however, I had not landed on the island to actually check these out. I visited the small island on May 31, 2005. Even though there were a few terns above the island as we arrived, there did not appear to be any to be nesting there.

Île-aux-maringouins (a.k.a. Pinch Gut Island) and on Île-aux-fraises (a.k.a. Green Island): June 20, 2005 - very disappointing on both islands. Only 105 tern nests on Île-aux-maringouins. Most of the eggs were cold, some had been depredated. The only tern species seen there were Common Terns. The situation on Île-aux-fraises was a little better even though the nest numbers were lower at only 59. Most of the tern eggs here were warm. Most of the terns were Common with one or two pairs of Arctics. It is possible there could have been a Roseate Tern nest on Île-aux-fraises. The single cold egg had been laid under a plywood structure. The egg fit the overlapping similarities of some Common Tern and of some Roseate Tern eggs. There were no Roseate Terns seen at Île-aux-fraises. In 2004, I had counted 459 Common and Arctic Tern nests on Île-aux-fraises; this was up from the 362 nests in

2003. I must note that there was a Great Black-backed Gull nest with two large chicks in the middle of the tern colony. The terns were very busy with the half a dozen or so GBb Gulls overhead. I feared few tern chicks will survive to fledge after the eggs hatch. I was not able to revisit this island.

There were still small colonies of Arctic Terns on Mud Island and on Flat Islands. I did not make a nest count on these two islands.

Other species of interest:

Also at Green Rock, on May 31, we saw about 6 Puffins as well as **7 Razorbills** coming out of a rocky islet. I am sure there were more Puffins there but the 7 Razorbills were a treat. The most Razorbills I had ever seen before at Green Rock were 3. This could almost be called a Razorbill colony. I expect they would be nesting there with the Puffins.

The Puffin colonies at Noddy Island and at Round Island (in the Mud Island group of islands) were still as active as usual.

Least Tern Colonies

Kate O'Brien, Rachel Carson NWR

Synopsis: A minimum of 109 least tern pairs nested within the State. This is an undercount due to colony disruption and ongoing predation problems. A total of 6 sites were used for nesting, including a new one, Stratton Island and beach nourishment site on Western Beach which had not been occupied since the 1980s.

Wells Beach, Wells, Maine

Jody Jones, Maine Audubon

Population Estimate:

Zero nesting pairs, although Least Terns were seen loafing in the area earlier in the season. Symbolic fencing was not placed in advance around former nesting site per instructions from private landowners.

Comparison:

15 nesting pairs produced 10 fledglings in 2004.

Laudholm Beach, Wells, Maine

Kate O'Brien, Rachel Carson NWR

Population Estimate:

Peak Estimate of 4 pairs based upon nest count on 6/22/2005. Site was visited throughout the season. Nesting began on 6/9 and peaked on 6/21 with a total of 4 nests. Tide washed out 2 nests on 6/23 and another nest disappeared on 6/27. Limited re-nesting occurred, but only one nest was successful.

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Productivity:

All but one of the nests were predated. Most of the terns abandoned the site. One nest produced a single fledgling. The beach was highly eroded this year by winter and summer storms.

Comparison:

In 2004 only one Least Tern nest was documented and zero fledglings reported. In 2003, there were twenty nests and zero fledglings produced.

Predator Control:

None.

Crescent Surf Beach, Kennebunk, Maine

Kate O'Brien, Rachel Carson NWR

Population Estimate:

We used the new Least Tern survey protocol for the 2005 field season in order to estimate number of nesting adults (using flock estimates and nest counts for adults and evening surveys for productivity). Predation issues and shifting nesting sites made determination of the population of Least Terns difficult. Our high count of nests was 52, on June 30th, however there were 38 predated eggs also detected during the survey. We know peak nesting numbers were higher than our estimate.

Date	# of 1 egg nests	# of 2 egg nests	# of 3 egg nests	Total	Survey Type	# of Chicks **	# of Adults *	Comments
6/22	18	14	1	33	Nest	0		3 predated eggs
6/22					Flock	0	104	
6/30	20	31	1	52	Nest	0		38 predated eggs
7/06	11	31	0	42	Nest	0		Fox tracks and predation
7/21	13	30	0	41	Nest	23		Mink Tracks inside fence
7/27	14	19	0	33	Nest	18		Mink Tracks through colony
8/3	12	12	0	24	Nest	12		Mink Tracks
8/4	5	3		8	Nest	1	80	Fox inside electric net fence and predated nests and chicks

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A dusk survey was completed on August 15th and August 17th. These surveys counted only seven least tern fledglings on site. Some birds may have left before the survey, however productivity was very low for this site.

Comparison: In 2004 only 3 fledglings were observed after colony was abandoned due to crow predation. In 2003, only 8 fledglings were produced after colony abandoned due to predation and in 2002, a total of 145 fledglings were produced.

Predator Control:

We used solar powered net fence at Crescent Surf Beach with limited success. We were reduced the predation of nests for a portion of the field season. All nests outside the fencing were predated. However, we did have some operational issues which depressed productivity. We had some fence shorts, a fox breaching the fence and eating numerous chicks and eggs later in the season and we also had a mink which could walk through the net fence without being shocked.

A crow trap was used also at Crescent Surf Beach and we were able to capture the resident crow pair which we think was responsible for predated the eggs at this site. We also hung a crow effigy within the colony. After capture, crow predation within the colony was not observed, although crow tracks were occasionally seen on the beach.

Other notes: Of interest, two least terns which were banded as chicks by Jordan Perkins in 2002 joined other least terns nesting on Stratton Island. Also, another least tern which had been banded by Jordan Perkins in either 2002 at Crescent Surf or 2003 at Higgins Beach (the color bands were the same for both birds) was found dead on June 19th at Cranes Beach in Massachusetts.

Higgins Beach:

Jody Jones, Maine Audubon

Population Estimate:

On June 1st there were at least 20 pairs with scrapes and ground courtship. On June 13th there were 22 nests and many additional nests. On June 17th, the entire colony deserted due to massive crow predation.

Comparison of Productivity:

In 2005 productivity was 0. In 2004 there were 54 fledglings from 45 pairs and in 2003 there were 53 fledglings from 38 pairs.

Seawall:

Jody Jones, Maine Audubon

Population Estimate:

On June 27th there were 6 one egg nests and 28 adults counted. On 6/29 there were 17 nests and several loose pairs. On July 4th, fox or coyote depredate all nests and on July 7th the colony was gone.

Comparison: From 2002-2004 there were no least tern nests recorded.

Western:

Lucy LaCasse, Prouts Neck Country Club

Population Estimate:

The first least tern nest was documented on 6/18. On 7/16 there were a total of 40 active nests. Crow predated chicks and eggs and reduced productivity.

Comparison: Least terns had not nested here since 1981. A total of 3 fledglings from about 40 nests were produced.

Other notes: Western Beach was part of a beach nourishment project where 267,000 square feet of new habitat was created.

Stratton:

National Audubon

Population Estimate:

On 6/17 least terns were roosting at dusk. On 6/22 there were 50 least terns observed on Stratton. On 7/16 there were a total of 18 least tern nests which produced approximately 9 fledglings.

Comparison:

This is the first time least terns were noted nesting on Stratton Island. This was the most successful site in terms of productivity this year.

Part 2 – RESEARCH REVIEW PRESENTATIONS

AGGRESSIVE BEHAVIORS OF COMMON TERNS AT VARYING NEST DENSITIES, Lance D. Ebel, Unity College (lebel04@unity.edu)

Density is a very dynamic factor in seabird breeding success. It affects many different aspects of reproduction at once, leading to complex interactions (Gaston 2004). Often, this makes it difficult to depict the influence of an isolated factor on overall reproductive success. One of the correlative variables in breeding success is nest/breeding pair density. The reasons for this are many, and include the expenditure of energy. Densities can be locally and regionally highly variable (Nisbet 2002). High densities may increase the amount of energy that parents put into raising young. Aggressive behaviors can be a very important part of this energy budget. These behaviors may increase with colony density; this is an energy sink that may influence breeding success. Aggressive behaviors are easily observed,

and can be ranked in terms of intensity due to the representative displays that are consistently advertised at different intensity levels. In our study, we ranked these behaviors on a scale of 1 to 8, with one being the least intense interaction. The study site was Outer Green Island off of the coast of Maine. This island was chosen for its uniformity of nesting sites and species composition, for its highly variable nesting densities, and for its accessibility. Densities ranged from .23 to 2.23 nests/meter². Our primary alternative hypothesis is that the frequency of aggressive behaviors will increase as density increases. Secondly, we examine the intensity of aggressive behaviors. We hypothesize that the intensity will increase as density increases. We find that both rate and intensity increase with an increase in nesting density, and that the difference between high density and low density rate and intensity were significant (p .05). Using ANOVA analyses, we find a p-value of 1.66 E⁻¹¹ for intensity and 5.23 E⁻¹⁷ for rate.

CONTAMINANT ASSESSMENT OF COMMON TERNS IN THE GULF OF MAINE, Steve Mierzykowski and Linda Welch, USFWS; Scott Hall and Stephen Kress, NAS; Brad Allen, MDIFW; and David Evers, BRI. (Steve_Mierzykowski@fws.gov)

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 were examined at USFWS laboratories for organochlorine pesticides and trace elements. 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. Mean Total PCB concentration for all eggs was 0.40 µg/g fww. Low levels of HCB, dieldrin, oxychlorane and p,p'-DDE were also detected in eggs. Mean levels of metals (µg/g fww) in eggs were: arsenic 0.08, copper 0.62, mercury 0.12, selenium 0.60, and zinc 12.9. Cadmium, chromium, nickel, and lead were below detection limits. Wholebody chicks 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 metals (µg/g) in chicks were: arsenic 0.19, copper 1.20, mercury 0.18, selenium 0.67, and zinc 23.8. As in the case of eggs, cadmium, chromium, nickel, and lead in chick samples were below detection limits. Additional COTE egg and chick samples were collected in 2005 from all study islands and analytical results should be available prior to the 2006 field season.

FORAGING LOCATIONS AND SEGREGATION OF COMMON AND ARCTIC TERNS, Jeff Kimmons*, Scott Hall, and Kim Smith (jkimmon@uark.edu)

Previous research conducted by Project Puffin Seabird Restoration Program has shown life history variations between Common Terns in the Gulf of Maine. Common Tern colonies located on inshore islands have larger clutch sizes and grow faster to a greater asymptotic mass than conspecifics on nearshore and offshore islands. These life history variations have been attributed to nearshore and offshore island terns traveling greater distances to obtain food thus having less energy to dedicate to reproduction as well as a lower delivery rate of food to nestlings. To obtain a better understanding of foraging strategies between the islands, we collected hatchling and fledgling feathers from different islands to determine if isotopic differences exist in ^{13}C and ^{15}N isotopes. Stable isotope signatures of inshore island hatchlings should be more enriched in ^{13}C than nearshore and offshore feathers unless these birds are traveling to mainland estuaries. Future research will be dedicated to understanding the energetic constraints that have led to these life history variations.

HEAVY METAL CONTAMINATION IN DISCARDED TERN PREY, Stacey Hollis, Warren Wilson College

Rising concentrations of heavy metal pollution can have detrimental impacts on living ecosystems. Through biomagnification of metals across food chains and bioaccumulation within individual species, heavy metals can cause developmental abnormalities in seabirds. Common Arctic and Roseate Terns are piscivorous seabirds that nest on inshore and offshore islands in the northeastern United States. Offspring of these terns have recently been observed with unexplained hatching defects at some colonies. Researchers are investigating the cause of these defects by analyzing chicks and eggs for heavy metals. Through Warren Wilson College, my objective is to analyze the fish for heavy metals at one colony with observed defects and at a control site. Studies have shown heavy metal intake is higher on the breeding grounds than during the winter. Chicks hatching on Pond Island National Wildlife Refuge have been observed with unexplained deformities. This island is located at the mouth of the Kennebec River where a dam has recently been taken down. The offshore island, Seal Island NWR is 18 miles off the coast and chicks have not been observed with the same symptoms. Discarded prey, both fish and euphasiid krill, were collected from both islands. Collected fish were measured and identified to species level and wet weight was recorded. Specimens were frozen. Specimens will be analyzed using a Graphite Furnace Atomic Absorption Spectrophotometer to determine metal levels. Comparisons will be made between the islands as well as between prey species to identify any differences in metal levels.

NEST SITE CHARACTERISTICS OF ROSEATE TERNS (*STERNA DOUGALLII*) AND LAUGHING GULLS (*LARUS ATRICILLA*) ON EASTERN EGG ROCK, Sarah Thomsen, Hampshire College

The continued increase in the laughing gull population on Eastern Egg Rock could be intensifying negative impacts on roseate terns such as kleptoparasitism, predation, and habitat displacement. The goal of this project is to understand the nest site characteristics of these species along with a comparison of the available habitat to determine the degree of habitat competition. Nests were sampled within a 6 day window from June 18-23rd 2005. Laughing gull nests were selected using transects and roseate tern nests were selected in clusters from 6 subcolonies and monitored for hatching success. Transects and the island-wide 30m grid system were used to select habitat points for comparison. Variables were selected because they have been shown to affect nest site selection in other colonies, and included nest substrate, percent cover vegetation/rock within 0.5m² and 1m², percent grass/nongrass within 1m², percent visibility of nest from above and cover type, distance to and height

of nearest vegetation, and distance to and height of nearest rock. The next step for this project will be data analysis which will focus on the comparison of nest site variables between the species.

USING RADIO TELEMETRY TO INVESTIGATE ARCTIC AND COMMON TERN FORAGING AREAS, ATTENDANCE PATTERNS AND FORAGING TRIP TIMES ON SEAL ISLAND NWR. - C. Scott Hall and Carlos Zavalaga, , National Audubon Society SRP

Eighteen band mounted radio transmitters were placed on Arctic (6) and Common (12) Terns nesting on Seal Island NWR during June 2005. A receiver and data logger were positioned in the colony to record arrival, departure and “residence” times of birds carrying transmitters. Concurrent blind stints were conducted to evaluate the use of transmitters to determine attendance and foraging trip patterns. Blind stints were also conducted during aerial tracking flights to record prey deliveries to the nest. Two aerial tracking trips were conducted in mid and late July. Twenty foraging locations were identified (ARTE – 4; COTE – 16). Most foraging locations were within 10 miles of the colony, however some birds foraged 15 miles from SINWR. Foraging patterns are not evident. Transmitters were not effective for determining foraging rates or attendance patterns due to the slow pulse rate. Birds with transmitter may have spent more time at the nest and tended to make shorter foraging trips (for euphasiids) relative to mates not carrying transmitters – this needs further analysis.

AN ADAPTIVE APPROACH TO MANAGING GULL PREDATION AT SEABIRD RESTORATION SITES IN MAINE - Christina Donehower¹, David Bird¹, and Stephen Kress²
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Depredation of tern (*Sterna* spp.) offspring and displacement of adults from preferred breeding grounds have been used to justify nest destruction, harassment, and lethal control of gulls (*Larus* spp.) at seabird restoration sites in Maine. Despite widespread control, few studies have quantified gull predation or examined the predatory behavior of gulls at these sites. This study aims to: i) document gull-seabird interactions, ii) evaluate the effectiveness of predator control practices, iii) identify factors affecting predation rates, and ultimately, iv) enhance tern and Common Eider (*Somateria mollissima*) restoration efforts using knowledge of gull behavior and ecology. We used a variety of techniques (e.g. color-marking predatory gulls, predation watches, video surveillance, nest-monitoring) to examine gull-tern and gull-eider dynamics at two seabird sanctuaries on the Maine coast. From 2003-2005 at Eastern Egg Rock, adult Herring (*L. argentatus*) and Great Black-backed (*L. marinus*) gulls were the principal predators, specializing on tern offspring and sometimes maintaining feeding territories in the colony. In 2004-2005 at Stratton Island, few (if any) eider ducklings survived because of severe predation by Black-backs; video clips depicting the opportunistic nature of these group gull attacks were presented. Analyses are in progress to model eider nest success and tern chick survival.

MERCURY BURDEN IN THE SEABIRDS OF MACHIAS SEAL ISLAND: METHODS AND RATIONALE
Alexander L. Bond & Antony W. Diamond, Atlantic Cooperative Wildlife Ecology Research Network, University of New Brunswick

Mercury is a pervasive environmental contaminant, the main sources of which are power plant emissions and vehicles, although its dispersal is long range through the atmosphere. We will assess the

mercury burden in six species of seabirds nesting on Machias Seal Island (MSI), New Brunswick that sample different parts of the marine food web: Razorbill (*Alca torda*; fishes in deep water), Atlantic Puffin (*Fratercula arctica*; fishes and invertebrates nearer to the surface), Common (Sterna *hirundo*) and Arctic Tern (*S. paradisaea*; fishes and invertebrates at the surface), Common Eider (*Somateria mollissima*; benthic invertebrates) and Leach's Storm-petrel (*Oceanodroma leucorhoa*; plankton at the surface). Total mercury has been increasing in both Atlantic Puffins and Leach's Storm-petrels in the Atlantic since the 1970's, and the other four species have yet to be evaluated.

We collected feathers and blood samples from adults and chicks, as well as eggs. Feathers of the adults will indicate the amount of mercury acquired during the wintering period, while blood will show the mercury acquired while at the colony. The eggs will allow us to assess the mercury burden of females, and also enable us to determine if the nutrients contained in the eggs are derived from the wintering grounds (capital breeding) or at the colony (income breeding). Nutrient origin (inshore/offshore) and trophic level will be determined by stable isotope analysis of carbon and nitrogen, respectively. Sampling from chicks as well as adults will determine if the chicks are being fed at the same trophic level as the adults.

SEANET: UPDATE ON TERN MORTALITIES, Rebecca Harris, Seabird Ecological Assessment Network, Tufts University Cummings School of Veterinary Medicine

The Seabird Ecological Assessment Network (SEANET) coordinates volunteer monitoring of beaches from New Jersey to Maine for seabird mortality. In addition to over 300 volunteers walking beaches monthly, SEANET works with wildlife rehabilitators and researchers to investigate unusual mortality events in marine and coastal birds. Since 2002, several tern mortality events have taken place at various in the Gulf of Maine and beyond, including one involving over 2,025 common tern fledglings found dead and dying (exhibiting neurologic signs) at South Monomoy NWR, MA in 2004.

Veterinarians at Tufts have necropsied specimens from Maine and Massachusetts in cooperation with the National Wildlife Health Center (USGS), finding several birds with high levels of *Salmonella typhimurium* cultured from enlarged spleens from Monomoy and Cape Cod. Specimens from 2004 from both Maine (Seal Island NWR) and Monomoy had small, abnormal lymphoid system organs, suggesting viral infection, but viral isolation attempts have not been successful thus far (samples were negative for West Nile Virus, Avian Flu, and Newcastle Disease Virus). There have been some fledglings with abnormal leg bone growth and a few with flexible beaks, suggesting some sort of vitamin deficiency. During the 2005 season, fresh samples were taken from Monomoy, Seal, and Egg Rock, and symptoms similar to those observed in 2004 were seen again, with up to 50 fledglings found dead per day at Monomoy near the end of the season. Vitamin (including calcium bone ash) screens, bone density testing, viral and bacterial isolation and histopathology are pending on 2005 specimens. There is some speculation that these mortality events may be the result of some food deficiency (low herring feedings on Seal and high invertebrate feeding), but Monomoy terns were bringing in plenty of sand lance during both seasons, so this connection is still unclear. During the spring of 2004, a large-scale red tide outbreak occurred in the region, resulting in the death of at least 40 adult common terns on Monomoy NWR. Samples were positive for saxitoxin, and the majority of the birds killed were egg-laying females (findings were same as the last large red tide outbreak in 1978 which affected Monomoy terns, Nisbet 1983).