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 27)
- Established continual human presence throughout gull and tern nesting season. (April 27 through August 25)
- 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.

Table 1. The results of the great black-backed and herring gull census; 1997, 1998, 1999 and 2000.
Dates of initial census: **April 28, 1997; April 23, 1998; April 27, 1999; April 29, 2000**

	# of Gull Nests				# of Eggs			
	1997	**1998**	**1999**	**2000**	**1997**	**1998**	**1999**	**2000**
TOTALS	302	166	76	9	93	6	22	11

Common Terns

Census Results (June 18, 2000): **318 PAIRS**
End of year total: **446 PAIRS**

Phenology

Table 2. Breeding chronology and productivity of common terns on Seavey Island, 1997- 99.

	1997	**1998**	**1999**	**2000**
First tern arrives:	May 12	May 14	April 30	May 2
Copulation begins:	June 15	May 2	May 11	May22
Incubation begins:	July 9	June 2	May 28	May 24
First hatch:	August 2	June 27	June 19	June 16
First fledging:	Sept 2	July 27	July 20	July 12
Total # pairs:	6	45	June 20: 80 July 15: 140	June 18: 318 July 25: 446
Total # chicks hatched	7	91	*~350	*~968
Total # chicks fledged	6	~75	*~300	*~705
Productivity	1.0 chicks/nest	1.6 chicks/nest	*2.21 chicks/nest	*1.58 chicks/nest

Productivity: Core Colony of 318 nests

Number of nests monitored: **43** (Feeding/productivity nests)
Average Clutch Size: **2.60 eggs/nest** (SD = 0.49, N = 112 eggs,43 nests)
Hatching Success (eggs hatched/eggs laid): **89.3%**
Average Hatch: **2.33 eggs/nest** (SD = 0.57)
Fledging Success (chicks fledged/eggs hatched): **77%**
Productivity (Average number of fledglings per nest): **1.79 fledglings/nest** (SD = 0.86)

Productivity: Whole Colony of 446 nests

Number of nests monitored: **52** (Feeding/productivity nests)
Average Clutch Size: **2.54 eggs/nest** (SD = .50, N = 132 eggs, 52 nests)
Hatching Success (eggs hatched/eggs laid): **85.6%**
Average Hatch: **2.17 eggs/nest** (SD = 0.68)
Fledging Success (chicks fledged/eggs hatched): **72.57%**
Productivity (Average number of fledglings per nest): **1.58 fledglings/nest** (SD = 0.98)

Feeding Study (Data as of Tuesday July 25, 2000)

Total Number of Feedings: 1027
Total Number of Blind Hours: 147.67 Feeding Rate: 1.33 items/hour
Total Nest Observation Hours: 773.42

Food Item and **Relative Frequency (%)**

Hake: 47.14; Unknown Item: 12.93; Unknown Fish: 7.44; Herring: 6.64; Insect (unknown): 5.95; Lumpfish: 4.23; Amphipod: 3.43; Sand Lance: 1.95; Lobster/Fishing Bait: 1.60; Butterfish: 1.60; Moth: 1.14; Cunner: 0.92; Mackerel: 0.69; Snipefish: 0.69; Pipefish: 0.57; Ant: 0.46; Bluefish: 0.46; Grasshopper: 0.34; Pollack: 0.34; Stickleback: 0.34; Dragonfly: 0.23; Caterpillar: 0.11; Lobster: 0.11; Monkfish: 0.11; Squid: 0.11; Sea Roach: 0.11; Silverside: 0.11

Season Highlights

Tern Highlights

Arctic Tern- First seen- May 12- Adult observed feeding Common Tern chick-July, 12
Roseate Tern- First seen- May 13- Copulation observed- June 13, 25, 26, 28
Black Tern- visitations- May 11, June 8(2), 9, 16, 18
Caspian Tern- visitation- May 11

MAINLAND TERN COLONIES 2000

Nest site	#of pairs	Productivity Estimates
Hampton Saltmarsh	~35	minimum 10-15 chicks
Backchannel Islands	0	
Hen Island	~15	minimum 12 chicks
Nanny Island	0	
Little Footman	0	

***Monomoy Islands** – Stephanie Koch, Eastern MA NWR Complex, USFWS*

I. North Monomoy

Census and Productivity: 11 nesting COTE pairs were counted on 19 June down from 52 nests in 1999. 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. Only 2 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 scrapes - 9 May
1st eggs - 20 May
1st hatch - 16 June

Census: A total of 6758 COTE nests were counted on South Monomoy Island on 17 and 18 June. The Lincoln-Index boosted the total to 6886 total nests, an increase from 5480 in 1999. No B-count was conducted, but 48 additional nests were initiated in productivity enclosures after the census window, indicating 1597 additional nests after 20 June.

Productivity: determined using 207 (A-count only) nests in 26 fenced productivity enclosures.
Average clutch size: 2.55 eggs/nest (SD = 0.613, N = 207 nests) ***2.41 in 1999***
Hatching success: 2.20 eggs/nest (SD = 0.923, N = 207 nests) ***2.06 in 1999***
Reproductive success: 1.83 chicks/nest (SD = 0.980, N=207 nests) ***1.60 in 1999***

In addition to monitoring productivity, all chicks in productivity plots were weighed on days 0, 1, and 2, and then every third day until fledging or no longer found. Data has not yet been analyzed. Thirty-five nests were also used to determine prey types and size of prey provided to chicks until they were fledged. Observations are still being conducted, so data is still incomplete. In general, sand lance has been the most commonly delivered prey item.

In total, about 1200 COTE chicks were banded, and 55 banded adults were resighted (trapped or found dead).

LETE:

Phenology:
1st terns seen around the island - 12 May
1st eggs - 27 May
1st hatch - 20 June

Census: LETE showed reproductive behavior on two areas of South Monomoy Island in 2000, but the majority of nesters were on the south tip. On 20 June, 119 active nests were counted in this main nesting area.

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, and lack of any fledglings seen. GBBG depredation was evident beginning in early July, and direct depredation was often seen. Seven chicks and 2 nests were seen preyed upon within 15 minutes. In addition, coyote tracks were often seen in the colony.

ROST:

Phenology:
1st terns seen around the island - 4 May
1st eggs- 5 June
1st hatch - 1-2 July

Census: 3 pairs of ROST (3 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 100 hours were spent looking for ROST nests.

Productivity:
Average clutch size: 1.00 eggs/nest
(N = 3 nests of known completed clutch)
Hatching success: 1.00 eggs/nest (N = 3 nests)
Reproductive success: 1.00chicks/nest (N = 3 nests)

The reason for the decline in nesting ROST in 2000 (from 29 during the census window in 1999) is unknown. It is likely that GHOW presence in May and nocturnal abandonment of the COTE colony for 4 weeks in May and June deterred some ROST from establishing territories. In addition, some traditional ROST nesting areas were densely settled by COTE or colonized by LAGU this year.

BLSK (Black Skimmer):

Phenology:
1st seen around the island - 7 May
1st scrape - 1 June

Census: Only 1 pair of BLSK was seen during the census window.

Productivity: The BLSK nest present during the census window was found lost to an unknown avian predator on 19 June. Two additional BLSK nested unsuccessfully later in the season.

LAGU (Laughing Gull):

Phenology:
1st seen around the island - 3 April
1st eggs - 26 May
1st hatch - 19 June

Census: On 17 and 18 June, 376 active LAGU nests were counted, up from 19 in 1999.

Productivity: determined using a sample of A-count nests
Average clutch size: 2.83 eggs/nest (SD = 0.501, N = 40 nests)
Hatching success: 1.40 eggs/nest (SD = 1.081, N = 40 nests)

Mean hatch is probably an underestimate as nests were only visited every 3 days and often nests with pipping eggs were found empty on subsequent visits. Chicks were not followed after hatching.

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 16 May; 258 nests were in Area B and 0 nests were in Area A (down from 328 and 3, respectively, in 1999). 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 12 June. There were no gulls nesting in area A. In area B, 6 new GBBG nests and 19 new HERG nests were counted. In general, gulls were not present in the COTE colony often, and were only actually seen in the colony 15-20 times all season.

NOHA: At least three pairs of Northern Harrier nested on South Monomoy Island, and at least 1 pair was successful. NOHA were seen in the COTE colony about 40 times on at least 20 different days from 4 May - 3 August. At least 16 adult terns and 3 chicks found dead in the colony were likely killed by NOHA.

GHOW: A Great Horned Owl was likely visiting the COTE colony in the beginning of the season. Common Terns were consistently abandoning the nesting site at night as early as 11 May. After the first week of June, portions of the colony began staying for part of the night, but the whole colony did not stay for the entire night until 14 June. Despite the adverse impacts caused from nocturnal disturbance, few dead birds found in the colony were attributed to GHOW depredation, COTE productivity was still high,

and the overall affect on the COTE colony was therefore probably minimal. However, GHOW presence early in the season may have contributed to the decline in nesting ROST.

COYOTE: Ten coyotes were lethally removed from South Monomoy Island, and 3 additional coyotes were in the COTE colony during the 1st week of May, 3rd week of June, and the 1st and 2nd 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 on 19 June, despite suspected presence in the colony as early as May 29. From 19 June until mid July, BCNH were only seen/heard in the colony 3 times, and there was little sign of depredation. However, during the last 2 weeks of July, at least 1 BCNH was present in two different areas of the colony on most nights. The amount of depredation is difficult to determine, however, because the BCNH was usually in areas where productivity enclosures were already taken down, and chicks had already fledged or moved from the nest site.

LAGU: Kleptoparasitism increased with the increase in the number of Laughing Gulls this season (from 19 pairs last year). Kleptoparasitism was recorded opportunistically 227 times (this is an underestimate of the actual number of kleptoparasitism events). LAGU were successful about 28% of the time, COTE were successful about 41% of the time, and 31% of the time, the victor was undetermined. Kleptoparasitism waned at the end of June, and was rarely seen in July and August. Since observations were made opportunistically, it is unknown ho w much of an effect the LAGU are having on COTE. In 2001, we plan to conduct observations specifically to document kleptoparasitism.

OUTSIDE THE GULF OF MAINE

***Buzzards Bay** – Ian Nisbet, I.C.T Nisbet & Co.*

Massachusetts – Buzzards Bay and Nantucket Sound
Observers: Jeremy Hatch, Shelagh Parken, Carolyn Mostello, Dick Veit

Census Date	Island	COTE	ARTE	ROST	Method	Productivity F/N	N	Method	Late nests
8 June	**Bird Is**	1880			N	0.92	79	2	120
11 June				1130	N	1.19	173	2	150
8-9 June	**Ram Is**	1707			N	1.19	66	2	323
13 June				988	N	1.09	145	2	141
20 June	**Penikese**	82			N				60
			2		N				3
20 June	**Muskeget**	23			N				32

Part 2 – RESEARCH REVIEW

THIRTY-ONE YEARS OF RESEARCH ON TERNS IN MASSACHUSETTS

- Ian C.T. Nisbet
150 Alder Lane, North Falmouth, MA 02556; icnisbet@cape.com.

I was originally hired in 1968 to do research relevant to conservation, so my work on terns has always been research-oriented. I quickly assumed responsibilities for monitoring and management, but

these tasks do not take many hours per day or days per season, so >80% of my time and that of my assistants and students has always been devoted to research.

My first interest was in toxic chemicals and their effect on populations and demography, and I have continued working on contaminants, though I missed the major effects that occurred in the 1960s. Demography has proved to be the most difficult topic to study: I have only just obtained the first rigorous estimates of survival in Common Terns, and I still do not have good data on recruitment. During the 1970s I worked at times on 4 species of terns and at 11 sites, but I quickly focused on Common Terns at 4 sites, gradually reducing this to 2 sites in Buzzards Bay since 1994 but adding work on Roseate Terns as part of the metapopulation study. During the 1980s, I was working full-time on other work and did little but banding, monitoring, and gull control.

Since 1987, I have progressively intensified my work on terns as I have phased down my consulting business. I started banding with durable incoloy bands in 1975 and have since banded about 100,000 chicks and 15,000 adults. Other topics which I have studied include predation, foraging, ecology of prey fish, clutch-size, egg-size, reproductive success, dispersal, staging migration, algal toxins, parental behavior, mate choice, growth, parental quality, sex-ratio, physiology, energetics, endocrinology, endocrine disruption, parasitology, immunology, reproductive effort, adoption, age-specific biology; my current focus in on senescence. To date, I have published more than 40 papers on terns, with 55 co-authors.

It is easy and rewarding to add a research component to an existing program of monitoring and management, and the additional costs can be low or even zero. However, research requires careful planning and study design, and in most cases requires individually marked birds – i.e., trapping and handling.

THE GULF OF MAINE AND BAY OF FUNDY ARCTIC TERN METAPOPULATION PROJECT

- Catherine M. Devlin (presenter) and Anthony W. Diamond.
ACWERN and Department of Biology, P.O. Box 45111, University of New Brunswick, Fredericton, NB. E3B 6E1. Canada. Stephen W. Kress and C. Scott Hall. National Audubon Society, 159 Sapsucker Wd. Rd. Ithaca, NY 14850. Stan Skutek and Linda Welch. USFWS, Petit Manan NWR, P.O. Box 279, Milbridge, ME 04658.

Populations of terns in North America have undergone major fluctuations. The number of Arctic Terns (*Sterna paradisaea*) breeding in the Gulf of Maine and Bay of Fundy has been slow to recover in spite of over 15 years of conservation efforts by groups in the US and Canada. In 1999 we began a collaborative study combining current efforts in conservation and observation on the four main Arctic Tern colonies in the region to examine inter-colony movement. Our goal is to determine if the terns are part of a regional metapopulation, or if each island acts as separate colony by comparing movement of individuals (from resighting of banded birds, using field-readable bands) with measures of genetic structure of the population, to test the hypothesis that movement between colonies is frequent and significant.

The banding study of nesting adults investigates short-term, year-to-year movement patterns; the genetic analysis of feather samples from different islands will show the amount of gene flow among colonies over a longer time scale. Current data on the movement of terns among the island colonies will be discussed.

USING RADIO TELEMETRY TO CENSUS BREEDING RAZORBILLS IN A HETEROGENOUS HABITAT.

V. Dedreic Grecian and Anthony W. Diamond Atlantic Co-operative Wildlife Ecology Research Network, University of New Brunswick, PO Box 45111 Fredericton, NB E3B 6E1.

We attached radio transmitters to twenty-four adult, breeding razorbills (*Alca torda*). We also counted all the nest sites we could find in all available and/or occupied breeding habitat between peak lay

and peak hatch. We tracked each marked bird to its nesting site, and scored it according to whether or not it would have been recorded in the census. We then calculated a correction for the number of burrows that would not have been found during the census. We applied the correction to the sections of razorbill habitat where we were sure that we could not count all the nests based on the structure of the habitat (i.e., habitat dominated by large boulders). Similar methods have been employed successfully with other groups of birds (e.g. waterfowl) and we suggest it can be used to establish appropriate 'k'-factors for calibrating counts of cavity-nesting seabirds in heterogeneous habitats.

ARCTIC TERN CHICK PROVISIONING AT MATINICUS ROCK

- Christine Maranto
Dept. of Ecology and Evolutionary Biology, 321 Steinhaus Hall, Irvine, CA 92697 office: (949) 824-4747

THE IMPORTANCE OF LOBSTER BAIT IN PENOBSCOT BAY GULL DIET

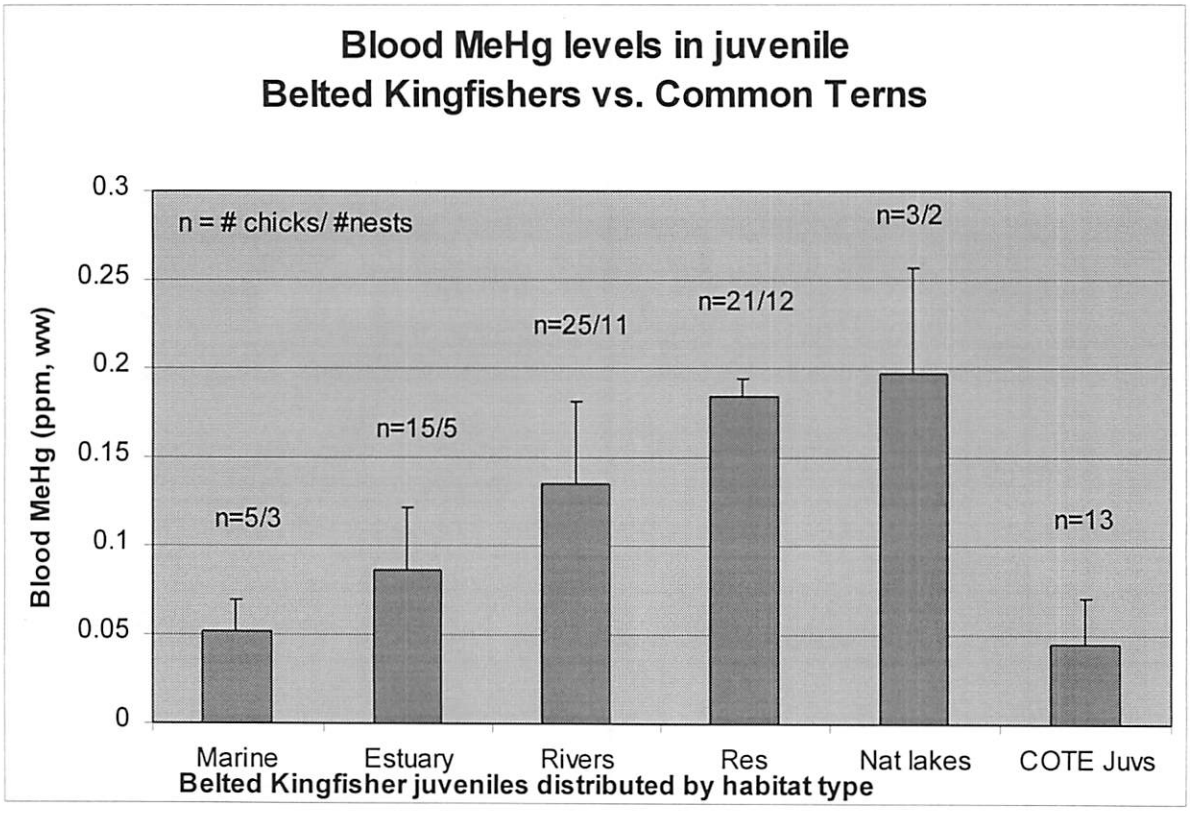
- Wing Goodale

Herring gull (*Larus agrentatus*) populations may be partially supported during the breeding season by the food subsidy of discarded lobster bait. Gulls displace breeding colonies of terns and puffins; therefore a reduction in discarded lobster bait could aid in seabird restoration by decreasing gull populations. I am documenting gulls' use of lobster bait by marking adult gulls, accompanying working lobstermen, and collecting chick diet samples. Preliminary data suggest lobster bait is the primary food of herring gull chicks. Herring gulls generally fly 0-8 km to follow lobster boats; lobstermen discarded approximately 14% of their bait; and herring gulls recover approximately half of the bait discarded. The frequency of lobster bait in herring gull chick diet on 5 study islands was 56% in 1999 (n = 251) and 41% in 2000 (n = 605).

PRELIMINARY STUDIES OF MERCURY LEVELS IN MARINE BIRDS

- David Evers
BioDiversity Research Institute, 411 Route 1, Suite 1, Falmouth, Maine 04105 (207-781-3324)

Blood samples were taken from juvenile Belted Kingfishers (*Alcyon ceryle*) and Common Terns (*Sterna hirundo*) in the summers of 1997-1999 in Maine and New Hampshire. Contaminant analysis of these blood samples showed mean mercury levels (ppm, ww) were primarily related to types of habitat that reflected differences in hydrology and biogeochemistry. Marine systems (primarily study site was in Casco Bay) appear to have the least amount of available mercury to higher trophic level organisms. Estuaries and rivers (primarily the Androscoggin and Kennebec rivers) had approximately three times higher mean mercury levels than the marine system, while kingfishers sampled from upper watershed natural lakes and impoumdments (i.e., "res" in the graph) had even higher mean mercury levels (six times that of the marine study sites). Three-week-old Common Tern chicks (sampled from Isle of Shoals, New Hampshire) had similar blood mercury levels as similarly-aged kingfisher chicks. From these limited sampling efforts, it appears that young-of-the-year Belted Kingfishers and Common Terns being fed from marine environments are likely not significantly impacted by mercury contamination. This is a collaborative study with Terry Haines of the University of Maine at Orono and Diane DeLuca of the Audubon Society of New Hampshire.



PRODUCTIVITY OF BLACK TERNS IN MAINE

- Andrew Gilbert and Frederick A. Servello
University of Maine, Orono

We measured hatching success, fledging rates, adult return rates and site fidelity as part of a long-term population monitoring project in Maine. We also continued studies of water level variation in wetlands and food resources for chick provisioning, two factors that may influence tern productivity. Monitoring in 2000 was conducted at seven wetlands: Messalonskee Lake, Carlton Pond, Douglas Pond, Madawaska Pond, Plymouth Pond, Great Moose Lake, and Huntley Brook Flowage. A total of 121 nests were found, and nest success varied widely among colonies (28-79%). The majority of nest loss could be attributed to predation (32%). Fledging rate varied among wetlands (0.25-1.33 fledglings/hatched nest). We captured 76 adult terns, including 20 recaptured individuals banded in 1997-99. We also resighted 11 terns based on color bands. Recaptures/resighting data indicated high colony site fidelity with only two movements among distant colonies and three movements among neighboring colonies over the last 3 years.

Water levels were high early in the breeding season, but varied among colonies. Levels decreased gradually during the summer and had no significant effects on nest success in 2000 in contrast to some previous years. Long-term water flow data suggest that fluctuations may be a limiting factor for terns in Maine colonies. We measured chick growth at eight nests at two wetlands and food habits and provisioning rates from tower blinds and by video. Growth rates for 1999-2000 were consistent with data from other regions. The proportion of fish and insects provided to chicks varied among colonies, but did not appear to affect chick growth. Note: These results are preliminary and subject to change after further analysis.

RECENT RESULTS AND NEW DEAS FOR ROSEATE TERN STUDIES

- Jeffrey A. Spendelow
USGS Patuxent Wildlife Research Center, 11510 American Holly Drive, Laurel, MD 20708-4017.
Email:Jeff_Spendelow@usgs.gov.

Many interesting recent results of our Metapopulation Project on Roseate Terns in the New York-Connecticut-Massachusetts area would have been difficult (if not impossible) to obtain without the availability of individually marked birds, especially those whose age and natal colony site are known. Perhaps the most important "take-home message" of what follows is to "BAND THE BIRDS!"

Recent results and thoughts on what might be done next include:

1) Development of multi-site models using capture-recapture data to estimate survival to first breeding and age-specific breeding rates show a much higher (~40%) emigration rate of young from Falkner Island, CT to Great Gull Island, NY and Buzzards Bay, MA than the 10% rate "guesstimated" 10 years ago (assuming emigration and immigration rates at FICT were equal). These models produce estimates of "survival to age 3" of ~30%. What percentage of the young ROSTs (and COTEs) from the NY-CT-MA area recruit to the GOM breeding population?

2) Some successful female ROSTs may remain at the FICT colony site up to three weeks after their mates have departed with their fledglings. Why? Does this continued greater responsibility for feeding of the young by males result in differential overwinter survival of the sexes?

3) Some adults bringing fish back, but not feeding ("teasing"), and some that beg at, chase, or otherwise interfere with adults bringing food back to chicks or recent fledglings are 2- to 4-yr-old nonbreeding birds or failed breeders, and are not the parents of the near/recent fledglings they "hang around". Are they older offspring of the adults whose young they "harass"?

Part 3 – NEW/OTHER BUSINESS

THE NORTHEAST REGIONAL TERN PLAN

- Stephen Kress and C. Scott Hall
Seabird Restoration Program, National Audubon Society, 159 Sapsucker Woods Road, Ithaca, NY 14850

The Northeast regional Tern Plan is approaching the first draft stage with release of the draft at the November 2000 meeting of The Waterbird Society. Ian Nisbet is consulting, Rick Schauffler developed the master map for the plan which includes all active and historic tern nesting sites from Long Island to the Maine/New Brunswick border. Another plan is also being released this year at the meeting; the North American Colonial Waterbird Conservation Plan which is a plan for all species in Canada, the US and Mexico.

THE BUZZARDS BAY TERN RESTORATION PROGRAM.

- Ian C.T. Nisbet
150 Alder Lane, North Falmouth, MA 02556; icnisbet@cape.com.

Although the official Gulf of Maine Watershed map includes all of Cape Cod, Nantucket, and Martha's Vineyard, most of Cape Cod and the Islands actually drain into Buzzards Bay or Nantucket Sound. These are part of a different body of water (influenced by the Gulf Stream) and have a different seabird community from the Gulf of Maine. Historically, this area had the largest colonies of Common and Roseate Terns in North America, especially at Muskeget and Penikese Islands, which were two of only about 6 sites where tern colonies survived through the persecution of the 1880s and 1890s. Numbers increased under protection to peak in the 1920s and 1930s, when there were about 40,000 pairs of Common and 5,000 pairs of Roseate Terns at 6-7 major sites.

Skiffs, Gravelly and Egg Islands washed away during the 1920s and 1930s, and gulls overran Muskeget in the 1930s, the Weepeckets in the 1940s, Penikese in the 1950s, and NoMans Land and Ram Island in the 1970s. By 1973, Bird Island was the only significant colony remaining in the region, and Bird Island itself was reportedly overrun in 1966 and almost again in 1970. Bill Drury and I eliminated most gulls from Bird Island in 1970-71, mostly by shooting, and I have kept it clear since 1971, mostly by egg breaking. By 1986, numbers at Bird Island had increased to about 1500 pairs of Roseates and 2000 pairs of Commons, but since 1990 habitat has been lost to erosion, predation has started to occur, and both species have suffered from overcrowding.

Since 1990, I have co-operated closely with the Massachusetts Division of Fisheries and Wildlife (MDFW) to restore other sites in the region. Ram Island was restored in 1990-93, initially by poisoning about 800 gulls and later by harassment and occasional shooting. Terns recolonized in 1992 and have steadily increased to over 1,800 pairs of Commons and 1,000 pairs of Roseates in 2000. In 1998-99, we cleared a discrete area of about 3 ha on Penikese Island, mostly by using dogs in early spring and subsequent egg breaking.

In 2000, we started a new project on Muskeget Island, which now holds about 1,200 pairs of Great Black-backed and 45 pairs of Herring Gulls, declining for natural reasons. Terns had spontaneously recolonized a new barrier spit in 1999. Using the same dogs, we displaced most gulls from an 8-ha buffer zone near the tern colony and prevented the rest of the gulls from raising young by breaking eggs. Despite the success of these non-lethal techniques in clearing gulls from project areas on Muskeget and Penikese, tern numbers did not increase significantly in 2000, and predation (by Peregrines, Short-eared Owls and Red-winged Blackbirds) was a problem at both sites. Our next project is to restore lost habitat at Bird Island by filling low-lying areas with dredge spoil. We have obtained funding for this project, engineering studies are under way, we are working on permit issues, and we hope to be pumping sand by September 2001.

Summary of Gull Control Manuscript

- Kim Mawhinney (under contract to USFWS)

This document (a draft to be completed by the end of the year) will review gull lethal and non-lethal control methods used since 1900. It will also address the philosophy and justification behind gull control efforts, as well as review public response to gull control.

Laughing Gulls in Maine – Discussion

The general discussion focused on two aspects of the effect of increasing Laughing Gull numbers on terns in Maine. 1. Should Laughing Gulls be managed in Maine? 2. What management options are available?

There was general agreement that nesting Laughing Gulls on Petit Manan NWR, Matinicus Rock NWR and Eastern Egg Rock are impacting terns. LAGU impacts include egg and chick predation (however, it was generally agreed that most LAGU, at least in other parts of their range, are insectivorous and that predation on tern eggs and chicks is a specialist behavior) and competition for nesting habitat. On Eastern Egg Rock, Roseate Terns (while increasing) are shifting from traditional nesting areas to new sites with fewer LAGU. On Petit Manan ROST are declining, but it is unclear whether PEFA predation or LAGU predation/displacement is the principle problem.

Most people favored some kind of management but it wasn't clear which technique offers the best option. Pilot habitat work in 1999 includes: On Petit Manan Island, ½ the island was burned during the fall of 1999. While there was not an expectation that LAGU's would be effected, terns did not respond as hoped. While terns used the new habitat in general, terns nested closer o LAGU than in the past – and several instances of egg predation were observed. On Eastern Egg Rock, two test stripes of landscape

fabric were laid over LAGU habitat adjacent to a known ARTE sub-colony where predation has been observed. ARTE predation did decline (but this is likely due to the use of nest boxes). While LAGU pairs didn't nest on the strips, they were used extensively by LAGU as a "landing pad" and for copulation. Many pairs nested immediately adjacent to the fabric. Neither technique produced the desired results – although both need further testing.

Additional management options discussed included taller fencing around terns – but this was discounted, as LAGU have been observed flying and walking into tern nesting areas. There was also discussion about removing individual specialists and about managing LAGU through egg/nest destruction and egg poking. Some felt that a combo of harassment and nest destruction might deter nesting. The state is willing to consider management options – Hall and Welch are planning to meet with McCollough and Allen over the winter to explore nest/egg destruction/management options at EER and Petit Manan.

CARA UPDATE – Mark McCollough

Meeting adjourned at 1530

ATTACHMENTS

- **Pond Island Report (Ann and Walter Gamble)**
- **Watershed Map of the Gulf of Maine**
- **Maine tern table 1885-2000**
- **2000 GOMSWG census survey results**
- **List of islands surveyed in Maine without terns**
- **Gull control summary table**
- **List of August 2000 GOMSWG meeting attendees**

Kennebec Point Report

August 7, 2000

Walter, starting

Like lake Woebegone, it has been a relatively quiet summer. However, there has been some activity. To begin with .....

Steve, interrupting

Walter, I'm afraid I haven,t told you the rules for presentation this year. Only five minutes are allotted to each speaker.

Walter continuing

Oh well - - - just a second - -*(Walter sorts papers and drops many sheets)* To begin with, let us look at productivity from a statistical point of view.

Steve, interrupting

Walter, NO STATISTICS ALLOWED

Walter continuing

Oh well - - - just a second - - *(Walter puts down most all of his papers)* Visible signs of activity on Pond Island included a huge new sparkling white tent and two blinds. For nesting, several small satellite tents were noted. Frequent landings of the Avon inflatable were noted.

The most pressing problem seems to be that of predation, most likely by Owl. Owls have been heard hooting in the woods on surrounding islands as well as Kennebec Point. Hence we would strongly suggest submitting a grant application to fund the deforestation of the entire region.

Table I-1. Estimates of the number of pairs and colonies for four species of terns nesting in Maine from 1885-2000. Numbers of colonies are in parentheses. Data do not include Machias Seal Island.

Year	# of Colonies	COTE	ARTE	ROST	LETE	Source
1885-1886	67-75	present	present	present		a,b,c,d,e
1890	31-32	present	present			a,b,c,d,e
1900	20 -23	1,100-1,700 (15)	4,400			a,b,c,d,e
1902-1905	25	4,800 (16)	4,400			b,c,d,e
1911	19-25	4,000 (19)	4,400			b,c,d,e
1931	19-27	4,900-6,500 (19)	5,000 (6)	275 (3)		b,c,d,e
1936	25-27	6,000 (25)	6,100 (9)			b,c,d,e
1940		8,000 (25)	4,500			b,c,d,e
1945		7,900	5,000			b,c,d,e
1972	35	2,600 (18)	2,900 (11)	75-150 (2)	40 (2)	b,c,d,e
1977	37	2,095 (24)	1,640 (8)	80 (3)	55 (6)	b,c,e,h
1984	33	2,543 (28)	1,720 (17)	76+ (10)	88 (4)	f,g,h
1987	27	2,173 (19)	1,720 (7)	52 (6)	89 (6)	g,h
1988	24	2,848 (18)	2,020 (9)	68 (7)	98 (5)	g,h
1989	27	2,634 (19)	2,347 (8)	80 (5)	83 (6)	g,h
1990	25	2,703 (18)	2,175 (10)	107 (4)	65 (5)	g,h
1991	31	3,925 (22)	2,094 (10)	127 (6)	52 (4)	g,h
1992	31	3,468 (23)	2,128 (8)	121 (4)	94 (4)	g,h
1993	24	4,065 (15)	2,250 (9)	141 (6)	125 (5)	g,h
1994	29	4,222 (21)	2,381 (9)	142 (5)	89 (4)	i,n
1995	30	4,872 (21)	2,490 (9)	151 (5)	100 (5)	j,n
1996	27	5,308 (22)	2,695 (7)	161 (4)	60 (5)	k,n
1997	27	6,563 (20)	2,270 (10)	237 (6)	50 (5)	l,n
1998	29	6,496 (21)	2,435 (7)	257 (5)	86 (7)	m,n
1999	26	6,506 (22)	2,854 (10)	288 (5)	62 (4)	n,o
2000	26	6,759 (23)	2,619 (10)	285 (4)	104 (3)	p

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Gulf of Maine Seabird Working Group 2000 Tern Census

NOVA SCOTIA

ISLAND NAME	CIR #	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
North Brother				466	25	86			95% COTE; 5% ARTE							D'EON
Pinch Gut				365	19				based on 384 total nests 95% COTE, 5% ARTE							D'EON
Thrum				6					observed 75 terns in the air							D'EON
Flat					11											D'EON
Gannet Rock					7											D'EON
Ile Chespeque				14					little or no success							D'EON
2000 NS COAST TOTAL				**851**	**62**	**86**										
1999 NS COAST TOTAL				**428**	**298**	**61**										

NEW BRUNSWICK

ISLAND NAME	CIR #	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
Machias Seal	79-367	13-14 Jun	N		1837				ARTE 0.4	87	0.52	1,2	1.6	87	0.52	DEVLIN/BERNARD
Machias Seal			N	825				1	COTE 0.6	34	0.5	1,2	1.7	34	0.62	DEVLIN/BERNARD
2000 NB COAST TOTAL				**825**	**1837**			**1**								
1999 NB COAST TOTAL				**896**	**2089**											

MAINE

ISLAND NAME	CIR #	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
Petit Manan	79-933	20-21 Jun	N	962					COTE 1.17	29	0.76	1,2	2.24	29	0.58	PAGE
Petit Manan			N		474				ARTE 0.62	60	0.64	1,2	1.85	60	0.36	PAGE
Petit Manan			N			15		794	ROST 1	16	0.63	3	1.63	16	0.5	PAGE
Little Nash Island	79-627	14-Jun	N	4									1.75	4		SCHICK
Dry Money Ledge	59-449	18-Jun	N	72					5 on 7/21	Clutch count: 1egg=7; 2egg=34; 3egg=31; 4egg=0						DRURY
Conary's Nub	59-137	14-Jun	N	201									1.8	201		SCHICK
Indian Point		14-Jun	N	50									2.2	50		SCHICK
Ship Island	59-341	14-Jun	N	0					30 nests seen earlier abandoned by census period							DIXON
Buck Island	59-672	13-Jun	NP	1												ALLEN
Hard Head Island	59-872	13-Jun	N	43					7/11 feedings & fledgers seen			VEB				ALLEN
Eaton Island Ledge	59-716	13-Jun	N	32					7/11 feedings & fledgers seen			VEB				ALLEN
Spectacle Island	59-688	13-Jun	VEB	1												ALLEN
Eastern Cow Pen		18-Jun	N	46					19 on 7/21	Clutch count: 1egg=8; 2egg=12; 3egg=25; 4egg=1						DRURY
Three Bush Island	59-980	18-Jun	N	239					0 on 7/21	Clutch count: 1egg=44; 2egg=116; 3egg=76; 4egg=3						DRURY
Great Spoon Island	63-287	18-Jun	VEB							2 ARTE seen at SE beach; 15 COTE seen on 5 Jun over nesti						DRURY
Wooden Ball Island	63-917	19-Jun	N		2				0	Clutch count: 1egg=2						DRURY
Little Green Island	63-418	15-Jun	N	12	48				16 on 7/19	Clutch count: 1egg=12; 2egg=40; 3egg=8						DRURY
Hog Island	63-588	15-Jun	N	20	17				0 on 7/19	Clutch count: 1egg=4; 2egg=21; 3egg=12						DRURY
Metinic (north end)	63-584	15-Jun	N	41					min 13 fledgers			1,3	2.27	55		WARZYBOK
Metinic (north end)		15-Jun	N		33				" "			1,3	1.98	41		WARZYBOK
Metinic (south end)	63-584	15-Jun	N	17	31				0 on 7/19	Clutch count: 1egg=6; 2egg=30; 3egg=12						DRURY
Shorebird Ledge	63-099	20-Jun	N	1						Clutch count: 1egg=0; 2egg=0; 3egg=1						DRURY
Seal Island	63-923	15-16 Jun	N	1205					COTE 0.8	35	0.41	2	2.2	35	0.58	BRETON
Seal Island			N		890				ARTE 0.92	60	0.38	1,2	2.2	35	0.58	BRETON
Seal Island		18-Jul	N			1			ROST 1	1	0	other				BRETON
Matinicus Rock	63-940	17,18-Jun	N	176												MARANTO

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Matinicus Rock			N		1030			355	ARTE	0.91	83	0.555	1,3	1.928	83	0.44	MARANTO
Eastern Egg Rock	63-860	18-19 Jun	N	1443					COTE	1.08	61		1,2	2.28	61	0.54	CARR
Eastern Egg Rock		20-Jun	N		85				ARTE	0.76	25		3	2.04	25	0.35	CARR
Eastern Egg Rock		20-Jun	N			165		966	ROST	1.28	40		1,3	1.7	40	0.46	CARR
Pond Island	73-282	18-Jun	N	33						0.394	33	0.899	1,3	2.73	33	0.72	BENEDICT, L.
Jenny Island	55-159	15-Jun	N	1050				2		0.015	68	0.9	1,2	2.31	68	0.63	LIGHTCAP
Sisiter Isl Ledge	55-237	18-Jun	N	1													Houston/Arbuckle
Higgins Beach (Scarborough)		11-Jul	N				4										JONES
Stratton Island	81-002	12-Jun	N	1109					COTE	1.1	89	0.68	1,2	2.3	89	0.67	CERNY
Stratton Island		12-Jun	N		9				ARTE	0.3	9	0.47	3	2	9	0	CERNY
Stratton Island		12-Jun	N			104			ROST	1.4	42	0.7	1,3	1.9	42	0.54	CERNY
Laudholm (Wells)		11-Jul	N				36										JONES
Crescent Surf (Kennebunk)		11-Jul	N				64										JONES
2000 ME COAST TOTAL				**6759**	**2619**	**285**	**104**	**2117**									
1999 ME COAST TOTAL				**6506**	**2854**	**288**	**86**	**1690**									
1998 ME COAST TOTAL				**6496**	**2405**	**257**	**62**	**1517**									

NEW HAMPSHIRE

ISLAND NAME	CIR #	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
Back Channel Island																DELUCA
Seavey Island		18-Jun	N	318					1.79	43	0.86	1,2	2.6	112	0.49	DELUCA
Hampton Marsh				35												DELUCA
Little Footman Island																DELUCA
Hen Island				15												DELUCA
Nanny																DELUCA
2000 NH Total				**368**	**0**	**0**	**0**	**0**								
1999 NH Total				**116**	**0**	**0**	**0**	**0**								

MASSACHUSETTS (Gulf of Maine colonies ONLY)

ISLAND NAME	CIR #	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
Woodbridge Island				120												USFWS
Plum Is. River Group				5												USFWS
Plum Is. Beach							13									USFWS
Bagwell Island				19												ECG
Rowley Salt Marshes				30												ECG
Lords Island				7												ECG
Ipswich Salt Marshes				6												ECG
Crane Beach				2			220									TTOR
Tinker's Island				35												MAS
Saugus River Bridge				44												ZENDEH
Mystic River				7												ZENDEH
Central Sq. Pier				114												ZENDEH
Snake Island				12												ZENDEH
Logan Airport, Boston							11									SMITH
Rainsford Island							35									MAS
Hog Island Pier				75												MAS

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North R. Mouth, Scituate				2			133									MAS
Duxbury Beach, Duxbury							18									MAS
Plymouth Beach, Plymouth				16	3		31									MAS
Ellisville Harbor, Plymouth							4									MAS
N. Sandwich Area				1			32									MAS
Scorton Creek, Sandwich							24									MAS
Sandy Neck, Barnstable							128									BARNSTABLE
Gray's Beach, Yarmouth				684			5		fair productivity							MAS
Wood End-Long Pt., Provincetown							40									NPS
Race Pt Light Area, Provincetown							53									NPS
Mission Bell, Provincetown							70									NPS
Tasha's Area, Provincetown							42									NPS
Beach Pt., Pilgrim Beach, Provincetown							8									MAS
High Head, Truro							47									NPS
Nauset- Orleans (Chatham line N to Nauset Harbor Inlet)							1									ORLEANS
Nauset, New Island - Orleans				997	3	3		702	Low success							NPS
Nauset-Eastham (CG Beach & Plover I.)							12									NPS
Marconi Beach, Wellfleet							19									NPS
Pamet Harbor Bar, Truro							20									MAS
Great Is. - Jeremy Pt, Wellfleet.							105									NPS
North Monomoy		19-Jun	N	11						not measured, but	low to none					KOCH
South Monomoy		17-18Jun	N	6886					1.83	207		2	2.55	207		KOCH
South Monomoy		17-18 Jun	N			3			ROST 1.0	3		3	1	3		KOCH
South Monomoy		17-18 Jun	N				119	376	BLSK 1(2)							KOCH
2000 MASSACHUSETTS Totals				**9073**	**6**	**6**	**1190**	**1078**								
1999 MASSACHUSETTS Totals				**9877**	**3**	**27**	**1010**	**804**								

2000 TOTAL: GULF OF MAINE	**17,876**	**4,524**	**377**	**1,294**	**3,196**
1999 TOTAL: GULF OF MAINE	**17,823**	**5,244**	**376**	**1,096**	**2,494**

BUZZARDS BAY, MA colonies (restoration sites):

ISLAND NAME	CIR #	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
Penikese Island	20-Jun	N	82	82					COTE					additional 60 late nests		
Penikese Island	20-Jun	N				2			ROST					additional 3 late nests		
Bird Island	8-Jun	N	1880	1880					COTE 0.92	19	79		2	additional 120 late nests		
Bird Island	11-Jun	N				1130			ROST 1.19	173	173		2	additional 150 late nests		
Ram Island	8-9 Jun	N	1707	1707					COTE 1.19	66	66		2	additional 323 late nests		
Ram Island	13-Jun	N				988			ROST 1.09	145	145		2	additional 141 late nests		

NANTUCKET SOUND

ISLAND NAME	CIR #	DATE	METHOD	COTE	ARTE	ROST	LETE	LAGU	FLEDGE/NEST	N	SD	METHOD	EGGS/NEST	N	SD	OBSERVER
Muskeget Island	20-Jun	N		23									additional 32 late nests			MOSTELLO & VEIT

Methods: N=nest count, NP=nesting pairs (visual estimate), VE=individual birds (visual estimate from island), VEB=individual birds (estimate from boat)
Productivity Methods: 1=feeding study, 2=fenced plot, 3=unfenced plot

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

Additional Maine Islands Surveyed in 2000 - but supporting no nesting terns

ISLAND NAME	DATE	OBSERVER
Squid Island		Benedict
Colthead Island	13-Jun	Allen
Grass Ledge West	13-Jun	Allen
Grass Ledge East	13-Jun	Allen
Dagger Island	13-Jun	Allen
Pond Island	13-Jun	Allen
Thrumcap Island	13-Jun	Allen
Pond Island		Cerney
Ram Island		Cerney
Bonney Chess		Schick
Eastern Island		Schick
Sally Island		Schick
Bald Rock		Schick
Sheep Island		Schick
Outer Bar		Schick
Big Black Ledge		Schick
Schoodic Island		Schick
Moose Island		Schick
Egg Rock		Schick
Rum Key Island		Schick
Bald Rock		Schick
Night Cap Island		Schick
Norton Is. Ledge		Schick
Pot Rock		Schick
Ladle Ledges		Schick
Big Nash Island		Schick
Flat Island		Schick
Black Rock		Schick
Sheldrake & Goose		Schick
Inner & Outer Sand		Schick
Stanley Ledge		Schick
Seaduck Rock		Schick
Norton Ledges		Schick

ISLAND NAME	DATE	OBSERVER
Pomps Is. Ledge		Schick
Browney		Schick & Schaeffer
Fisherman		Schick & Schaeffer
Egg, Seal & Curlew		Schick & Schaeffer
Crumple Island		Schick & Schaeffer
The Nipple		Schick & Schaeffer
Virgin Island		Schick & Schaeffer
Gilchrist Rock		Schick
Seguin Island		Schick
Ballast Island		Schick
Little Sheep		Schick & Schaeffer
Sheep Island		Schick & Schaeffer
Spectacle Island		Schick
Green Island		Schick & Schaeffer
Calf Island		Schick
Mink Island		Schick & Schaeffer
Man Island		Schick
Freeman Rock		Schick & Schaeffer
Popplestone Ledges		Schick
Halifax Island		Schick & Schaeffer
Shag Ledge		Schick & Schaeffer
Scabby Island		Schick & Schaeffer
Ram Island		Schick & Schaeffer
Foster Island		Schick & Schaeffer
Green Island		Schick & Schaeffer
E&W Brothers		Schick & Schaeffer
Shag Rock		Schick & Schaeffer
Pulpit Rock		Schick & Schaeffer
Libby Islands		Schick & Schaeffer
Double Head Shots		Schick & Schaeffer
Old Man		Schick
Roque Island		Schaeffer
Anguilla Island		Schaeffer

Additional Maine Islands Surveyed in 2000 - but supporting no nesting terns (Continued)

ISLAND NAME		
Egg Rock		
Shabby Island		
Gooseberry Island		
Halibut Rocks		
Saddleback Ledge		
Green Ledge		
Southern Mark Is.		
Black Horse Island		
White Horse Island		
Little Spoon		
Mason Ledge		
Spirit Ledge		
Brimstone		
John's Island		
W. Green Island		
E. Green Island		
Poplestone Ledge		
Harbor Island Knob		
Green Island		
Criehaven Island		
Camp Cove High L.		
Camp Cove Ledge		
Green Ledge		
Pudding Island		
Shag Ledge		
Ten Pound Island		
Two Bush Island		

ISLAND NAME		OBSERVER
No Man's Land		Drury
Saddleback Ledge		Drury
Large Green		Drury
Metinic Green		Drury
Little Roberts Island		Drury
Roberts Island		Drury
Green Ledge		Drury
Sheep Island		Drury
Carvers Island		Drury
Hay Island		Drury
Otter Island		Drury
Little Brimstone		Drury
Little Hurricane		Drury
Dead Man's Ledge		Drury
Tobbacco Juice		Drury
Medric Rock		Drury
Little Two Bush		Drury
Two Bush Island		Drury
Yellow Ridge		Drury
Clam Ledge		Drury
Hurricane Island		Drury
Oak Island		Drury
Little Green Island		Drury
Gooseberry Knob		Drury
Crescent Island		Drury
Marblehead Island		Drury
Fisherman's Island		Drury

GULL CONTROL for Maine Coast Sites

	Gulls Killed		Eggs Destroyed		Nest Destroyed		
ISLAND NAME	HERG	GBBG	HERG	GBBG	HERG	GBBG	REPORTER
Machias Seal **	1		2		1		DEVLIN/BERNARD
Petit Manan	1		2		1		PAGE
Metinic (north end)	3	1	680	56	247	20	WARYZYBOK
Seal Island			346	428	6	22	BRETON
Matinicus Rock		2	32	1	14	2	MARANTO
Eastern Egg Rock	6	1	15	11	9	5	CARR
Pond Island			13	23	8	12	BENEDICT, L.
Stratton Island	1		69	17	31	8	CERNY
2000 ME COAST TOTA	12	4	1159	536	317	69	
1999 ME COAST TOTA	DATA NOT REPORTED TO GOMSWG						

GULL CONTROL for Selected New Hampshire Sites

ISLAND NAME	HERG	GBBG	HERG	GBBG	HERG	GBBG	REPORTER
2000 TOTAL	0	0	0	0	0	0	
1999 TOTAL	DATA NOT REPORTED TO GOMSWG						

GULL CONTROL for Massachusetts Colonies within the Gulf of Maine

	Gulls Killed		Eggs Destroyed		Nest Destroyed		
ISLAND NAME	HERG	GBBG	HERG	GBBG	HERG	GBBG	REPORTER
South Monomoy	0	0	122	411	52	154	KOCH
2000 TOTAL	0	0	122	411	52	154	
1999 TOTAL	DATA NOT REPORTED TO GOMSWG						