

**Gulf of Maine Seabird Working Group
6 August 2001
Hog Island, Bremen, Maine, USA**

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Welcome & Overview— *Steve Kress, National Audubon Society*

Steve Kress welcomed the group to the 18th annual meeting of the Gulf of Maine Seabird Working group (GOMSWG). He reviewed the origin of the group, which began with the focus of reversing declining tern populations on the Maine coast. Since its origin in 1984, the group has expanded its interest to include all seabirds nesting within the Gulf of Maine (GOM), an area defined by the elbow of Cape Cod, Massachusetts to Cape Sable, Nova Scotia. Beginning in 2000, the group changed the format of its annual meeting to include a morning review of the current nesting season with an afternoon dedicated to presentation and discussion of seabird research in the Gulf. This year's meeting followed this format.

Since 1984, Maine coast populations (including Machias Seal Island) of Common and Roseate Terns have increased substantially, from 2,543 and 76 pairs to 7,176 and 284 pairs respectively in 2000. Arctic Terns have also increased, but at a slower rate from 3,170 pairs in 1984 to 4,358 pairs in 2000. During this period, Laughing Gulls staged a dramatic increase of 737 % during the same period, increasing from 314 pairs in 1984 to 2,630 pairs in summer 2000. For the first time since GOMSWG censuses began, populations of Common and Roseate Terns showed no increase in summer 2000 and Arctic Tern numbers declined. Tern populations for the entire GOM region were remarkably similar between 1999 and 2000, with Roseate Terns increasing by just one pair. In contrast, the GOM Laughing Gull population increased by 22%.

2001 Overview

The 2001 tern-nesting season was characterized by continued slow growth of the GOM Common Tern population, small declines in Arctic and Roseate Tern numbers and rapid increases in Least Tern and Laughing Gull populations.

Common Terns increased by 5% over 1999 totals while Arctic Terns declined by 10% and Roseate Terns were nearly stable with a 2% decline. North Monomoy NWR supported by far the largest colony of Common Terns with 7,807 pairs and these produced 1.2 chicks/nest. Stratton Island was the next largest Common Tern Colony in the GOM with 1,881 pairs.

The increase in Laughing Gulls was greatest at Eastern Egg Rock (GOM's largest ROST colony) where LAGU increased by 30% to 1,252 pairs. Laughing Gulls were observed preying on Common and Roseate Tern chicks and this likely contributed to the first decline in the number of nesting Roseate Terns at Eastern Egg Rock (EER) in eleven years and a decline in productivity to just 0.4 chicks/nest. Laughing Gulls also increased over 2000 nesting populations at Petit Manan Island NWR (PMNWR) by 21%; at Matinicus Rock NWR by 17% and at North Monomoy Island NWR by 114%. For the first time, managers destroyed Laughing Gull nests (150 at EER and 50 at PMNWR).

Least Terns experienced a 70% increase in the GOM from 1,096 pairs in 1999 to 1,860 pairs in 2001. Most of this increase occurred at Massachusetts's colonies, but the two Maine colonies increased by 17% since the 2000 census.

The tern-nesting season in Maine was marked by the breakup of two of the state's largest Common Tern colonies—Jenny Island (Casco Bay) and Ship Island NWR (Blue Hill Bay) following mink depredation in 2000 and 2001. Based on larger than usual increases, it's likely that many of the terns from these colonies joined restoration projects at The Brothers (Nova Scotia), Metinic Island, Pond Island NWR, Stratton Island and most notably Seavey Island in the Isles of Shoals.

PART 1 – ISLAND SYNOPSIS

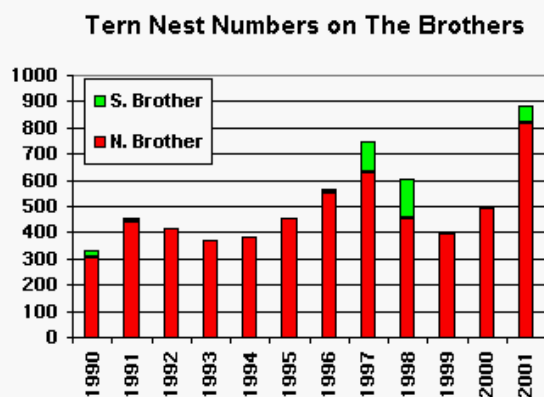
GULF OF MAINE ISLANDS

The Brothers, Nova Scotia – Ted D'Eon, West Pubnico, N.S.

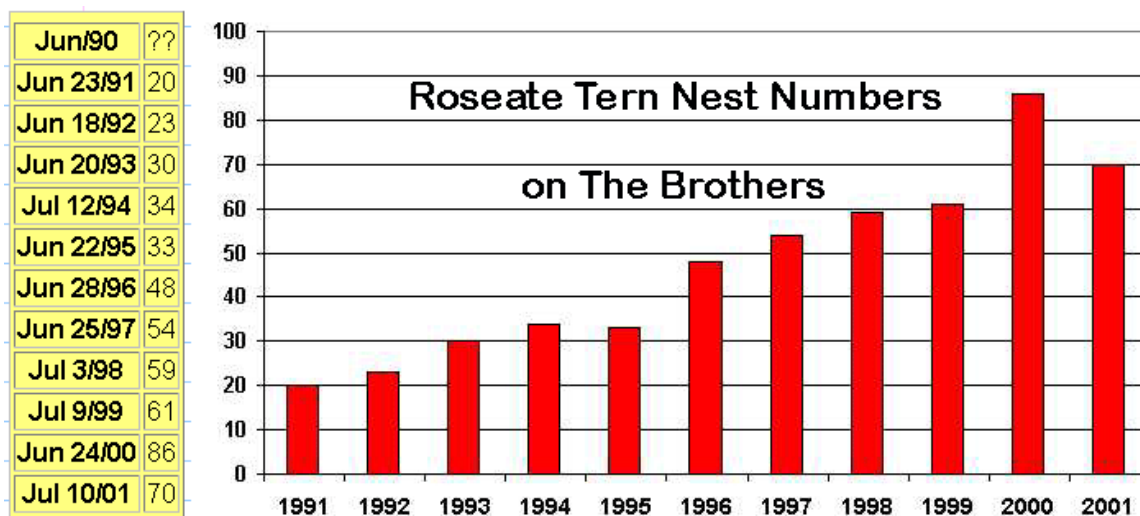
The following is a synopsis of the tern status in southwest Nova Scotia for the 2001 nesting season. My "tern" work and observations deal primarily with the tern colony on The Brothers. These two tiny islands are located about 1 km offshore from Lower West Pubnico in Yarmouth County. Tern nest numbers increased quite dramatically to 880, from 491 the previous year.

Tern Nests Numbers on The Brothers - 2001

	N. Brother	S. Brother	totals
June 7, 1990	302	28	330
June 11, 1991	441	13	454
June 11, 1992	413	0	413
June 9, 1993	367	0	367
June 8, 1994	380	0	380
June 14, 1995	457	0	457
June 16, 1996	554	12	566
June 12, 1997	630	120	750
June 11, 1998	452	151	603
June 7, 1999	399	0	399
June 10, 2000	491	0	491
June 9, 2001	817	63	880



The number of Roseate Tern nests located on these islands went down to 70 from the previous year's high of 86. However, Roseate Tern chick survival was probably higher than in 2000. At least 27 Roseate chicks were expected to fledge. Few Roseate eggs remained unhatched and only one Roseate chick was found dead.



No gulls nested on these islands in 2001 and there appeared to be very little owl predation.

One Banded Roseate was seen several times on North Brother. It was the only banded tern observed. The characters on its left band looked like "5N" over the characters "70". This year was the first time I really watched the terns to identify the type of fish they were bringing in. At least from July 10 to July 22, the main fish brought in were Sand Lance (*Ammodytes americanus*). A few terns brought in Mummichog (*Fundulus heteroclitus*), and one

brought in a species of hake. This was the first time I saw Sand Lance on The Brothers. None were observed with Herring though this does not mean no Herring were brought in.

This spring I erected an observation platform on North Brother. It served me well on a few visits there when I made a few observations from it in a small nylon tent.

In April I also placed two 9'x12' tarps over a couple of places where, each year, the vegetation gets rather thick and less productive than the less vegetated areas. The tarps were covered with beach gravel upon which nesting structures were placed. I expected this area would be colonized by the Roseates. As it turns out, very few terns nested there, though these areas were used as feeding stations.

Pinch Gut Island, a small island near Wedgeport, lost its tern colony this year. Last year there were close to 400 nests there; this year, none. An estimated 200 pairs of terns nested on another small island about 6 or 7 km away. This island, "Green I." on the charts and locally known as "Île-aux-fraises", is a historical tern colony site. Years ago the colony abandoned the island when a couple of rams were placed on there to graze for the summer. Sheep are no longer placed there. I have a good feeling about this island as an upcoming and vibrant tern colony.

Other tern colonies in the area:

Île Chespeque in Pubnico Harbour had a dozen or so Common Tern nests. Possibly only a few fledged.

The Thrum I. (about 5 km northwest of The Brothers) may have had about 25 Common Tern nests.

Gannet Rock probably fledged about 6 Arctic Terns.

I was not able to visit Flat I. this year to do a nest count. For the past few years about 20 Arctic Tern nests were found. I would expect the same this year. I expect Round I. had about 10 Arctic Tern nests also this summer, though I did not get the chance to check it out either.

The weather during June and July was rather windy and/or wet or cold. I was not able to visit the more distant islands, as I had wanted to. However, tern nesting success appears to have been good; certainly at least, on The Brothers.

Machias Seal Island - *Kate Devlin, Becky Manley, and Dedreic Grecian,*
ACWERN and Department of Biology, University of New
Brunswick

This year the field crew arrived on the island on May 12. The birds arrived and began nesting no later than usual this year. The peak for puffin egg laying was May 18 (calculated by back dating from hatching dates). The peak for Razorbill egg laying was May 26. The first tern nest was found on May 29, peak Arctic Tern laying was June 8 and peak Common Tern laying was June

14. Average productivity for each species is summarized in Table 1. No island wide census was conducted this year and likewise no species ratio was calculated.

Although there was an observer from CWS stationed on the island this year there was no warden/caretaker as in years past. We took on some of the warden's duties, including the scaring of Herring and Great Black-backed Gulls off the island. Noisemakers were used fairly regularly throughout the season to scare gulls (we are still waiting for Canadian firearm permits to be issued to island staff). Four herring gull nests with 1 egg in each were destroyed in the end of May/ beginning of June. The gulls seemed to be discouraged enough not to attempt re-nesting. We did have some cases of Herring and Great Black-backed Gulls eating tern eggs and chicks; however, there were not as many losses this year as compared to last year.

Productivity for terns and puffins was higher this year than last year; Razorbills had the same productivity as last year (Table 1). We did not see evidence of starvation that was widespread among the Arctic Terns and Puffins last year. There was a lot of Sand lance observed in the diets of all four species (Table 2); however, in spite of this the chicks seemed to be able to survive. The number of Puffin fledglings coming to the light has been low as of August 4, however, the puffins appear to have nested a little later this year than in years past. The chicks in the burrows are of healthy sizes for their ages, just a little younger at this point in the season.

Table 1: Seabird productivity for Machias Seal Island in 2001.

	ARTE	COTE	ATPU	RAZO
# nests	123	55	78	329
mean Clutch (SD)	1.5 (0.50)	1.9 (0.52)	1	1
mean Hatchlings/Nest (SD)	1.1 (0.79)	1.2 (0.91)	0.8 (0.40)	0.7 (0.46)
mean Fledglings/Nest (SD)	0.7 (0.64)	0.8 (0.67)	0.7 (0.47)*	0.6 (0.50)

*not all of our chicks have reached a fledging age yet, this estimate may change

Table 2: Observed prey items delivered to nests on Machias Seal Island in 2001.

	ARTE	COTE	ATPU	RAZO
Hours of Observation	67.3	63	65	36.6
Approximate Nest Hours	297	453	585	329
Identified items / Total	588/722 (81%)	722/817 (88%)	2357/2551 (92%)	689/691 (99%)
Herring	7.1%	28.3%	14.0%	15.2%
Hake / Rockling	19.2%	14.8%	24.2%	12.3%
Euphausid	0.5%	2.4%	0.2%	0
Butterfish	1.0%	0.6%	0.1%	0.7%
Sandlance	71.1%	44%	61.4%	70.1%
Pollock	0.2%	5.3%	0.2%	1.6%
Moths	0.7%	4.4%	0	0

Other	0.2%	0.2%	0	0
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*assumes 9 burrows per observation site

Please note: A more extensive season report will be available on the internet later in the fall, contact K. Devlin (i65v9@unb.ca) for more information. [This can be found at: <http://www.unb.ca/web/acwern/msi2001/msi2001.htm> - ed.]

Petit Manan Island – Stacie Schoppman, Petit Manan NWR

Census

The GOMSWG census was conducted on June 18 and 19, 2001. The total count for tern nests was 1449, with a Lincoln Index corrected value of 1481. This represents an increase of 45 nests over the 1436 nests recorded in 2000.

The species ratio of Common (COTE) to Arctic (ARTE) Terns was estimated by identifying 300 nests to species, 20% of the total population. Three vantage points were used to obtain a fair representation of the entire island: the lighthouse tower located on the south end, the second story windows of the boathouse located on the north end, and a blind located in the middle of the island. We identified 174 COTE and 126 ARTE nests, resulting in a species ratio of 58% COTE and 42% ARTE or an estimated total of 859 COTE nests and 622 ARTE nests. The 2001 species ratio shows a 9% increase in ARTE nests when compared to the 2000 estimates of 67% COTE to 33% ARTE.

An estimated 961 Laughing Gulls (LAGU) nested on PMI this year, a 17% increase from 2000, and a 34% increase from 1999. A total of 116 Common Eider (COEI) nests were estimated for 2001, a decrease of 8.7% from last year.

A total of 21 Roseate Tern (ROST) nests were counted this season, 16 of which were present at the time of the GOMSWG census. This is a 16% increase when compared to the 16 nests found last year, and a 32% decrease from 28 nests in 1999. Twelve artificial nest boxes were placed in the locations frequently utilized in past years by nesting ROST, however, none of the boxes were used by the birds this season.

Tern Timetable

SPECIES	FIRST EGG	FIRST CHICK
COTE	May 28	June 18
ARTE	May 29	June 18
ROST	June 5	June 22

Tern Productivity

The following values for COTE and ARTE productivity were determined from fenced plots and from nests followed for provisioning studies. All ROST nests were monitored for breeding success.

	COTE (n=46)	ARTE (n=36)	ROST (n=21)
<i>Mean Clutch Size</i>	1.19	1.78	1.29
Mean Hatching Success	85.2%	71.9%	92.6%
Mean Fledging Success	65.3%	63.0%	92.0%
Mean Reproductive Success	55.7%	45.3%	85.2%
# Chicks Fledged / Nest	1.07	0.81	1.10

COTE productivity this season was consistent with values from the 2000 season. ARTE productivity was slightly increased over previous seasons, however, still lower than COTE productivity. ARTE fledging success increased by > 10% when compared to the 51.4% value from 2000.

ROST nesting on PMI experienced high productivity levels this season. There was nearly a 20 % increase in both hatching success (73% from 2000) and reproductive success (61.5%). Fledging success was up 12% (84.2% in 2000).

Chick Provisioning

In total 120.5 hours were spent observing 27 nests to document food provisioning to chicks. A total of 619 food items were brought into the observed nests, with an average of 1.33 items per nest per hour.

FOOD ITEM	% TOTAL	MEAN LENGTH
Herring	45.6%	1.50
Hake	19.1%	1.27
Pollock	8.6%	1.57
Invertebrates	6.8%	-
Sand Lance	1.3%	1.48
Butter Fish	0.8%	1.29
Stickleback	0.3%	1.25
Unknown	17.6%	-

ARTE Metapopulation Study

As a part of the ARTE metapopulation study 35 adult ARTE were trapped 7 of which were previously banded with field-readable bands. A total of 158 ARTE chicks were banded. Of these, we collected blood samples from 30 chicks, which were older than 10 days of age. Over the season, a total of 51 ARTE adults were resighted.

Great Black-backed Gull (GBBG) and Herring Gull (HERG) Depredation

On two occasions HERG were shot. The first gull was shot July 16th on the north berm of the island. The second gull was shot on July 17th on the south berm of the island. Both birds were observed entering the colony and depredating tern and LAGU chicks. There were several instances where GBBG entered the colony along the berm, where the depredation of two tern chicks was witnessed. However, no particular “problem” GBBG was identified.

Alcids

High counts for the season are as follows: 124 Atlantic Puffins (ATPU) on July 26th, 394 Black Guillemots (BLGU) on the June 9th, and 34 Razorbills on June 8th. We banded 31 BLGU chicks, 12 ATPU chicks and 2 ATPU adults. At the beginning of the season, six artificial burrows were constructed in an effort to provide additional nesting opportunities for nesting alcids. Of the six, one contained a puffin egg that was abandoned and three contained some nesting material. A minimum of 17 pairs of ATPU nested on PMI this season. No Razorbills are known to have nested on PMI although we observed copulation attempts. Five common murrelets visited the island in June.

Raptors

A Peregrine Falcon visited PMI on 10 occasions, 6 of which an adult tern was taken. On 10 occasions Bald Eagles, both adult and juvenile, were seen frequenting PMI and Green Island. No prey was confirmed however they were possibly preying upon gulls, Eiders, and ducklings. Finally a Merlin flew over PMI three times without any evident success.

East Penobscot Bay – Brad Allen, 650 State Street, Bangor, ME 04401 (207-941-4469)

On 15 June we checked 4 islands without terns (Colthead, Spectacle, Dagger, Eaton Island Ledge) from the boat, and landed on 2 with terns: 96 COTE nests counted on Hardhead, 31 COTE nests on Buck.

Ship Island - Joshua Pennell, USFWS Petit Manan NWR

During the 1999 season, Ship Island supported a colony of 558 pairs of COTE, however during 2000 no terns nested on the island. Unfortunately this season did not prove to be much better for the terns. In early May, the Refuge observed extensive evidence of a raccoon on the island, but it appeared the animal left the island prior to the terns arrival. Several hundred terns returned to Ship Island by late May, and we documented 267 COTE nests during the GOMSWG census. We also observed several dead adult birds and approximately 75 predated eggs. Unfortunately about one week later the island crews observed mink tracks on the beach and nearly complete colony abandonment. We had numerous traps set across the island from early May until late July, but were not able to trap any predators. Although a small portion of the colony remained at Ship Island throughout the summer, only four tern chicks fledged. The Refuge anticipates a proactive trapping effort to be initiated on Ship and Trumpet Islands prior to the 2002 tern-nesting season.

*The Mid Coast Area - John Drury, Box 102 Vinalhaven, ME 04863;
Jbdlam@foxislands.net, 207-863-4962*

Tern work is supported by a grant from the Maine department of Inland Fisheries and Wildlife.

The Cow Pens; east of Isle au Haut.

Eastern Cow Pen

*June 7 - 90+ adult common terns, all the birds did not flush, 2
Roseate loafing on the shore.*

*June 18 - @180 adult Common tern. 2 observers, we found: 14 nests with one egg,
50 nests with 2 eggs, 20 nests with 3 eggs and one nest with 4 eggs.*

Total: 85 Common Tern nests There were 46 in '00

July 21 - @ 250 adult Common terns, 23 fledgling seen from ashore on a rock NE of the colony. There was good productivity here this year. Apparently some of the birds that failed elsewhere (the western cow pen?) Have taken up roosting here, the flock has swelled well beyond what I would expect from a colony with @85 nests. The extent and success of late nesting is unknown.

Western Cow Pen,

June 7 - at least 20 adult Common Terns in the nest area at the southern end of the island.

June 18 - @100 adult Common Terns present. Two observers found; 13 nests with 1 egg, 50 nests with 2 eggs, and 25 nests with 3 eggs.

Total: 88 Common Tern nests. There were none in '00

July 21 - Abandoned eggs, a few very small chicks, and very small dead chicks, 1 fledgling seen. One dead eaten adult seen and one dead eaten fledgling seen as well as a dead petrel. There was a dead adult black back in the colony that had its bill snarled shut by fishing line, this bird may have terrorized the terns before dying, though I would think that it would have smashed some of the abandoned tern eggs. The abandoned uneaten eggs and the dead petrel suggest an Owl, or perhaps a Merlin. Interesting that the colony on the eastern Cow Pen @ 120 Meters away at high water was prosperous, apparently unaffected by the disturbance that caused the failure on the western.

Three Bush;

June 7 - 145 Common Terns attending the island.

June 18 - 250-300 Common Terns; Two observers, we found: 24 nests with 1 egg, 74 nests with 2 eggs, 37 nests with 3 eggs, and 1 nest with 4 eggs.

Total: 136 common tern nests. There were 153 in '00

July 2 - @300 adult terns around the island, we saw only @6 fledglings, and found only one large chick in the veg. We saw many nests with eggs; many used nests with no sign of chicks dead or alive. Mysterious; why so many adults persist in attending a colony that achieved so little? We did see a black-back fiercely attacked by the terns, though there were no gull nests on three bush, Saddleback is only @1/2 mile away and a Gull nesting there might have learned to harvest tern chicks on three bush.

Wooden Ball Island:

June 14 - **2 Arctic tern nests found**, 1 with 2 eggs, 1 with one egg.

There were 2 nests found in '00

July 17 - Terns were seen over the nesting area.

Little Green.

June 16 - @ 200 adult terns all but 12 along the eastern beach. 8 adult terns west of the landing. Two observers, we found; 3 nests with 2 eggs, and one nest with one egg. @ 40 Adult terns 2/3ds common, at the N end of the eastern beach. In the rocks Just north of the beach we found 2 Arctic tern nests with 2 eggs. At the Northern end of the beach we found, 1 nest with one egg, 12 nests with 2 eggs, and one nest with three eggs. Middle of the beach we found 5 nests with two eggs. Southern end of the beach @150 adult terns @2/3ds common. We found 17 nests with one egg, 83 nests with 2 eggs, 21 nests with 3 eggs.

Total: 145 nests. (@95 common @50 Arctic, based on visual estimate of the ratio of adults). @2/3 Common. There were 60 in '00

July 18 - 60 adults roosting on the eastern beach two fledglings seen. There was good cover and there were fish coming in. A few adults apparently still incubating, there has apparently been good success here thus far this year. No terns seen west of the landing.

Metinic Island; Southern end, four observers

June 16 - Southern tip east side, 12-15 arctic tern We found: 7 nests with 2 eggs, and 2 nests with 3 eggs. There was a tern egg seen in a gull nest. Total, 9 nests Southern tip, west side, 5 adult we found: 2 nests with 1 egg and 3 nests with 2 eggs, Total, 5 nests; @150 meters up the western shore, we found one nest with 2 eggs and one nest with 3 eggs a common tern. Total 2 nests; Another 50 meters up the western shore we found 2 nests with one egg, and 2 nests with two eggs. Total 4 nests; On the beach SW of the houses we found 3 nests with 2 eggs. Total 3 nests

Total: 23 tern nests, mostly arctic at least one common tern nest.

There were 48 tern nests found in '00.

July 18 - 12 adult, seen from the boat, still attending nesting area on the east side of the southern tip, and 20 more roosting on the intertidal zone below the nest area. Their presence suggests some success.

Hog Island, Metinic.

June 16 - 25 adult arctic terns on the western shore. 4 observers, 17 nests with 2 eggs, 2 nests with three eggs. Total 19 Arctic tern nests; East side of Hog island, one nest with one egg.

Total: 20 Arctic tern nests. There were 37 nests found in '00

July 18 - 20 adults attending the nest area, 12 more on the shore near the colony including two one year old birds, a search in the nest area we found, 2 large chicks, we saw one fledgling and no sign of late nesting.

Little Two Bush

Brian Benedict reported one pair of Common Terns during nest count. The lone pair that had nested here for years was absent last year.

July 18 - At least 20 adult Common terns attending, 12 over the old nesting area and the rest loafing on the intertidal zone nearby. Extent and success of the late nesting effort is unknown.

Dry Money Ledge

June 18 - @130 adult Common Tern. We found: 9 nests with 1 egg, 36 nests with 2 eggs, 29 nests with 3 eggs, and 2 nests with 4 eggs. 2 eggs dumped, the small patch beach pea was saturated with nests. As at the eastern cow pen there is a high ratio of adults to nests.

Total: 76 common tern nests. There had been 72 nests in '00.

July 21 - @200 adults attending the colony, apparently the successful colony attracted birds that had failed elsewhere. 12 fledglings seen from the dory rowing around the island. The colony here has had some success.

Islands with no terns

Harbor island Knob (SE of Swan's Island), *Gooseberry* (south of burnt coat harbor).
Halibut Rocks, *Little Spoon*, *Great Spoon*, *John's island*, *Mason Ledge*, *Brimstone* (burnt coat harbor), *Saddleback* (Jericho bay), *Southern Popplestone Ledge*, *Green Ledge* (Fog Island), *Southern Mark*, *Large Green*, *Brimstone*, *Otter*, *Carvers*, *Roberts*, *Lanes Nubble*, *Dead man's ledge*, *Little Hurricane*, *White Islands*, *Tobacco Juice*,
No terns seen in the Basin (Vinalhaven), *Dogfish Knob*, *Sugarloafs*, *Goose rock Knob*, *Shore bird ledge* (seal bay Vinalhaven), *Smith island*, *Duck Islands*, *Green ledge* (east side VH), *Green ledge mouth of Carvers harbor*.

Great Cormorants:

Count date June 7.

Island	# nests 2001	# nests 2000
Little Spoon SE	32	22
Little Spoon NW	21	19
Great Spoon	28	34
Brimstone	20	14
Southern Mark	5	1
Green Ledge	34	23
Little Roberts	13	10
Seal Island ¹	18	12
Totals	171	136

¹ Andre Breton counted from shore

This year was the first significant gain since '92, and followed 8 years of slow but steady decline.

Great Cormorant Productivity:

Green Ledge - July 21, 65 GC chicks counted at @22 sites where there had been 34 nests.

Seal Island - 51 chicks counted mid July from 18 nests. (Andre Breton)

Little Spoon NW - 39 Chicks July 21 from 17 sites where 21 nests were counted.

Great Spoon; 29 chicks July 21 from 28 nests.

Total: @1.8 chicks per nest.

The theory that the Eagles have been part of the cause of the decline in the number of Great cormorant nests was not supported by the fact that the colony at Green Ledge grew and did well despite being within sight of an eagle nest on Fog Island.

Guillemots on the Islands SE of Vinalhaven

Mink had been trapped off these islands during the late 90's and occupation and success of nesting Guillemots had improved until '00 when at least one Mink returned causing a decrease in the number of nesting sites that produced chicks from @128 in '99 to 58 in '00. No Trapping effort was made in '01 despite that Mink were absent from the islands and Guillemot success increased again 94 sites with chick guano were found on the four islands. Roberts had 19, Carvers had 22, Lanes Nubble had 10 and the southern end of Otter had 43.

*Seal Island National Wildlife Refuge - André Breton, Supervisor
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Tern Management

1. Tern Census Results and Species Ratio

Census Dates: 6/15/01
 Census Hours: 3 hours 25 minutes

Summary of Census Results:

Year	Unadjusted Total	Adjusted Total	Correction Factor
2001	1933	2058	1.027
2000	1963	2095	1.067
1999*	1913	1951	1.02
1998	1848	1973	1.068

*Originally reported incorrectly as 1993 (unadjusted) and 2037 (adjusted).

Species Ratio

Year	% COTE	Number Pairs	% ARTE	Number Pairs	Nests Identified to Species
2001	58%	1197	42%	860	452
2000	57.5	1205	42.5	890	683
1999	47	936	53	1060	546
1998	47	972	53	1045	353

2. Summary of individual bands read by species (details are available)

ARTE: 110
 COTE: 6
 ROST: 3
 BLTE: 1
 ATPU: 235

3. Productivity of ARTE and COTE

Species	# Nests	# Eggs	Mean Clutch	SD Clutch	# Hatched	Mean Hatch	# Fledged	Mean Fledge	SD Fledge
ARTE	59	110	1.86	0.35	97	1.64	56	0.95	0.22
COTE	33	68	2.06	0.35	64	1.94	33	1.00	0.50

4. ARTE Feeding Study

Summary of Effort and Feeding Rate:

Year	Observation Hours	Total Feedings	Feeding Rate
2001	891	2094	2.35
2000	896.35	1643	1.83
1999	878.0	2277	2.59
1998	902.75	2089	2.31

Summary of Major Prey Items (sample includes all nests in Feeding Study):

Prey Item Description	Total Feedings	Percent of Diet
Hake	735	34.67
Euphausid	400	18.87
Amphipod	392	18.49
Herring	148	6.98

* Euphausid made up .03% of the diet in 2000.

Gull Census

Census Dates: 5/21/01-5/22/01 Census Hours: 10

Summary of Nests Encountered by Species during the Gull Census:

Species	2001	2000	1999
<i>HERG</i>	105	127	130
<i>GBBG</i>	145	149	162

ARTE Metapopulation Study

Chicks Banded: 253

Adults Banded: 100

Individuals Resighted: 110

Atlantic Puffin Management

- First Observed Feeding: 06/25/01(2000 June 19th, 1999 June 19th)
- Breeding Pairs: Currently at 146 pairs (126 pairs in 2000).
(Late season team will be continuing observation to determine pairs of Puffins nesting on the island until August 15th)
- New Burrows in 2001: 33 including banded breeders from all five puffin colonies in the western Gulf of Maine (details available)

Matinicus Rock - Christina J. Maranto, Island Supervisor

Census

We conducted the GOMSWG nest count on 18 June 2001. The Arctic Tern Nest Count was 900 with a Lincoln Index of 1.13 yielding an adjusted total of 1014 Arctic Tern nests (1030 adjusted in 2000). This year we did a direct count of Common Terns in the main Common Tern nesting area yielding 147 nests (compared to 176 in 2000). The combined nest count for Arctic and Common Terns is 1161 nests (compared to 1206 in 2000). We also counted Laughing Gulls, which totaled 417 nests. The Laughing Gulls have increased by 62 nests over 2000's value (355 in 2000).

Table 1. GOMSWG Census numbers, 1990-2001

Year	ARTE	COTE	Total Terns	LAGU
2001	1014	147	1161	417
2000	1030	176	1206	355
1999	968	102	1070	367
1998	791	97	888	343
1997	934	90	1024	322
1996	865	148	1013	358
1995	990	247	1237	285
1994	1049	218	1267	290
1993	1000	95	1095	271
1992	991	146	1137	231
1991	1161	200	1361	181
1990	1252	25	1277	203

Tern Productivity

When we arrived on the island on June 5th we discovered that tern #'s were low. After walking the island we saw evidence of predation. We noticed many eggs split in half, wet and dried yolk on many nests, and eggshell fragments. The predator destroyed all of the nests in the Common Tern nesting area (approximately 150 nests), half of the nests in the tern feeding study plots, and one complete productivity plot. As a result of the predation many terns nested late this year. Most eggs were relayed by June 18th. In total, we monitored 75 Arctic Tern nests from laying to fledging for our productivity figure in 2001.

Table 2 . Hatching Success, Fledging Success, and Productivity, 1996-2000.

	1996	1997	1998	1999	2000	2001
Hatching Success	0.73	0.88	0.64	0.82	0.88	0.83
Fledging Success	0.44	0.67	0.38	0.56	0.53	0.55
Productivity	0.59	1.06	0.43	0.87	0.90	0.80

Tern Feeding Study

During the 2001 field season, we observed forty Arctic Tern nests to identify prey items provisioned to chicks. Eighty percent of the chick diet consisted of fish. Twenty percent of the chick diet consisted of invertebrates. The use of invertebrates in the chick diet decreased 15.1% from last year's value of 34.2%. At the population and individual level, the Arctic Terns on Matinicus Rock had a much less varied diet this year feeding primarily fish and much fewer invertebrates than seen in previous years.

Prey Species	# Prey Deliveries in 2001	% of Chick Diet in 2001
Hake	1341	52.2
Herring	312	12.1

Butterfish	126	4.9
Other Fish (< 5% in diet)	85	3.3
Unknown Fish	193	7.5
Total Fish	2057	80.1
Amphipod (<i>Gammarus sp.</i>)	472	18.4
Other Invertebrates	39	1.5
Total Invertebrates	511	19.9
Unknown Prey Items	68	
Observation Hours	1458	
Population Feeding Rate	1.81 Prey Items/hr	

Laughing Gulls

This year Petit Manan Wildlife Refuge and Eastern Egg Rock color marked Laughing Gulls to determine the most effective time for breaking up nests. From all the sightings combined we determined that we had 4 different color marked Laughing Gulls on the island. Of the four color marked birds, three were pink on the breast and one was green.

Atlantic Puffins

Banded puffin chicks are resighted during each field season in order to estimate juvenile survival rates for cohorts. The survival rate for juveniles is strikingly high in some years. Survival rates for cohorts have been over 70% since 1991.

Table 3. # Banded Chicks, #Resighted Chicks by 2001, and % Recovery for 1988-2000.

Year	# Banded Chicks	# Resighted by 2000	% Recovery
1988	16	10	62%
1989	10	2	20%
1990	35	19	54%
1991	24	19	79%
1992	28	22	78%
1993	37	35	94%
1994	50	42	84%
1995	52	45	86%
1996	35	31	88%
1997	49	36	73%
1998	77	57	74%
1999	69	50	72%
2000	69	3	4%

Razorbills

This year we visited the Razorbill nesting area at the end of May to ascertain the number of breeding pairs on Matinicus Rock. To minimize disturbance we made two nest sweeps in the main Razorbill nesting area. In early May we found 159 active Razorbill nests by the presence of an egg or chick. Active Razorbill burrows increased by 23 nests over last year's 136 active

nests. We also determined hatching success for Razorbills during 2001. We monitored 25 nests from laying to hatching which yielded a hatching success figure of 0.84 chicks hatched/eggs laid.

Common Murre

This is the tenth season of the Common Murre attraction program on Matinicus Rock. This year resembled 2000 in that we recorded high numbers of Common Murres on the island; however, the high numbers were not as consistent as they were during 2000. On June 10th and 11th we saw 18 and 36 Common Murres on Murre Ledge.

Manx Shearwater

In late May there were 4-5 Manx shearwaters present around the island on several days. We briefly inspected the Manx burrow in May and found fresh signs of digging at the entrance. We also checked the Manx burrow twice throughout the season (during daylight hours) and found an adult Manx in the burrow during both checks.

Metinic Island, North End—Rachel Page and David Bethel, Petit Manan NWR, USFWS

This was the most successful tern-breeding season that Metinic Island has seen in several years. Numbers have increased from 0 nests in 1998 to 3 nests in 1999, 74 nests in 2000, and 111 nests in 2001. As in past years, an attraction area on the NE point of the island was enclosed in an electric fence to exclude sheep. ARTE and COTE decoys were placed within the area, and a recording of an active ARTE colony was played continuously throughout the season.

Tern Nesting and Species Ratio

We found a total of 132 total tern nests on Metinic this season. The 111 nests laid during the GOMSWG census window were predominantly ARTE (71.2% ARTE and 28.8% COTE). The 21 nests laid after were 42.1% ARTE and 57.9% COTE. The overall species ratio for the season was 66.7% ARTE and 33.3% COTE.

Tern Productivity

Last year (2000), both hatching and fledging success rates were low due to high rates of egg and chick predation (61% of nests were depredated). This year (2001), the terns had much higher success rates. ARTE had a mean fledge rate of 1.53 chicks/nest and reproductive success (total chicks fledged/total number of eggs laid) of 81%. COTE had a mean fledge rate of 1.18 chicks/nest and reproductive success of 50%.

	ARTE (n=19)	COTE (n=11)
Mean clutch size	1.89 ± 0.32	2.36 ± 0.50
Mean hatch/nest	1.68 ± 0.67	2.18 ± 0.60
Mean fledged/nest	1.53 ± 0.70	1.18 ± 0.87
Reproductive success	81%	50%

Provisioning Study

We observed 438 feedings at 11 ARTE nests. 99% of prey was delivered to chicks and 1% to mates. Hake and herring were the predominant prey items.

prey item	% of total	mean length
hake	50.9	0.92 ± 0.34
herring	37.2	0.92 ± 0.29
amphipod	3.4	0.25 ± 0.00
pollock	1.4	1.17 ± 0.34
butterfish	0.9	1.19 ± 0.43
stickleback	0.2	1.25 ± 0.00
unknown	5.9	0.82 ± 0.41

Gulls

This was the fifth season of active gull control on Metinic. We found and punctured the eggs of 220 HERG and 59 GBBG nests on the northern half of the island. We also destroyed three HERG nests located in the designated “gull-free zone” near the tern attraction area. We killed three HERG; two because they were injured and one because we suspected it of depredate tern chicks.

Predation

There were numerous predation attempts in the tern colony this season, but for the most part the terns were effective at deterring predators. We observed five successful predations of young tern chicks by HERG and GBBG, and many unsuccessful attempts. Later in the season, a Merlin visited the colony frequently. We observed two successful Merlin predations of tern fledglings, and several unsuccessful attempts. We also saw a Merlin take a starling and a savannah sparrow.

Common Eiders (COEI)

On May 31 and June 1, the refuge staff conducted a COEI census on the north end of Metinic, including the north half of the forest in the center of the island. We found a total of 246 COEI nests: 194 in the forest and 52 in non-forested areas.

Black Guillemots (BLGU)

We found a total of 31 BLGU burrows this season, on par with the 32 burrows found in 2000 and the 34 burrows found in 1999.

Muscle Ridge Islands – Brian Benedict, Petit Manan NWR

On 18 June, no terns were found on the following islands: *Cutter’s Nubble, Fisherman’s Island, Marblehead* (2 pair Snowy Egrets), *Crescent Is., Oak Is., Birch Is., Dix Is., Nettle Is., Two Bush Is.*; on *Little Two Bush* there was **1 pair COTE**.

Sheepscot Bay, Boothbay - Brian Benedict, Petit Manan NWR

On 19 June the following islands had no terns: *Damariscove, Pumpkin, Outer White, Thrumcap, Rain, The Cuckolds, Nick Ledge, Middle Mark, Powderhorn, Outer Head, Heron, Sequin, Sugarloaves.*

Muscongus Bay - Brian Benedict, Petit Manan NWR

On 20 June the following islands had no terns nesting: *The Brothers, Gunning Rocks, Hart, Bar, Two Bush, Shag Ledges, Little Burnt, Old Woman Ledge, Little Egg Rock, Shark, Port Clyde Brothers* (driven out of bay by thunderstorms – returned 3 July, no terns).

Eastern Egg Rock - Julie M. Kleinhans, Island Supervisor

Census

The GOMSWG census was conducted from June 17th to June 19th. The Common tern nest count was 1335. A Lincoln Index of 1.105 yielded an adjusted total of 1514. LAGU nest count was 1252, up 30% from 2000. ARTE and ROST nests were counted by direct observation of adults on June 15th and 16th. ARTE nests numbered 92, the highest number since 1997. ROST numbers decreased for the first time, down 20 nests from last year.

Table 1: Census Numbers, Nesting Pairs 1995 - 2001

Year	COTE	ARTE	ROST	LAGU
2001	1514	92	145	1252
2000	1443	85	165	966
1999	1110	91	149	660
1998	1293	81	144	575
1997	1389	94	138	555
1996	1261	79	126	460
1995	1159	45	86	234

Tern Productivity

Common, Arctic and Roseate terns were all monitored for productivity. Fifty-two COTE, 25 ARTE and 37 ROST nests were followed. Results were much lower than in previous years; predation pressure from the significant laughing gull population increase was most certainly a major factor. COTE and ARTE productivity was less than half of last year’s results, and ROST productivity was less than one third of last year.

Table 2: Tern Productivity, #Fledglings/Nest, 1996 – 2001

Year	COTE	ARTE	ROST
2001	0.4	0.3	0.4
2000	1.08	0.76	1.28
1999	1.07	0.2	1.24

1998	1.17	NA	0.84
1997	1.66	NA	1.47
1996	0.51	NA	0.82

Tern Feeding Study

Twelve COTE and 12 ROST nests were singled out for a tern chick provisioning study. Both COTE plots had complete mortality; no chicks fledged. The ROST feeding study plots each had five successful nests. Percentages of prey items brought to feeding study nests are summarized in Table 3. Feeding rates were down significantly in 2001. COTE nests received 0.65 feedings/hour, compared with 1.6 in 2000. ROST feeding rate was 0.89, down from 1.05

Table 3: Summary of Prey Items Identified in Tern Feeding Study (Percentages):

Species	Hake	Herring	Sand Launce	Unknown	Other
COTE	29	48	3	19	1
ROST	34	26	7	33	0

Laughing Gulls

A pilot study was conducted on Laughing gulls in 2001 to determine the effectiveness of early versus late nest destruction on adult re-nesting and dispersal. Two study groups of nesting pairs were color marked while incubating, and the nests subsequently destroyed: one group early in the nesting season, and the other group just prior to hatching). The study areas were checked periodically for new nests, and observation stints were conducted to resight color marked birds. Results showed late nest destruction to be more effective in initiating site abandonment by adults. There was no re-nesting by late treatment pairs, and no late color-marked birds were seen on island later than 12 days after nest destruction. In contrast, two weeks after the early treatment nests were destroyed, 30% had re-nested. Early color-marked gulls were observed as late as 6 weeks after nest destruction, and had the dye not faded would most likely have been observed until the end of the season.

2001 marked the first year that LAGU nests were fenced in and monitored for productivity. Eight nests were enclosed. Of those eight, four were abandoned, probably due to close proximity to the fence. Chicks were first banded with temporary plastic coils. After 8 days those coils were replaced with permanent BBL bands. Mean clutch size was 2.1. Mean hatch was 0.9, and 0.6 chicks/nest were fledged. Discounting the abandoned nests, productivity was as follows: mean clutch – 2, mean hatch – 1.75, and 1.25 chicks were fledged per nest.

Atlantic Puffins

The number of active puffin burrows has been increasing on Eastern Egg Rock since 1994. This year 37 burrows were observed. When the island was closed for the season, 28 of those burrows had fledged and 7 were still actively feeding. Five new sites were occupied this year by new breeders and unbanded birds.

One hundred and three banded puffins were resighted in 2001. Eight unbanded adults were trapped and banded. Three local chicks were grubbed and banded, a new record for EER.

Manx Shearwater

A Manx Shearwater was observed almost daily throughout the 2001 season. It was regularly seen circling the north end of the island and heard vocalizing nightly.

Pond Island - Heather and Jaap Eijzenga

Introduction

May 9th through August 4th marked the best, but also the worst year in the history of the project's efforts to restore common terns to Pond Island National Wildlife Refuge. The number of terns on the island has been growing significantly in the past few years after management actions were initiated in 1995. Pond Island has huge potential as a seabird island thanks to its abundant nesting habitat and location in the mouth of the Kennebec River, which provides an excellent fishery. However, its location near the forested mainland increases the danger of predation, which has been proven this year, making it the worst predation year in the history of the Pond Island project.

COTE Time Table

May 24 th :	First five one-egg nests found.
May 31 st :	COTE high count: 375, also record number of ROST: 49
June 22 nd :	First COTE chick hatched
July 18 th :	First flying COTE fledgling observed.

Census

On June 18th the annual GOMSWG census was conducted by Heather Eijzenga, Jaap Eijzenga, Scott Hall, Jason Yakich, and Bill Mauck. During the census a total of 135 active nests were counted: 7 one-egg, 42 two-egg, 81 three-egg, 4 four-egg, and 1 five-egg nests. The distribution of the nests was as follows: 8 on the spine, 6 in the gorge, 101 on the ridge and 21 in the sand dunes on the west side of the island. Nesting in the dunes has not previously been recorded. The census results indicated a significant growth of the colony compared to last year when only 33 nests were counted. After the designated census date, an estimated 25 late nests were laid.

COTE Productivity

Due to the high number of nests this year a productivity plot was established on the ridge. Also, a group of 4 nests in the dunes were monitored to estimate success there. The enclosed 17 nests in the plot, 4 in the dunes, and an additional 22 feeding study nests on the ridge produced a total of 121 eggs giving an average clutch size of 2.81. Of those eggs, 75 hatched for a rate of 1.74 (standard deviation 1.24) and 19 of those chicks fledged resulting in a productivity of 0.44 (standard deviation 0.91). The low productivity can be attributed to predation by both Great Horned Owls and one raccoon. Chicks were killed directly by the owls, but were affected to a greater extent by nocturnal abandonment of the parent birds, as a result of owl presence. As a final blow, a raccoon washed ashore late in the season and destroyed approximately 50 nests before being dispatched.

Diet Studies

Chick Provisioning studies were carried out in 3 locations and included a total of 43 nests. The study sites were limited to the ridge as there was virtually no success elsewhere. Each of the chicks was followed until it died or disappeared. A combination of high chick mortality and a tendency for chicks to wander made feeding studies difficult to perform. Because of this, 3 additional nests from a fourth location on the ridge were added to the provisioning study. An overall 95.25 hours was spent and 437 items were observed being fed. At 247 items, Sand Lance predominated, followed by Hake with 124 feedings and then Herring with 46. A single sand shrimp and amphipod were observed and an additional 17 were unable to be determined. The feeding rate was determined to be 2.85 items/nest/hr and 1.33 items/chick/hr.

Predator Control

Predator control was the predominate focus of this season. It was initiated by enforcing the no gull policy on the island through means of nest destruction and discouragement. A total of 14 Great Black Backed Gull nests with 25 eggs, 1 Herring Gull nest with 1 egg, and an additional 11 empty nests of unknown gull species were destroyed. These actions were not enough as 4 pairs of Great Black Backed Gulls persisted in loafing and reneating. In effect, it was necessary to shoot 3 of them after which the remaining gulls left the island.

Great Horned Owls have been a historic problem on Pond Island. This year preparations were made by constructing two new Bal-chatri traps and by acquiring 6 new leghold traps. These combined with 2 Swedish Goshawk traps and 5 padded leg-hold traps from the previous season totaled an impressive 15 traps on the 10-acre island. They were operated nightly for a total trapping effort (night hours operated x number of traps) of 1140 hours for the Goshawk traps, 5090 hours for the leg-holds and 200 hours for the Bal-chatri. Night vision binoculars were another important addition in removing the owl. They greatly assisted in the 000 hours of night observation. Owl activity was recorded by direct observation and by finding kills starting at the beginning of the summer and persisting throughout. On June 20th a banded owl was discovered in a trap located on the rocks of the western side of the island. This particular owl had been trapped and subsequently relocated in 1996 and again in 1998. Because it has specialized in eating terns and consistently returns to Pond Island, it was euthanized. A second owl appeared less than a week later and it is suspected they are a pair that has been sharing the island. Every attempt was made to dispatch the second owl to no avail.

In an unfortunate turn of events, a raccoon appeared on the island. It was discovered walking on the beach during a night stint on July 6th and was dispatched 2 days later. The destruction was great in that short period of time as the raccoon methodically ate all eggs and decapitated all chicks in a path from the beach to the top of the ridge. Because this is the first time a raccoon has appeared on a Project Puffin island and because raccoons are poor swimmers, it is believed that this was an incidental occurrence. In the final days of the season, a mink was discovered on Pond. No signs after the initial sighting were recorded and it is assumed the mink left immediately after its arrival

Eider Census

On May 29th 40 Common Eider nests were censused and marked. In mid-June they were rechecked to determine hatching success. The marked nests showed an average hatching success of 79.0% (standard deviation 0.247), as determined by eggshells remaining in the nests. After hatching, the high count of ducklings on the island was 33, but this is a very conservative estimate of the number present. The highest count of adult Eiders was 182 on May 26th.

JENNY ISLAND

This season marked two consecutive years of Common Tern colony reduction due to predation, in this case by at least three mink. Tern numbers reached their lowest level since human occupation and management of Jenny Island began over a decade ago. Despite mink control successes that allowed for a period of relative colony re-building, productivity was negligible due to intense mink predation late in the season. Both chick growth measurements and feeding observations indicated that in the absence of predation Jenny would have remained a site of high tern productivity.

The census was conducted on June 19th. 59 active nests were counted, with no Lincoln Index adjustment due to confidence in the actual count. This is a substantial decrease from the 2000 count of 1050 nests. All active nests were clustered around Jenny's north end. 52 additional nests were reckoned as abandoned, many along the eastern and southern portions of the island. The average clutch size of active nests was 2.47 ± 0.59 . Terns were observed in the hundreds during the set-up of the island in late May but by the beginning of the field season in early June numbers had decreased dramatically and continued to do so throughout most of that month. Tern numbers increased noticeably in July after two mink were removed from the island, and several new nests appeared along the north end and the eastern portion of the island.

No Roseate Terns nested on Jenny in 2001 for the second straight year and very few were seen even loafing on the island. Roseate sightings became more frequent after two mink were removed; a pair was observed courting and copulating in July during the period of no mink presence.

Common Tern productivity was extremely low in 2001. Many study nests were abandoned entirely and hatched no eggs. However, chicks in non-abandoned study nests showed strong growth rates and an overall propensity for survival. Unfortunately, the renewal of mink predation for a brief period in late July when the bulk of study chicks were close to actual fledging resulted in the death of nearly all of these birds. Only two chicks are known to have fledged from Jenny in 2001 and both were banded study chicks.

Feeding observations were conducted from three blinds from June 29 to July 21. 81.0 hours were spent observing 16 nests. A total of 797 feedings were recorded, the prey species being identified in 83.6% of them. Among known-prey feedings, Atlantic Herring and Hake-complex were the most common prey items at 58.3 and 30.6% respectively. Less common but relatively important items were Pollock and Alewife.

Mink control was a significant activity on Jenny in 2001. A mink was present in late May and possibly early June as evidenced by scat and tern nest abandonment. The island was searched for caches of dead terns on several occasions with no success. It appears likely that the mink left the island for 2-3 weeks and returned in mid-June, being sighted on three occasions at that time. Efforts had been made to trap the animal prior, including the setting of four framed conibear traps baited with muskrat by Phil Bozenhard on June 6th. Increased zeal coupled with consultation regarding more efficient means of trapping resulted in the removal of a mink from Jenny on June 26th via a modified conibear trap. A second mink was detected the evening of June 30th and shot with a .22 rifle the following morning; no evidence of predation by the second mink was detected. A third mink arrived on July 20th and nearly all study chicks present at that time were killed or missing by the morning of the 22nd. Efforts were made to trap the third mink but were unsuccessful, likely because it decimated its food source in a very brief period.

The potential for Jenny Island to host a large and productive Common Tern colony as in previous years remains. However, the close proximity of the island to the mainland and thus highly destructive predators cannot be ignored. It is suggested that the project evaluate its long-term goals in managing a tern-breeding site in Casco Bay and determine if and how management of Jenny can achieve these goals.

STRATTON ISLAND- Hilary Cerny

The Stratton Island field season opened on May 16th and will be closed on August 11th, 2000. The overall season was a success, with almost all birds nesting on the island increasing in numbers.

Censuses

The annual heron census was conducted on May 22nd and 24th. The number of Glossy Ibis nests grew by 73 nests. The Snowy Egret/ Little Blue and Black-crowned Night Heron remained similar to last year. Immature and adult Tri-colored Herons were seen at the end of the season suggesting that one pair may have nested.

Heron Species	# of Nests
Glossy Ibis	159
Snowy Egret/ Little Blue	129
Black-crowned Night Heron	24
Great Egret	2

The Double-crested Cormorant census took place on July 8th. Stratton and Bluff Island’s colony increased by 91 nests, to 259 nests.

The tern census was conducted on June 13th and 14th. The census found 1,801 nests, which was adjusted to 1,881 COTE nests using the Lincoln index. This is an increase of 772 nests from

2000. The Roseate Tern numbers also increased by 23 nests from last year. Finally, 10 Arctic Tern nests were found during the census period.

Productivity

Species	Mean Clutch Size	# Fledge/nest
Common Terns	2.5	1.2
Roseate Terns	1.8	1.4
Arctic Terns	2.0	0.3

Provisioning Study

Feeding studies were conducted at 17 Common Tern nests and 15 Roseate Tern nests. The average feeding rate for Common Terns was 1.7 feedings per hour, and the feeding rate for Roseate Terns was 2.4 feedings/hour. Herring was by far the dominant prey for Common Terns diet and Sand Lance dominated the Roseate Tern diet.

Miscellaneous

American Oystercatchers fledged two chicks. The Black Guillemots also produced two young for the third consecutive year. This season 378 people visited Stratton Island, 110 of those came on organized Maine or Prout’s Neck Audubon trips.

WHITE AND SEAVEY ISLANDS, ISLES OF SHOALS, NEW HAMPSHIRE

Diane De Luca, Dan Hayward, Andrew LeFrancois

Background

In 1997, the Audubon Society of New Hampshire (ASNH), the New Hampshire Fish and Game Department Nongame Program (NHF&G), the Office of State Planning Coastal Program (NHCP), the Department of Resources and Economic Development - Parks Division, USDA - Animal Damage Control, Shoals Marine Laboratory, Isles of Shoals Steamship Company, Gulf of Maine Seabird Working Group and the US Fish and Wildlife Service worked cooperatively to successfully complete the first year of this project by using nonlethal means of gull control along with decoys and tern colony sounds to attract breeding terns back to the Isles of Shoals. A small colony of six pairs of common terns raised and fledged six young at this site. This was the first documented breeding by terns at the Isles of Shoals since the early 1950's. The 1998, 1999 and 2000 field seasons saw significant growth as the number of breeding common terns climbed to 45, 141 and 446 pairs, respectively.

2001 Overview

Gull Control

Discouraging gulls was done using the non-lethal techniques that established an atmosphere hostile to gull nesting. The following highlights the methods used:

- Arrival prior to gull nest initiation (April 23)
- Established continual human presence throughout gull and tern nesting

season. (April 23 through August 24)

- Prior to gull control, conducted nest census, marked and mapped all potential nests.
- Destroyed all active nests by disposing of eggs. A brick or rock was placed in the nest cup to discourage repeated use.
- During early stages of season all personnel wear bright orange vests while in the colony.
- Used pyrotechnics, “bangers” and “screamers”, to dissuade gulls from nesting and loafing.
- Walk the perimeter of the island ½ hour before sunrise and ½ hour after sunset each day to disrupt gull nesting and loafing.

Common Tern Productivity

Census Results- A Wave (June 14, 2001): **447 Pairs (Adjusted number 460)**

- B Wave (July 7, 2001): **349 Pairs**

End of year total: **809 Pairs**

Breeding chronology and productivity of common terns on Seavey Island, 1997 - 2001.

	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>
1 st tern arrives:	May 12	May 14	April 30	May 2	April 30
1 st Copulation:	June 15	May 2	May 11	May 22	May 19
1 st Incubation:	July 9	June 2	May 28	May 27	
1 st hatch:	August 2	June 27	June 19	June 16	June 19
1 st Fledging:	Sept 2	July 27	July 20	July 12	July 14
Total # pairs:	6	45	June 20: 80 July 15: 140	June 18: 318 July 25: 446	June 14: 460 July 7: 809
Total # hatched	7	91	~350	~968	~1003*
Total # fledged	6	~75	~300	~705	~773*
Productivity ¹	1.0	1.6	2.24	1.58	1.68*

¹ Productivity expressed as # chicks per nest

*estimated from productivity rate

Productivity: A Wave of 460 nests

Number of nests monitored: **73** (Feeding/productivity nests)
 Average Clutch Size: **2.44 eggs/nest** (SD = 0.69, N = 178 eggs, 73 nests)
 Hatching Success: **89.33%**
 Average Hatch: **2.18 eggs/nest** (SD = 0.81)
 Fledging Success: **77.36%**
Productivity: 1.68 fledglings/nest (SD = 0.62)

Productivity: B Wave of 349 nests (As of July 31, majority = 15 days by August 11)

Number of nests monitored: **51** (Feeding/productivity nests)
 Average Clutch Size: **1.96 eggs/nest** (SD = .63, N = 100 eggs, 51 nests)
 Hatching Success: **83%**
 Average Hatch: **1.63 eggs/nest** (SD = 0.85)

Roseate Tern Productivity

Breeding chronology and productivity of roseate terns on Seavey Island, 2001.

1st tern arrives: May 10
 1st Copulation: July 1
 1st Incubation: July 4
 1st hatch: July 28
 1st Fledging: August 2
 Total # pairs: 1
 Total # hatched: 1
 Total # chicks: 1
 Productivity: 1.0 chicks/nest

MAINLAND TERN COLONIES 2001

<u>Nest site</u>	<u>#of pairs</u>	<u>Productivity Estimates</u>
Hampton Saltmarsh	~25	undetermined
Backchannel Islands	0	
Hen Island	12	min. 8 chicks
Nanny Island	0	
Little Footman	0	

Feeding Study

Data as of Tuesday July 31, 2001

Total Number of Feedings: 847

Total Number of Blind Hours: 115

Total Nest Observation Hours: 603

Feeding Rate: 1.40 items/hour

Food Item

Relative Frequency (%)

Herring:	46.64
Hake:	22.08
Bluefish:	9.45
Sand Lance:	6.38
Unknown Fish:	4.60
Insect(unknown):	2.60
Amphipod:	2.13
Unknown Item:	2.01
Butterfish:	1.30
Lumpfish:	0.71
Ant:	0.59

Stickleback:	0.35
Pollack:	0.24
Butterfly:	0.12
Crustacean:	0.12
Cunner:	0.12
Grasshopper:	0.12
Moth:	0.12
Squid:	0.12
Whiting:	0.12
Mackerel:	0.12
<hr/>	
Total	100.00

Predation Events

<u>Date</u>	<u>Species</u>	<u>Taken</u>
5/14	Peregrine Falcon	1 Adult Common Tern
5/17	Peregrine Falcon	1 Adult Common Tern
6/3	Great Black-backed	2 Common Tern eggs
7/4	Great Black-backed	2 Common Tern chicks
7/24	Herring Gull	Predated Common Tern fledglings (6 feather piles)
7/30	Great Black-backed	1 Common Tern fledgling

Season Highlights

Tern Highlights

Arctic Tern- First seen- May 9
 Black Tern- Adult- July 7
 Least Tern- Adult-June 27

Rare Bird Sightings

King Eider- Adult male- April 26 and 30
 Immature male – May 15 and 16
 Female – May 15-21
 Atlantic Puffin- 2 Adults- July 31
 Razorbill- 2 Adults - July 8
 1 Adult – July 9
 Black Guillemot – One nest with chicks confirmed at Appledore
 American Oystercatcher- June 29
 White-eyed Vireo- May 1

South Coast Beaches (Least Terns)

Least Tern activity at Laudholm and Crescent Surf beaches - 2001

Kate O'Brien, Wildlife Biologist, Rachel Carson National Wildlife Refuge
Chrissy Bouscher, Plover and Tern Biological Technician, Rachel Carson NWR

Table 1. Least Tern Activity at Laudholm

Date	# of Adults	Nesting Activity				# of Chicks out of Nest	Total # of Nests	Total # of Eggs	Total # Chicks
		1e	2e	3e	1e 1c				
6/5	18	7	4	0	0	0	11	15	0
6/19	30	0	12	3	0	0	15	22	0
7/3	N/A	1	5	0	1	3	7	12	4
7/18	25-30	1	1	0	0	0	2	3	0

Table 2. Least Tern Activity at Crescent Surf

Date	# of Adults	Nesting Activity							# of Chicks out of Nest	# of Fledglings	Total # of Nests	Total # of Eggs	Total # of Chicks
		1e	2e	3e	1e 1c	1e 2c	1c	2c					
6/5	75-85	23	23	4	0	0	0	0	0	0	50	81	0
6/19	140	6	80	16	0	0	0	0	0	0	102	214	0
6/28											81		28
7/3	95	10	20	0	3	1	5	4	20	0	43	54	38
7/18	90	1	4	0	0	0	0	0	15	31	5	9	15

The first least terns were observed on Crescent Surf on May 18, and on Laudholm on May 22. Nesting for the least tern colony at Crescent Surf beach commenced on 5/29. The first chicks were observed on 6/28 and the first fledglings were observed on 7/10. Staff from Rachel Carson National Wildlife Refuge and Maine Audubon Society conducted several walk through nest counts to determine peak nesting and nesting chronology. Staff found these worked well for

counting numbers of nests but consistently underestimated chicks. Given the dynamic nature of the nesting habitat, determining nest fate was difficult. A large storm occurred on July 1st and parts of the beach eroded, wiping out several nests in narrower sections of beach. Some sign of predators was evident, especially later in the season.

Table 3. Least Tern Dusk Survey

Site	Date	High Tide	Time	Highest Count of Fledglings
Crescent Surf	7/25	4:03 PM	7:45-	50
Laudholm	7/25	4:03 PM	7:45-	7
Crescent Surf/Laudholm	8/2	11:24	7:30-	42
Webhannet Mouth	8/2	11:24	7:30-	3
Mousam River Mouth	8/2	11:24	7:30-	5
Upstream Little River	8/2	11:24	7:30-	2
Estimated total number of fledglings at colony on 7/25				57
Estimated total number of fledglings at colony on 8/2				47*

** this number does not count birds which left other areas at dusk and were most likely resighted on the last count at the main roost on Crescent Surf.*

To determine a minimum number of fledglings for the colony, we tried several methodologies. Some of the approaches we used were; conducting dusk surveys, conducting opportunistic walking surveys when the birds were loafing, and dividing up the areas into survey blocks that were surveyed simultaneously. All estimates were relatively close. Several walking counts conducted by one person were made at Crescent Surf during the course of the nesting season. These yielded estimates ranging from 7 fledglings on 7/10 to 21 fledglings on 7/19, to a high of 54 fledglings on 7/20. A ground survey dividing the spit into sampling blocks was conducted near high tide on the afternoon of 8/2. When we compared data we were surprised to find the total matched the fledgling count conducted on the same day at dusk (even with the majority of observers being different).

Estimates are likely undercounts as some fledglings were not observed and some of the older fledglings may have already left.

Two important factors have come through this exploratory effort: tide and timing of survey determines the ease of estimation. Counting the birds effectively is best when they are loafing or roosting. When birds are actively feeding, estimating the number of fledglings is almost impossible.

MONOMOY ISLANDS 2001 - Sharon Fish Marino

I. North Monomoy

Census and Productivity: 5 nesting COTE pairs were counted on 11 June down from 11 nests in 2000. The nesting area on North Monomoy is subject to flooding during high tides and strong westerly winds. Birds continued to lay eggs in this area (and be washed out) through July. No chicks were seen all season. Productivity was not quantitatively measured but is assumed to be zero.

II. South Monomoy

COTE:

Phenology

1st terns seen around the island - 30 April

1st eggs - 21 May

1st hatch - 16 June

Census:

A total of 7648 COTE nests were counted on South Monomoy Island on 16 and 18 June. The Lincoln-Index boosted the total to 7807 total nests, an increase from 6886 in 1999. No B-count was conducted, but an additional 105 nests (26% of the total 406 nests) were initiated in productivity enclosures after the census window, indicating an additional 2723 nest after 20 June.

Productivity:

Determined using 301 (A-count only) nests in 29 fenced productivity enclosures and 1 unfenced enclosure.

Average clutch size: 2.57 eggs/nest (SD = 0.582, N = 301 nests)	<i>2.57 in 2000</i>
Hatching success: 1.99 eggs/nest (SD = 1.007, N = 301 nests)	<i>2.27 in 2000</i>
Reproductive success: 1.2 chicks/nest (SD = 1.002, N=301 nests)	<i>1.85 in 2000</i>

Feeding stints were conducted differently in 2001. Stints lasted 1 hour and a study area was delineated and species, size and receiver were recorded for each prey brought in. In general, sand lance has been the most commonly delivered prey item followed by herring. In total, about 1000 COTE chicks were banded, and 38 banded adults were resighted (trapped or found dead).

LETE:

Phenology:

1st terns seen around the island - 12 May

1st eggs - 4 June

1st hatch - 13 July

Census:

LETE showed reproductive behavior on one area of South Monomoy Island in 2001. They nested on the northeast tip this year. In 2000 they nested on the south tip. On 19 June, 16 active nests were counted and on 18 July, 13 active nests were counted. A total of 6 chicks were found during the second census. Numbers decreased substantially this year as compared to 2000 when over 119 nests were counted on the south tip.

Productivity:

An attempt to monitor productivity was made by marking nests and monitoring nest contents weekly. It was difficult to determine the fate of many nests due to the time span between nest checks. However, productivity was probably low to none, based on the few chicks seen. Coyote tracks and gull tracks were seen frequently in the colony.

ROST:

Phenology:

1st terns seen around the island - 7 May

1st eggs- 11 June

1st hatch - 22 July

Census:

6 pairs of ROST (6 nests) nested during the A-count window. Observers began looking for ROST nests in early May, and searched most days in June and July, weather depending. In total, over 200 hours were spent looking for ROST nests.

Productivity:

ROST nests were checked nearly every day; chicks were weighed from day 0-3.

Average clutch size: 1.00 eggs/nest (N = 6 nests of known completed clutch)

Hatching success: .83 eggs/nest (N = 6 nests)

Reproductive success: .83 chicks/nest* (N = 6 nests)

**5 out of 6 nests hatched and 1 nest was depredated. 3 chicks were followed past day 5 and 2 chicks were followed only till day 4. A 7th ROST nest was found on 7 July abandoned and was a possible reneest from the depredated nest.*

BLSK:

Phenology:

1st seen around the island - 25 May

One pair was observed but did not nest. Pair was seen on 25 and 27 of May. A single bird was seen sporadically in June and Jul

LAGU:

Phenology:

1st seen around the island - 10 April

1st eggs - 24 May

1st hatch - 16 June

Census:

On 16 and 18 June, 805 active LAGU nests were counted, up from 376 in 2000.

Productivity:

Productivity information was not taken this year but was assumed to be fair. A number of laughing gull fledgers were observed at the end of the season.

PREDATORS

GBBG AND HERG: Gull harassment was conducted in area A twice a day in May, and about twice a week in June and July. A census was conducted on May 17; 145 nests were in Area B and 3 nests were in Area A (down from 258 and up from 0, respectively, in 2000). Most of the nests containing eggs belonged to GBBG. Eggs in Area B were punctured to suppress productivity. GBBG and HERG nesting in areas A and B were censused for a second time on 13 June. There were no gulls nesting in area A. In area B, 16 new GBBG nests and 48 new HERG nests were counted. All the eggs were punctured. In general, gulls were not present in the COTE colony often, and were only actually seen in the colony 25 times. Gull disturbance increased in the later part of the nesting season.

NORTHERN HARRIER: At least one pair of Northern Harrier nested on South Monomoy Island. A total of 3 newly hatched chicks were observed just south of the colony. NOHA were seen in the COTE colony 29 times on 23 different days from 9 May - 1 August. At least 11 adult terns found dead in the colony were likely killed by NOHA.

GREAT HORNED OWL: Great Horned Owl(s) were likely visiting the COTE colony in the beginning of the season. Common Terns were abandoning the nesting site early and did not stay all night until May 31. Owl disturbance did not occur again until 21 June. The owl was present in the colony for about one week and at this time the signs were taken down in the colony. Owl disturbance decreased after this time.

COYOTE: Thirteen coyotes (1 adult and 12 pups) were lethally removed from South Monomoy Island, and at least 2 additional coyotes were in the COTE colony during the first week of June, and during the last two weeks of July. However, there was little evidence of depredation. In addition, coyote tracks were seen on a regular basis in the intertidal zone and berm area surrounding the COTE colony.

BCNH: Black-crowned Night-heron were first seen/heard in the COTE colony 29 May. BCNH were seen and heard in the colony during June and July and were present most nights.

LAGU: Kleptoparasitism increased with the increase in the number of laughing gulls this season (from 376 pairs last year). Kleptoparasitism was recorded during 1 hour-long stints. Over 60 stints were conducted this season. Data is still being analyzed but LAGU were successful about 31% of the time, COTE were successful about 17% of the time, and about 50% of the time the victor was undetermined or there was no clear victor. Kleptoparasitism was consistent throughout the season and no apparent trends were observed.

PART 2 – RESEARCH REVIEW

ESTIMATING AGE-SPECIFIC SURVIVAL AND DISTRIBUTION OF EMIGRANTS BETWEEN COLONIES OF ATLANTIC PUFFIN (*Fratercula arctica*) IN THE GULF OF MAINE - *André R. Breton and Anthony Diamond at ACWERN University of New Brunswick P.O. Box 45111 Fredericton, New Brunswick, E3B6A1, Stephen Kress (skress@audubon.org), and Richard Elliot (richard.elliott@ec.gc.ca)*

The regional breeding population of Atlantic puffin in the Gulf of Maine is spatially distributed between 7 colonies. We focus on the 5 western most colonies, which include 98% of the regional population in 2001. Data for our analyses come from a long-term banding and resighting project started in 1973. However, initiation of data collection varies temporally between colonies. Due to this temporal variation, 1982-2001 is the longest running data set we consider. Most of our analyses require known age birds. From 1980-2001, all colonies provide 3,942 local birds (i.e. chicks) banded and 13,977 subsequent resightings. As part of our banding protocol, birds receive individually engraved colour-bands, which are easily read from a distance. Our main objective is to document and quantify emigrant distribution between colonies and age-specific survival for a seabird metapopulation. We use Maximum Likelihood Estimates (MLE) as estimates of survival and movement. MLEs will be determined through reduction of two initial model designs: (1) the open population model Cormack-Jolly-Seber and (2) a multi-strata model used specifically to estimate emigration probabilities. Model parsimony is determined using a Goodness-of-fit test through program RELEASE and evaluation of AIC (Akaike Information Criterion) values. AIC values and hypothesis testing using Likelihood Ratio Tests provide a means to compare models and investigate several a priori hypotheses. These hypotheses consider geographic and temporal variation in survival and movement probabilities.

WHOSE TERN IS IT ANYWAYS? - *Kate Devlin, ACWERN, University of New Brunswick, P.O. Box 45111, Fredericton, N.B. Canada E3B 6E1*

Machias Seal Island is located at the mouth of the Bay of Fundy situated on the border between the U.S. and Canada. It is the largest known Arctic Tern colony in the region and is designated as a Migratory Bird Sanctuary. Before understanding the dynamics of a regional population, it is necessary to closely examine the characteristics of local populations. Between 1995-1998 over 100 nesting adult terns were banded on the island and since the initiation of a regional study of Arctic Terns involving the use of field readable bands in 1999, over 500 adult terns and 700 chicks have been banded. In the long term we will establish a population of known-age banded birds in the region, however, in the short term, information can be gathered about the survival rates and movement patterns of adult terns. In the 2001 field season we will obtain our first estimate of adult survival based on birds wearing both standard BBL bands and field readable bands. Additionally we will have collected two estimates of inter-colony movement to this island. I discuss the implications of these data as well as records of historical banding. This island was never completely abandoned during the declines of seabird populations on the eastern seaboard of North America in the late 19th and early 20th centuries. It is thought this island may have served as one of a few refuge populations for the Gulf of Maine and the Bay of Fundy.

Recent estimates of movement patterns in combination with observations of productivity indicate that this colony may currently be a "sink" in the regional populations.

THE INFLUENCE OF FOOD QUALITY ON REPRODUCTIVE PERFORMANCE IN AN ARCTIC TERN POPULATION - Christina J. Maranto Department of Ecology and Evolutionary Biology, University of California, Irvine, 321 Steinhaus Hall, Irvine, CA 92697-2525

I studied the influence of food quality on reproductive performance in Arctic Terns at Matinicus Rock, ME. At the population level Arctic Terns appear to be a generalist predator. They have a mixed diet consisting of 60% fish and 40% invertebrates by occurrence. At the individual level Arctic Terns have strikingly different provisioning strategies. Most terns provision chicks with high quality fish while a few provision chicks with low quality invertebrates. Based on past studies purporting that food quality influences reproductive performance, I hypothesized that reproductive performance would be lower for Arctic Terns provisioning chicks with low quality invertebrates. Results show that terns provisioning with low quality invertebrates have the same reproductive performance as terns that provision with fish. I proposed two hypotheses to account for the lack of relationship between food quality and reproductive performance: (1) The contribution of invertebrates to the total energy delivered to the nest is small and (2) Terns feeding invertebrates may increase provisioning rates so that young receive the same rate of energy input as those fed fish. Analyses of foraging trip lengths and energy density of prey showed that terns compensate for low quality food by increasing the rate of provisioning. The ability to shift to invertebrate prey may allow terns to reproduce successfully in years when fish are scarce.

BLACK TERN PRODUCTIVITY IN MAINE: PRELIMINARY REPORT ON THE 2001 FIELD SEASON - Shannon B. Kearney and Frederick A. Servello

We monitored breeding success at the major colonies in Maine, continued banding efforts, and began studies on predation of Black Tern nests and chicks in 2002. We also continued studies of water level variation in wetlands and chick growth rates, two factors that may influence tern productivity. Monitoring in 2001 was conducted at seven wetlands: Messalonskee Lake, Carlton Pond, Douglas Pond, Madawaska Pond, Plymouth Pond, and Great Moose Lake. We used temperature loggers at nests (2-3 /colony) to monitor nest attentiveness. Nest attentiveness, particularly at night, was used as an indicator of disturbance by predators. We also used video cameras to monitor nests for predation attempts and to validate temperature logger results. We constructed predator exclosures around 16 nests to study fledging rates in the absence of predation, and growth of chicks was measured from hatch to fledging. A total of 96 nests were found, and as in past years nest success varied widely among colonies (33-74%), though rates for individual colonies continued to be consistent across years. Overall success at 56% was approximately average for 1997-2001. In 2001, a flood event resulted in a major loss of nests at Douglas Pond, the site of the largest colony. We banded 24 adult terns in 2001 and recaptured or resighted 36 individuals banded in previous years. We observed some movement among colonies particularly from Great Moose Lake where that colony decreased substantially in 2001. We were able to successfully monitor attentiveness with temperature loggers, but video will be useful for interpreting temperature data because of effects of adult behavior and environmental

variability. We did not record any predator activity on video in 2001, but predation was not as important a factor in 2001 as in some earlier years. In spite of our best efforts, some nests in predator exclosures were depredated, but enough survived to compare fledging rates in successful exclosures to rates measured for natural nests in the same colonies. These analyses are in progress. Note: These results are preliminary and subject to change after further analysis.

MANIPULATING BEACH GRASS TO INCREASE TERN NESTING HABITAT ON MONOMOY NATIONAL WILDLIFE REFUGE, CHATHAM, MA. *Sharon Fish Marino, Stephanie L. Koch U. S. Fish and Wildlife Service, Monomoy National Wildlife Refuge, Wikis Way, Chatham MA. 02633.*

South Monomoy Island, part of Monomoy NWR, has a large colony of nesting common terns that has steadily increased since 1997. In 2001 this part of the island supported 7,807 pairs of nesting common terns, 6 pairs of nesting roseate terns, and 805 pairs of nesting laughing gulls. Laughing gull numbers have increased from 19 nesting pairs in 1999 to 805 pairs in 2001. In recent years, the distribution and abundance of American beach grass (*Ammophila breviligulata*) has increased significantly on portions of the island. The density of this grass has excluded nesting terns on large portions of the island and benefited nesting laughing gulls. In spring of 2001 Refuge staff manipulated vegetation in a 30 x 30 meter plot in the densest beach grass habitat. Vegetation was hand pulled in half of the plot and weed whacked and covered with landscape fabric in the other half of the plot. A 30 x 30 meter control plot was simultaneously established. A total of 283 common tern nests were censused in the vegetation plot during the census window while a total of 93 laughing gull nests were counted in the control plot. Productivity was very low in the two experimental plots. This could be due to high predator disturbance in this part of the colony and potential depredation by surrounding nesting laughing gulls.

RESPONSES OF TERNS TO REVETMENT CONSTRUCTION AT FALKNER ISLAND
- *Jeffrey A. Spindelov USGS Patuxent Wildlife Research Center, Laurel, MD 20708*

Following the 2000 breeding season, construction was completed on Phase 1 of a "Shoreline Protection and Erosion Control Project" at Falkner Island, Stewart B. McKinney NWR, Connecticut. When terns arrived in spring 2001, they encountered several major habitat changes: 1) a rock revetment covering former nesting habitat on the beach of the northwestern section and about 60% of the eastern beach, 2) an elevated 60m-x-4m area replacing the beach and lower bank of the southwestern section, and 3) about 2,000 sq. m of devegetated areas on top of the northeast edge and southern half of the island. As peak egg laying by several hundred pairs of Common Terns in the newly devegetated areas on the top of the island came 10-14 days after those nesting in unmodified areas, the timing of nesting and distribution of nests of Common Terns from 2000 to 2001 changed more so than that of Roseate Terns. Use of "subterranean channels" by Roseate Tern chicks made it difficult to measure growth and productivity in 2001, and preliminary observations suggest that some chicks of this endangered species died within the revetment.