

Gulf of Maine Seabird Working Group Annual Meeting – August 2013

Report summarized by National Audubon Society Seabird Restoration Program

The Gulf of Maine Seabird Working Group (GOMSWG) is a collaborative effort among state and federal agencies, national and state Audubon agencies, universities, non-governmental organizations, and private citizens that have been working to monitor, manage, and restore populations of colonial nesting seabirds in the Gulf of Maine for the past 29 years. Despite this combined effort, many seabird populations still face significant threats and challenges from predators, declining availability of prey species, climate change, sea level rise, human disturbance, invasive species, and threats during migration. Many of the management agencies are also facing declining budgets that challenge our ability to manage the colonies. It is through our combined effort and sharing of knowledge that seabirds stand the best chance of overcoming the challenges they now face.

Meeting activities involved island reports from Massachusetts to Canada, followed by six afternoon presentations.

Island Reports

Massachusetts Summary

Dr. Ian Nisbet

Massachusetts Tern Census Numbers, 2013

These numbers were compiled at the Massachusetts tern and plover meeting, held on 6 August. They are preliminary and are subject to minor changes when full reports are submitted. They were compiled by Ian Nisbet on behalf of Carolyn Mostello (MA NATURAL HERITAGE AND ENDANGERED SPECIES PROGRAM)

	ROST	COTE	ARTE	LETE	BLSK	LAGU
TOTAL pairs in MA 2011	1,360	16,501.5	0.5	3,774	3	1,863
% CHANGE from 2011	+7	+12	0	+39	0	+49
MASS GOM (includes Monomoy NWR)	8	9,104	0	1,872	0	1,863
% CHANGE from 2011	0	-1	—	+36	-	+49

Notes on total pairs:

ROST: More or less stable since 2008, following major decline 2000–07.

COTE: Stable at about 16,000 pairs since 2003, following steady increase from low of <4,000 pairs about 1976. Last year's low count was an anomaly.

ARTE: The lone surviving male at Penikese Island again interbred with a Common Tern in 2013. Some of the hybrid young raised at Penikese Island since 2007 are expected to return to breed.

LETE: Numbers have fluctuated between 3,300 and 4,300 pairs since the mid-2000s. Last year's low count was an anomaly.

BLSK: Again none in the GOM.

LAGU: Highest count, exceeding 2008 high of 1,816 pairs, following low counts in 2010–12.

Buzzards Bay Tern Census Numbers, 2013

	COTE	ROST	ARTE
BIRD ISLAND	2,645	793	0
% CHANGE from 2011	+39	-3	—
RAM ISLAND	3,511	543	0
% CHANGE from 2011	+40	+17	—
PENIKESE ISLAND	673.5	9	0.5
% CHANGE from 2011	+16	-74	0
BUZZARDS BAY total	6,829.5	1,336	0.5
% CHANGE from 2011	+37	+6	0

Buzzards Bay is outside the GOM, but is traditionally reported on at GOMSWG meetings because it is the site of intensive management and monitoring programs by MNHESP, and is the core breeding area for Roseate Terns, from which some birds emigrate to the GOM (and to which a few birds return from the GOM).

Generally, numbers returned to normal following anomalously low counts in 2012. Common Terns at Bird Island reached an all-time high after being stable at around 1,800 pairs since 1988.

MONOMOY ISLANDS – Monomoy National Wildlife Refuge

Carly Congdon – Biological Science Technician, U.S. Fish & Wildlife Service

Yianni Laskaris – Biological Science Technician, U.S. Fish & Wildlife Service

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

North Monomoy Island

Common Tern:

Census: The North Monomoy Island tern census was not conducted this year because no terns were observed to be nesting in areas that were historically used. Habitat loss due to over wash and expansion westward of the saltmarsh has left little area for terns to nest.

Productivity: Productivity for North Monomoy Island was zero.

South Monomoy Island

Common Tern:

Census: The South Monomoy Island tern and gull census was conducted on the 11, 12, and 17 June. The nesting area has been delineated into 60m² grids, and all nests were tallied by grid number. The total number of common tern nests counted was 7,368. With the Lincoln Index adjustment, this number was increased to a total estimated count of 7,526 nests for South Monomoy Island.

A second census was not conducted, but an additional 37 nests (13.12% of the total 282 enclosed nests) were initiated in productivity enclosures after the census window, indicating an additional estimated 1,137 nests in the colony after 20 June.

Productivity: The reproductive success of common terns on South Monomoy Island was excellent based on 245 A count-nests in 28 fenced productivity plots. The reproductive success for the plots monitored was 1.65 chicks fledged per nest. The burn that took place in November 2012 likely contributed to the increase in productivity this season. Following the burn, nesting habitat was greatly improved, and the terns were able to occupy areas that were once covered in vegetation. The overall nesting density in the main nesting area was lower than last year, as there were more terns utilizing habitat further south. A crow nest was found outside of the colony at the beginning of the season and destroyed. This pair likely contributed to the loss of eggs in the tern colony. Coyote tracks were seen in the colony on a handful of occasions, but no coyote was sighted during night observations. Coyote presence on South Monomoy Island in general was low this year, likely due to the fact that the island is once again separated from the mainland. Great black-backed gull and herring gull predation was frequently documented in the colony and on numerous occasions gulls were observed taking chicks. The following calculations are based on A-nests only and reproductive success is measured by chicks fledged per nest attempt.

Table 1. Comparison of Productivity Information for A-Period Nesting Common Terns on South Monomoy Island: 2011 to 2013

	<i>2011</i>	<i>2012</i>	2013	Standard Deviation	Standard Error	Sample Size
Average Clutch Size	<i>2.49 eggs/nest</i>	<i>2.55 eggs/nest</i>	2.42	0.58	+/- 0.04	245
Average Eggs Hatched Per Nest	<i>1.99 eggs hatched/nest</i>	<i>2.18 eggs hatched/nest</i>	2.20	0.78	+/- 0.05	245
Hatching Success	80%	85.8%	90.9%			
Fledging Success	64.70%	57.6%	67.3%			
Reproductive Success	<i>1.29 chicks/nest</i>	<i>1.26 chicks/nest</i>	1.65	0.79	+/- 0.05	245

Table 2. Number of Pairs and Reproductive Success of Common Terns on South Monomoy Island 2011 to 2013

	2011	2012	2013
Number of Pairs	6904	7762	7526
Reproductive Success	1.29	1.26	1.66

Feeding Stints: Common tern feeding stints were not conducted during the 2013 field season due to an inadequate number of staff and lack of availability during the field season.

Adult Trapping and Banding: Fifty-nine adult common terns were captured this season during banding efforts. Of the 59 captured, 46 were previously banded and 13 were affixed with new bands. In addition to those trapped during normal Refuge banding efforts, an additional 10 previously banded birds were captured during trapping associated with a nano-tag research project (conducted by Pam Loring of the University of Massachusetts). Of the 56 banded adults captured, 36 were originally banded at Monomoy NWR, 5 have not been reported, and the remaining were as follows; Brazil (1), Cuttyhunk Island, MA (2), Great Gull Island, NY (1), Mattapoissett, MA (2), Punta Rasa, Argentina (5), and Wareham, MA (4).

Salmonellosis: Presence of the Salmonella bacteria was estimated to be very low in the tern colony this year. Salmonella was suspected in a handful of fledglings, though samples submitted to the National Wildlife Health Center in Madison, WI for testing came back as negative for the bacteria.

Roseate Tern:

Census: Eight roseate tern nests were counted during the 11, 12 and 17 June census of South Monomoy Island. A total of 12 chicks hatched and all chicks were considered fledged based on GOMSWG standards. Roseate tern B-Census was conducted on 8 through 10 July, and no additional nests were located.

Productivity: The reproductive success of roseate terns on South Monomoy Island was excellent with a 100% fledging success rate. The following calculations are based on the total number of A-nests and reproductive success is measured by chicks fledged per nest attempt.

Table 3. Comparison of Productivity Information for A-Period Nesting Roseate Terns on South Monomoy Island: 2011 to 2013

	2011	2012	2013	Standard Deviation	Standard Error	Sample Size
Average Clutch Size	1.14 <i>eggs/nest</i>	2.00 <i>eggs/nest</i>	1.63	0.52	+/- 0.18	8
Average Eggs Hatched Per Nest	0.57 <i>eggs hatched/nest</i>	2.00 <i>eggs hatched/nest</i>	1.50	0.53	+/- 0.19	8
Hatching Success	50%	100%	92%			

Fledging Success	50%	100%	100%			
Reproductive Success	0.29 <i>chicks/nest</i>	2.00 <i>chicks/nest</i>	1.50	0.64	+/- 0.23	8

Table 4. Number of Pairs and Reproductive Success of Roseate Terns on South Monomoy Island 2011 to 2013

	2011	2012	2013
Number of Pairs	7	1	8
Productivity (chicks fledged/nest)	0.29	0.29	1.5

2013 Attraction Project: A roseate tern attraction project was initiated beginning in 2009 in an effort to attract roseate terns to South Monomoy Island due to the severe loss of habitat on Minimoy Island. This project was continued annually and in 2013 one sound system was placed near the main nesting colony along with artificial nesting structures, which consisted of 6-artificial nest boxes covered by a piece of plywood, and a new type of chick shelter that is shaped like a teepee. An additional array of nesting structures was placed in a second area deemed as quality habitat for roseate terns. The new teepee chick shelters used this year were modeled after those used by the Massachusetts Natural Heritage and Endangered Species Program on Ram Island. One pair of roseate terns nested inside one of the artificial nesting structures, which was about 10ft to the west of the sound system, and another roseate tern pair utilized one of the teepee chick shelters. This is the first time that roseate terns have nested in nesting structures on South Monomoy Island and this is considered by staff to be a small but important success of this effort thus far.

Adult Trapping and Banding: Four roseate tern adults were captured using Potter traps, all of which had been previously banded. The bands were reported to Bird Banding Lab and Jeff Spendelow of USGS.

Roseate Staging and Re-sighting: In conjunction with Mass Audubon and USGS, Refuge staff has been conducting counts of staging roseate and common terns on the refuge and South Beach, Chatham, in addition to re-sighting color banded adult roseate terns. Staging counts began on 21 July and will continue as staff availability allows and the terns are present. This year staff is also distributing materials to educate beach users about staging and roosting birds and documenting human caused disturbances as they occur.

Least Tern:

Census: Least terns nested along four separate sections of beach on South Monomoy Island. The A-period census was conducted on 15 and 17 June for the northern section of beach and 16 June for the three southerly nesting areas. A total of 261 nests were counted during the A-period census window. There was no B-period census conducted this year because the number of terns present at the Refuge nesting areas remained relatively consistent throughout the nesting season.

Productivity: Productivity was not quantitatively monitored, but was estimated to be fair to moderate based on observations of multiple fledglings. There was a small but notable increase in

fledglings observed from 2012; however, it is not known how many chicks actually fledged. Productivity was qualitatively estimated to be poor to fair in 2012 and poor in 2011.

Black Skimmer:

Census: A pair of skimmers was seen on 22 of May in the tern colony on South Monomoy Island. The pair did not nest and was not seen after that date.

Laughing Gull:

Census: During the tern census, which took place 11, 12 and 17 June, 974 active laughing gull nests were counted, compared with 441 in 2012, and 395 in 2011.

Productivity: Productivity was not monitored, however it was estimated to be qualitatively good based on the number of chicks and fledglings seen throughout the season. Ten laughing gull nests were destroyed early in the season due to their location near the roseate sound system and nesting structures.

Kleptoparasitism: Stints were continued this year to monitor the number of kleptoparasitism attempts by laughing gulls on common terns. Fifty-seven one-hour long stints were conducted in the tern colony throughout the field season. During stints a total of 1056 kleptoparasitism attempts were recorded, with an average of 18.53 per hour. Laughing gulls were successful 43% of the time, common terns were successful 17% of the time, the outcome was unknown 35% of the time, and prey items were dropped during 5% of the attempts. The number of laughing gulls involved in a kleptoparasitism may affect the outcome of each attempt. When laughing gulls were most successful at kleptoparasitizing fish from terns, there was on average six laughing gulls involved. When common terns were successful, the average number of laughing gulls was three.

Minimoy Island

Common Tern:

Census: No common tern nests were found or monitored on Minimoy Island this field season. This is the first time that we have had no nesting pairs of terns on Minimoy Island since it has been visited. This is most likely due to the loss of habitat from frequent over washes and seasonal storms.

Productivity: Productivity on Minimoy Island was zero.

Roseate Tern:

Census: No roseate tern nests were found on Minimoy this field season. This is attributed to the loss of nesting habitat due to over wash and seasonal storms.

Productivity: Productivity on Minimoy Island was zero.

Black Skimmer:

Census: No black skimmer nesting activity occurred on Minimoy this year. No nests were found in 2013 or 2012 and five nests were counted each year in 2011, 2010, 2009, and 2008.

Laughing Gull:

No laughing gull nesting activity occurred on Minimoy this year.

Predators (Refuge-wide)

Great Black-backed Gull and Herring Gull: Five herring gulls and 23 great black-backed gulls were removed from South Monomoy Island during 2013. Four great black-backed gull nests and seven herring gull nests were destroyed because of their proximity to nesting piping plovers, American oystercatcher nests, and the tern colony. Great black-backed gulls were observed in the colony a total of 57 times and herring gulls were observed in the colony 7 times throughout the month of July. Gulls were often seen eating chicks before exiting the colony, and are suspected of being the primary predator of tern eggs on South Monomoy Island during this nesting season.

Northern Harrier: Nesting northern harriers were not documented on the refuge, but based on their presence on South Monomoy Island, in addition to the abundance of suitable northern harrier habitat, it is likely that at least one pair was actively nesting. Northern harriers were observed at the South Monomoy Island tern colony seven times throughout the season. In mid-August harrier predation was observed to have been the cause of death to many fledgling terns.

Coyote: A total of 9 coyotes (4 adults, and 5 pups) were removed from South Monomoy Island in 2013. Scat, tracks and sightings of coyotes were seen near the tern colony and throughout the island. Overall predation by coyote was thought to be minimal.

American Crow: Suspected American crow predation of tern eggs was noted on several occasions. A pair of American crow nested off the southeast boundary of the tern colony in a small cluster of shrubs. On May 31, 1 crow and 4 chicks were removed. These shrubs will be removed prior to the 2015 nesting season. Additionally, two crows were removed on June 17 and 18 after evidence of heavy depredation on piping plover nests was observed.

Common Grackle: Evidence of common grackle predation on piping plover nests was also observed in 2013. Twenty-five common grackle were removed between June 18 and 26 to reduce predation stress on nests in areas of high predation. Common grackle likely have little to no impact on nesting terns. However, they may consume least tern eggs, although no evidence of this was observed.

Wading Birds: A wading bird census on North Monomoy Island was conducted on 17 May. Observers counted 150 black-crowned night heron nests, 62 snowy egret nests, and 16 great egret nests. No census was conducted on South Monomoy Island this year, because wading birds have not been found nesting on the island since 2007. Staff sighted 4 black-crowned night-herons on South Monomoy Island and a small amount of depredation was observed in the tern colony.

Owl (Unidentified Species): A snowy owl was found dead inside of the tern colony on 15 May prior to the most active period of tern nesting. Unidentified owls were documented on South Monomoy and Minimoy Islands and pellets were collected. On one instance pellets were found on Minimoy Island with roseate tern color bands in them, still attached to legs.

Peregrine Falcon: No evidence of peregrine falcon predation was documented within the colony on South Monomoy Island, though falcons were seen throughout the season at various locations on the refuge.

White and Seavey Islands, NH

TERNS, LLC

Project Coordinators: Dan and Melissa Hayward

Field Biologists: Vanessa Kleiss and Leah Moran

Census: We were not able to conduct a complete census of the Common Tern population on Seavey Island due to inclement weather during the census period in June. Once the weather became favorable there were many chicks that had already hatched. We felt that it would be best to stay out of the colony and estimate the number of nests using historical data and the nests in our monitoring plots. The nests in our monitoring plots represent a percentage of our total population. We averaged that percentage over the past 5 years, which is 11.68%+/-0.78. This number was derived by dividing the corrected ground count census number by the total number of nests in the monitoring plots. We multiplied the average percentage by the number of nests, 162, in our monitoring plots on June 12 to arrive at an A-Wave estimate of 1893. We do not count the nests in our plots during the census. They are added after, along with the numbers from White Island. All totaled we had approximately 2269 COTE pairs during the census period. This is an increase from 2044 in 2012. On June 20th we had 51 Roseate Tern nests. That is the same as last year. Arctic Terns were down to 2 pairs in 2013 from 4 in 2012.

The presence of a dog on White throughout the breeding season discouraged the terns from nesting in the area around the house. An electric dog fence was set up upon arrival and the dog was encouraged to roam within the boundaries. There were nests initiated within the fenced in area and they were slowly moved to the perimeter. Most of the nests were not successful. An assessment of the White Island terns will be conducted next year. We will be setting up a couple of productivity plots to monitor and compare with those on Seavey Island.

On the 8th of July, based on new nests in the monitoring plots, we estimated that our COTE B-Wave was approximately 350 pair. After the census period there were 8 new ROST nests initiated and no new ARTE nests.

Census (6/12-6/20)

Species	COTE	ROST	ARTE
Date	6/12/2013	6/20/2013	6/20/2013
A-Wave (Seavey estimate)=	1893	51	2
+ Plots(162)+			
White Is(214) (6/20/13)=Total	2269	After 6/20/13	After 6/20/13
B-Wave (July 8)	350	8	0
Season Total Nests	2619	59	2

Five Year Population Comparison (at Census)

Species/Year	2007	2008	2009	2010	2011	2012	2013
COTE (prs)	2121	2011	1993	2251	2447	2044	2269
ROST	52	37	34	48	42	51	51
ARTE	5	6	6	6	3	4	2

Five Year Population Comparison (Season Totals)

Species/Year	2007	2008	2009	2010	2011	2012	2013
COTE (prs)	2539	2227	2377	2615	2811	2577	2619
ROST	57	40	40	53	50	63	59
ARTE	6	8	7	6	5	5	2

Tern Productivity: (A-Wave) COTE productivity increased from 0.94 chicks per nest in 2012 to 1.30 in 2013. The clutch size increased from 2.29 eggs per nest in 2012 to 2.70 in 2013. ROST productivity increased in 2013 to 1.21 chicks per nest compared to 0.98 in 2012. ARTE productivity increased in 2013 to 2.0 from 0.50 chicks per nest in 2012. However, we only found a total of two ARTE nests (White and Seavey Islands combined), compared to 5 ARTE nests observed in 2012.

The weather from mid May until the end June was unusually wet with rainfall at over 10 inches. Fortunately this did not seem to significantly impact the adult terns or chicks. The strongest storm, with winds reaching up to 65 mph, did not seem to significantly affect the chicks. We did find more dead chicks (than usual) the day following the storm, but not in alarming numbers.

The vegetation on Seavey was affected by winter storm wash-over. The areas of Seavey that were washed over grew slower than the areas not washed over. During the early part of the season there were defined lines throughout the vegetation indicating the areas impacted the most. These areas of disturbance were well liked and provided more suitable nesting habitat than last year. This was evident in our monitoring plots as well.

At census, the COTE numbers were up 11.0% and the nest density in the plots, 2.89 per m², decreased by 0.61% in 2012. At the end of the season, the overall population was up 1.63% and the nest density in the plots, 3.39 per m², decreased by 20.83% from 2012.

(B-Wave) There were 25 COTE nests in the productivity plots for the B-Wave. This translated to 350 COTE nests for the entire colony. They averaged 1.88 eggs per nest. The average hatch was 0.76 eggs per nest and the fledglings per nest was 0.39 chicks per nest. There were 8 ROST nests initiated after June 20th with an average clutch size of 1.25 eggs per nest. The average hatch was 1.00 eggs per nest with a productivity of 0.86 chicks per nest. The adults in the nests that we were able to follow became less and less attentive towards the eggs and chicks once the majority of the colony started leaving for the day.

Gull predation was consistently light through the first half of the season until fledglings started to fly (mid-July), at which point gull predation of tern chicks and adults noticeably increased. Problem gulls began to consistently predate on fledglings and chicks both on the wing and off of the outer rocks of Seavey Island. We observed this increased predation for a couple of days before lethal methods were used to reduce the presence of problem gulls (see Predator Control below). Fortunately, these gulls did not cause any abandonment nor did a significant amount of chicks or fledglings die due to gull predation.

The following table represents the Peak COTE hatch information for the A-Wave.

Year	2008	2009	2010	2011	2012	2013
Peak Hatch Period	6/23-6/27	6/26-6/29	6/19-6/23	6/23-6/28	6/15-6/21	6/22-6/28
Peak Day	6/23	6/29	6/20	6/25	6/18	6/25
Standard Deviation	3.95	3.64	4.10	3.25	3.83	5.25

Tern Productivity

COTE A-Wave Totals [Season Totals]

Year	2008	2009	2010	2011	2012	2013
Nests Monitored	128 [143]	122[140]	184[189]	184[212]	163[235]	162[190]
Mean Clutch	2.35[2.29]	2.53[2.45]	2.68[2.62]	2.29[2.22]	2.70[2.43]	2.40[2.32]
Mean Hatch	2.08[1.95]	2.15[2.00]	2.37[2.26]	2.05[1.91]	2.02[1.40]	2.06[1.86]
Fledglings/Nest	1.28[1.21]	1.23[1.11]	1.81[1.67]	1.36[1.22]	0.94[0.80]	1.30[1.22]
Total Fledglings	2614[2695]	2541[2638]	4074[4393]	3328[3429]	1921[1649]	2950[3195]

ROST A-Wave Totals [Season Totals]

Year	2008	2009	2010	2011	2012	2013
Nests Monitored	37[40]	34[40]	48[53]	42[50]	51[63]	51[58]
Mean Clutch Size	1.78[1.75]	1.88[1.75]	1.90[1.87]	1.98[1.86]	2.0[1.89]	1.69[1.64]
Mean Hatch	1.46[1.35]	1.26[1.10]	1.44[1.38]	1.38[1.22]	1.25[1.06]	1.22[1.21]
Fledglings/Nest	1.24[1.18]	1.06[.93]	1.31[1.27]	1.21[1.16]	0.98[0.86]	1.14[1.12]
Total Fledglings	46[47]	36[37]	64[66]	51[58]	50[54]	58[64]

ARTE A-Wave Totals [Season Totals]

Year	2008	2009	2010	2011	2012	2013
Nests Monitored	6[8]	6[7]	6	3[5]	4[5]	2
Mean Clutch Size	1.83[1.88]	2.00[2.00]	2.00	2.00[2.00]	2.00[1.80]	2
Mean Hatch	1.33[1.25]	0.43[0.71]	1.83	1.00[0.60]	1.5[1.20]	2
Fledglings/Nest	0.67[0.63]	.33[0.29]	1.5	0.33[0.20]	0.50[0.44]	2
Total Fledglings	3 [3]	2[2]	9	1[1]	2[2]	4

Tern Feeding Study

COTE

Nest Hours	Feeding Rate
449 2/5	0.89

Species	Hake	Herring	Sand Lance	Butterfish	Mackerel
% of Diet	47.73	32.07	2.78	1.01	0.76

Predator Control: Biologists arrived on White and Seavey Islands on May 17 and found evidence of gull nesting; one GBBG nest with 3 eggs was found and destroyed. The eggs were tossed on the rocks and the nest cup was covered with rocks to prevent future use of the site and materials. Pyrotechnics and regular sweeps of Seavey Island to reduce the presence of gulls, began May 17 and continued through the end of the field season. As a result of gull predation on terns and the non-response of gulls to all other control methods, six GBBG were taken. Three GBBG were also euthanized due to wing injuries. There were instances of gull depredation on terns throughout the breeding season.

Predator Control (as of 8/5/2013)

Species	Nests Destroyed	Eggs Destroyed	Adults Taken
GBBG	1	3	6(+3 relief kills)
HERG	0	0	0

Gull Control (May 17-Aug 5)

Control Method	Average/Day
Screamer	1.79
Human Control	0.79
Banger	0.23
Problem Gull	0.08
Relief Kill	0.04
Nest Destruction	0.01

Other Nesting Species

There was no evidence of breeding Black Guillemots this breeding season. Common Eiders nested on Seavey Island and White Island and several Spotted Sandpiper nests were found on both islands as well.

Species	COEI	SPSA
# Of Nests	~25	~10

Other Tern Sightings, Rare Birds, and Interesting Observations

- PEFA- 6/18 (2x), 6/19 (1x), 7/9 (1x) & 7/27 (2x); we suspect it could have been the same one but we know for sure that the first sighting was a juvenile PEFA
- AMKE-5/18
- ATPU- 5/23 (1) & 7/11 (2)
- Black Tern- 5/31
- GRCO- 6/7

Funding for this project comes from the USFWS State Wildlife Grants, New Hampshire Fish and Game Nongame and Endangered Wildlife Program, NH Moose Conservation License Plate Program, the 908 Group, and private donors.

2013 Final Maine State Synopsis of Nesting Least Terns

From June 14-20th, a coordinated GOMSWG window count survey documented a minimum of 224 least tern pairs within the State of Maine. During the window count 129 of those least tern pairs nested at Crescent Surf while 92 nested on Stratton Island and 3 nested at Popham Beach. Later in the season, but outside of the window count, there was 110 nesting pair recorded at Stratton. Stratton Island produced a minimum of 79 fledgers, while Crescent Surf produced at least 93. The smaller colony at Popham Beach State Park was not successful due to predation issues. State productivity was estimated to be > 0.75 fledgers per a pair. Overall, it was a successful year for the terns and represents the highest statewide window count of least terns to date

Estimate of Least Tern Pairs

	WELLS	LAUDHOLM FARM	CRESCENT SURF	GOOSE ROCKS	WESTERN BEACH	STRATTON ISLAND	HIGGINS	RAM ISLAND	SEAWALL	POPHAM	REID STATE PARK	TOTAL
2003	0	20 (0)	57(8)	8(0)	0	-	38 (5 3)	0	0	0	33(5)	156 (66)
2004	15 (10)	1(0)	[50 (3)]	0	0	-	45 (5 4)	0	0	0	50(2)	146 (69)
2005	0	4(1)	[52 (7)]	0	[40 (3)]	18(9)	[2 2 (0)]	0	[17 (0)]	0	0	114 (20)
2006	[1(0)]	0	30 -10	[25 (1)]	0	103 (15)		0	0	0	[1(0)]	134 (26)
2007	1(1)	0	[37 (1)]	[45 (2)]	0	113 (10)8	0	0	0	0	0	150 (112) *
2008	0	0	92(52)	2(0)	[2]	72 (33)	0	0	0	0	0	166 (89)*
2009	0	0	102**(62)	[6** (0)]	0	72(16)	[1 6 (0)]	0	0	0	0	170 (78)
2010	0	[1**]	136** (45)	[18**]	0	76**(5)	0	0	0	0	0	211* (50)
2011	0	0	123* (73)	23* (12)	0	59* (28)	0	0	0	0	0	205* (113)
2012	0	0	99* (78)	0	0	86-92* (72)	0	5 (1)	0	2	0	185- 191 (151)
2013	0	0	129(93) *	0	0	92(76)*	0	0	0	3(0) *	0	224* (169)

[] colony deserted

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

** nesting outside of the window count and not included in state total

Crescent Surf Beach, Kennebunk, Maine

Kaiti Titherington, and Kate O'Brien, Rachel Carson NWR

Population Estimate: There were 129 active nests during the statewide least tern census on June 13th. Crescent Surf Beach had a productive season despite fox predation issues. Our final estimate is > 93 fledglings produced, or 0.72 fledgers per a pair. Two simultaneous daytime beach counts were conducted and the numbers of fledgers counted on July 17rd and July 31st were 63 and 30, respectively. On July 17th an additional 18 medium and two small chicks were counted while on July 31st there were still 6 medium chicks present. These medium chicks were not counted in the fledging rate, but likely fledged.

The solar powered net fence was largely successful in protecting nests, with the exception of red fox which breached the fence and remained inside it undetected for several days. Although there was undoubtedly predation, most of the chicks were older and moved outside the nest fence to avoid predation.

Late in the season approximately 3 exceedingly emaciated, dead, least tern fledglings were found. They appeared to have possibly starved.

Comparison: In 2012, the high count of nests was 191, with a minimum fledgling count of 151, or an overall productivity of 0.79. In 2011, the high count of nests was 123. The high fledgling count was 73, yielding an estimated productivity of 0.59. Productivity was poor from 2003-2007. The steady growth of the tern population is likely due to the intensive wildlife management actions at these productive beaches on the mainland and at Stratton

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

Goose Rocks Beach, Kennebunk

Maine Audubon

Population Estimate: No least terns nested on Gooserocks in 2013.

Comparison: In 2012 no terns nested, in 2011 a high of 23 pairs we observed, however due to predation only 9 pairs nested, and produced at least 12 fledglings.

Predator control: USDA Wildlife Services removed numerous predators from Goose Rocks Beach area.

Ram Island

Laura Minich Zitske, Maine Audubon Society

Population Estimate: No least terns nested on Gooserocks in 2013.

Stratton Island:

John Gorey, National Audubon Society

There were 92 least tern nests documented on Stratton Island during the census window, and 110 total nests for the season in 2013. Fledgling counts were conducted almost daily. The highest fledgling count was 69, with an additional 10 late season fledglings, for a minimum of 79 fledglings produced.

Popham Beach

Laura Minich Zitske, Maine Audubon Society

Approximately 3 pair was documented nesting during the window count with a high count of 4 nesting at any one time. Unfortunately, predation prevented any fledging.

Stratton Island, Maine

Emily Pollom and John Gorey, Island Supervisors, National Audubon Society

Summary

Census numbers for nesting Common and Roseate Terns in 2013 increased on Stratton Island. Like in 2012, this year's tern success seemed to depend mostly on food quality. Fish supply in 2013 was adequate for nest success but fish were smaller than in 2012. This required more time fishing and more feedings per chick.

Census

Arctic and Roseate Tern nests were identified between 1 June and 30 July, with Roseates increasing from 2012 levels to 93 nests for the GOMSWG census and 106 total for the season. Arctic Terns increased from 0 in 2012 to 3 nests in 2013. An island-wide Common Tern nest count was conducted from 12 to 13 June. Common Terns increased from 1033 in 2012, with a raw total of 1142 nests that was corrected with a Lincoln index of 1.01, to 1153 nests. With feeding study, productivity, and carpet plots added the total nest count was 1284. Least Terns on Stratton Island increased from 84 nests in 2012 to 92 in 2013 and ended the season with a total of 110 nests. This was similar to the 112 nests found in 2012.

A census of the wading bird colony on Stratton Island was conducted on May 18-19. A total of 95 Glossy Ibis, 14 Black-crowned Night Heron, 33 Great Egret, 75 Snowy Egret, and 4 Little Blue Heron nests were found.

Tern Productivity

Tern productivity was conducted using both fenced and unfenced plots. The 82 nests in the Common Tern plots hatched at a rate of 1.87 chicks per nest and fledged at a rate of 1.41 chicks per nest. Roseate Terns hatched 1.52 chicks per nest and fledged at a rate of 1.27 chicks per nest for the 93 nests followed. Predation events were somewhat rare in 2013, and weather was good and therefore did not have a significant impact on fledging success; instead, the highest cause of mortality in all larid species appeared to be starvation.

Tern Diet

Thirteen Common Tern nests were observed for a total of 512 nest hours. This year sand lance was the fish species most offered to chicks comprising 53% of the diet, with hake and

herring each making up 16% of the diet. Thirteen Roseate Tern nests were observed for 420 nest hours. Sand lance made up 81% of their diet, with hake being the second most common item at 3% and herring at 2%. The remainder was made of up unknown fish, euphasids, and butterfish. A subset of Least Tern nests were observed. Sand lance were the most commonly fed item at 46%, with hake at 33%, herring at 13%, and killifish at 5%.

Predation

Herring and Great Black-backed Gulls were the predominant tern predators and also continue to have a devastating impact of Common Eider chick success. Four Herring and 23 Great Black-backed Gulls were shot over the course of the season. Six Herring Gull nests and 7 Great Black-backed nests were found on Stratton and destroyed. As part of an effort to reduce Herring and Great Black-backed Gull populations on Stratton and Bluff Islands, eggs in all gull nests found on nearby Bluff Island were poked; 64 Herring Gull and 50 Great Black-backed Gull nests were poked on Bluff Island.

Census and Productivity estimates for terns at Stratton Island, 2009-2013.

	2009	2010	2011	2012	2013
COTE					
Census count	1037	854	960	1033	1284
Mean Clutch	2.76	2.64	2.50	2.60	2.02
Mean Hatch	2.60	1.85	2.23	2.40	1.83
Productivity	1.74	1.67	1.89	2.02	1.41
ROST					
Census count	76	35	51	51	93
Mean Clutch	1.98	2.06	1.90	1.89	1.88
Mean Hatch	1.46	0.88	1.82	1.58	1.52
Productivity	1.31	0.98	1.24	1.32	1.27
LETE					
Census count	72	76	59	86	92
Mean Clutch	2	2	1.9	2.0	1.97
Mean Hatch	--	--	1.5	1.5	1.65
Productivity	--	--	0.38	0.76	0.72

Outer Green Island, Maine

A. Catherine Pham, Island Supervisor, National Audubon Society

Census

The Gulf of Maine Seabird Working Group (GOMSWG) tern census was conducted on Outer Green Island on June 17th. A total of 1066 Common Tern (*Sterna hirundo*) nests were counted. The inclusion of 32 productivity study nests, 20 feeding study nests, and a Lincoln correction index of 1.02 resulted in a corrected total of 1143 nests. This represents a 10.65% increase from 2012, and may or may not be related to habitat modification on the island (see

Habitat modification below). Though the dataset is too short to show a significant trend, it appears that the Common Tern population may be at or near its carrying capacity on Outer Green Island. There were no known Roseate or Arctic Terns (*S. dougallii* and *paradisaea*, respectively) nesting on the island this year, though one or two Roseate Terns were observed loafing around the island through the month of July. One pair of Roseate Terns appeared to be prospecting for nesting sites in early July, but no known nesting followed.

Table 1. GOMSWG annual census

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
COTE	1	94	510	971	732	937	828	837	1151	1067	1034	1143
ROST	0	0	8	36	6	7	0	0	15	0	0	0
ARTE	0	0	0	0	0	0	1	2	0	0	0	0

Productivity

The first Common Tern egg was laid between May 17th and May 27th, with a more accurate date unknown due to island staff being absent during that time period. The average number of eggs per nest was 2.62 (n=52), which is in line with the average of 2.54 for 2002 – 2012. The first hatch occurred on June 17th, and peak hatch lasted approximately from June 25th – 30th; this is considered a few days later than normal for this island, but no objective data is available. The average number of eggs hatched was 2.27, which is similar to the average of 2.19 for 2002 – 2012. The fledging success rate was only 1.15, which is noticeably lower than the average of 1.36 for 2002 – 2012. This may be related to changes in chick diet or to an unusually large number of rainy and foggy days (see *Provisioning* and *Weather* below).

Table 2. Outer Green Island annual productivity

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Clutch	2.26	2.22	2.35	2.48	2.32	2.87	2.81	2.43	2.81	2.62
Hatch	1.92	1.69	1.92	2.24	2.08	2.7	2.63	1.98	2.19	2.27
Fledge	1.45	0.67	1.13	1.71	0.61	1.68	2.09	1.77	1.42	1.15

Provisioning

Chick provisioning was observed at 20 Common Tern nests this season over 835 observer hours. A total of 921 feedings were recorded for an average feeding rate of 1.10 items/hour. The average prey size was 55.87 mm, with the average size appearing to increase through the season, although exact data is currently unavailable. The most frequently observed prey were hake species at 41.80% of the observed chicks' diet and herring species at 26.60%. Of particular note was the appearance of juvenile Atlantic Moonfish (*Selene setapinnis*) in the chicks' diet later in the chick rearing period, with the first three specimens observed on July 19th dropped in a productivity plot. Though only two of these were recorded during a feeding study, many more were observed fed to chicks and dropped across the colony in the weeks following those first three. Although there is no published information available on the energetics of these fish, they are probably of little value as they are not known to be an important prey item. In addition to this, the inability of most chicks to swallow them may have affected chick survival later in the season.

Predation

Predation was a minor problem for the terns this season. When staff returned to the island on May 27th, there were signs of egg predation by gulls, but these predators were easily deterred by consistent harassment. One Great-Black-backed Gull (*Larus marinus*) nest was found on the neighboring island Junk of Pork and was destroyed. An apparent re-nest attempt (only a nest cup, no eggs) was later found and also destroyed. A pair of Herring Gulls (*Larus argentatus*) attempted to nest on Outer Green Island twice, and both nests were destroyed. A Peregrine Falcon (*Falco peregrinus*) preyed on adult Common Terns on a number of occasions throughout the season, which resulted in disturbances lasting anywhere from 15 minutes to an hour. It was assumed to be the same individual returning each time as it was always observed to be a large dark morph bird.

Table 3. Outer Green Island annual gull control

Gull nests destroyed	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Great Black-Backed Gull	30	48	28	16	10	9	7	4	4	2
Herring Gull	3	33	8	9	5	2	0	0	1	2
Total	33	81	32	25	15	11	7	4	5	4

Weather

The weather this season was dominated by days of rain and fog, which may have affected Common Tern productivity. Rain was recorded on 40 days for a season total of 10.59 inches. Fog was recorded on 17 days, though there were more days with fog that were not recorded as such due both to visibility parameters used and to the timing of the fog relative to that of recorded weather. A weeklong period of rain and fog in late June and early July may have affected chick survival at that time. Temperatures ranged from 43°F to 93°F, with average temperatures of 54°F in May, 61°F in June, and 69°F in July. The only significant extreme weather event occurred when Tropical Storm Andrea passed through on June 7th and dropped 1.50 inches of rain overnight.

Habitat modification

This year, a study was conducted by Kiah Walker to determine whether the productivity and phenology of Common Terns nesting on habitat modified by the placement of carpets differed significantly from that of Common Terns nesting on unmodified habitat. A total of 112 Common Tern nests were found on carpets that had been laid down in 2012 and 2013. Their average hatch date was July 1st, which is much later than the average of June 24th for the productivity and feeding study nests. The productivity of these modified habitat nests (n=25) was 1.16, which is comparable to the productivity of 1.15 of the productivity plot and feeding study nests (n=32). The productivity data from the modified habitat nests is not necessarily accurate because it became difficult to find the chicks once they were old enough to run and hide far from their nests.

Black Guillemots

This year, three new Black Guillemot (*Cephus grylle*) burrows were found, raising the island total to 16. Of those, ten were active this year with an average clutch size of 1.9 eggs per nest; this data does not consider relays following the failure of the first clutch. Of the ten active burrows, five hatched, three failed, and at least one was still incubating at the close of the season

on July 30th. Of the five hatches, one fledged two chicks, one failed, and three were still raising chicks at the close of the season on July 30th. Due to their lateness this season, total Black Guillemot productivity for the island could not be determined.

Common Eiders

There was an attempt to follow Common Eider (*Somateria mollissima*) nests on Outer Green Island this year in order to determine hatch success. Nests were mostly found opportunistically and were checked periodically to determine hatch success. Thirteen nests were found during the incubation period, and two more were found at the end of the season. Of these fifteen, at least seven hatched.

Jenny Island, Maine

Halley Walsh, Island Supervisor, National Audubon Society

Census

The annual Gulf of Maine Seabird Working Group (GOMSWG) census was conducted on June 15th. A total of 829 COTE nests were counted, with clutches ranging between 1 and 4 eggs. A Lincoln index mark/recapture correction of 1.083 was applied to the uncorrected count. The addition of 48 productivity plot and feeding study nests brought the total to 946 nests.

Seven Roseate Tern nests were found. This is much lower than the 2010 count of 33 nests but is around the same number of nests found in 2011 and 2012.

Productivity

For Common Terns, four productivity plots containing 33 nests and three feeding study plots with 23 nests were used to determine productivity, a summary of which follows:

Location	# of Nests	# of Eggs	# Hatch	# Fledge	Clutch Size (SD)	# Fledge/Nest (SD)	Hatch Success ¹ (%)	Fledge Success ² (%)
Overall	56	137	117	59	2.45 (0.63)	1.05 (0.77)	85	50
<i>Productivity Plots</i>	33	82	72	36	2.48 (0.67)	1.09 (0.78)	88	50
<i>Feeding Studies</i>	23	55	45	23	2.39 (0.58)	1.00 (0.85)	82	51

¹Hatch Success = # Hatch / # Eggs

²Fledge Success = # Fledge / # Hatch

For ROST, mean clutch size was 1.6, 45% of eggs hatched, and 0.73 fledglings were produced per nest based on the ROST Recovery Team algorithm, which assumes that 95% of A chicks fledge and B chicks weighing more than 16.7g on day 2 fledge.

Predator observations and control

The level of Common Tern chick mortality in 2013 is hard to determine due to predation by two mink (*Mustela vison*) and one Black Crowned Night-Heron (*Nycticorax nycticorax*). On

June 21st the first mammal sighting occurred, as well as the first tern hovering response. Traps were set that evening and the mink was captured within three days. On the night of June 25th a Black Crowned Night-Heron was spotted predated the north side of the island. Night stint efforts began that evening and the heron was removed on the night of the 26th. It is unknown how long the BCNH had been predated the island while predation control efforts were focused on the first mink. On the afternoon of the 28th another tern hovering event was spotted. Hovering occurred on and off until the close of the island. Traps were set but a second mink was not captured. Due to the spacing between observed hovering events, it is suspected the mink was traveling between Jenny Island and the mainland. A Peregrine Falcon (*Falco peregrinus*, PEFA) was also seen visiting the island for about a week. One adult COTE was observed being taken and 2 other adult terns were found on the island predated by the PEFA.

There were only 2 LAGU nests this season on Jenny, and both were removed before the GOMSWG census. Laughing Gulls were observed silently landing in the tern colony. Three were removed.

Large gulls were more aggressive than in past years. Great Black-Backed Gulls (*L. marinus*, GBBG) predated the colony mainly at night. One was removed. Herring Gulls (*L. argentatus*, HERG) were also observed predated the island. One was removed.

Feeding Study

Three feeding plots with 23 COTE nests were monitored in 2013. A total of 446 feedings were observed during 600 nest-observation hours, producing an average feeding rate of 0.74 deliveries per hour (compared with 1.50 deliveries per hour in 2012). Average prey size was 48.09 mm. Atlantic herring (*Clupea harengus*) constituted 36% of observed feedings. Hake (including white hake, *Urophycis tenuis*, and four-bearded rockling, *Enchelyopus cimbrius*) made up another 26% of the feedings. Sand Lance (*Ammodytes hexapterus*) constituted about 10% of the observed feedings. Butterfish (*Peprilus triacanthus*) were not seen in abundance this season contributing only 2% to the total feedings. While not recorded during feeding stints, Cunner fish (*Tautoglabrus, adspersus*) were also observed being fed to chicks. Roughly 90% of prey deliveries were fin fish.

Prey Species	Number of Items	% of Diet (Frequency)	Average Size (mm)
Herring	161	36	61.1
White Hake	116	26	44.69
Unknown Fish	45	10	34.2
Sand Lance	42	9.4	52.07
Insect	20	4.5	27
Butterfish	8	1.8	57.38

Management Strategies

In 2013, vegetation in productivity plots and on carpet edges (modified habitat) was uprooted and cut extensively early as well as mid-season in order to open habitat and facilitate

finding chicks. Cow parsnip (*Heracleum maximum*) umbels were lopped off early season before seeding in hopes of decreasing this dangerous plant's presence on the island. 2.5 meter tall black mustard (*Brassica nigra*) proved to be suffocating for tern nests this season. The increasing density of black mustard, wild radish (*Raphanus raphanistrum*), ragweed (*Ambrosia artemisiifolia*), hedge bindweed (*Convolvulus sepium*) and raspberry has significantly decreased available tern habitat and made it nearly impossible for adults to feed chicks in certain areas. Intense management of the south side of the island (spraying) is recommended for the early spring of 2014 to facilitate more suitable nesting habitat.

Pond Island NWR, Maine

Kristina McOmber, Island Supervisor, National Audubon Society

Census

The tern census was conducted on June 16. The unadjusted nest count for COTE was 612 (not including study nests). The count was adjusted using a Lincoln Index of 1.07 (107 marked nests and 8 unmarked nests), with the adjusted count (including study nests) being 692. This is the highest COTE count in the last 6 years (see table 1).

There were two confirmed ARTE nests on Pond Island in 2013, but both failed before the GOMSWG census window. Though ROSTs had a daily presence on Pond Island in 2013, no pairs laid eggs.

Table 1. Pond Island Tern Census Counts, 2008-2013

Year	COTE	ROST	ARTE	TOTAL
2008	434	0	3	437
2009	438	0	4	442
2010	590	0	3	594
2011	586	2	0	588
2012	596	0	0	597
2013	692	0	0	692

Tern Productivity

COTE productivity was measured by following 53 nests in both fenced and feeding plots. All nests were monitored from hatch until fail/fledge. Mean clutch size was 2.55 with 1.25 chicks produced per pair (see table 2).

Table 2. Estimates of COTE Reproductive Performance on Pond Island 2008-2013

Year	# Nests	Avg. Clutch/Pair	Avg. Hatch/Pair	Avg. Fledge/Pair
2008	45	2.69	2.33	1.07
2009	39	2.74	2.21	0.79
2010	48	2.71	2.35	2.08
2011	16	2.06	1.0	0.69
2012	52	2.88	2.38	2.31
2013	53	2.55	2.04	1.25

Tern Provisioning

A COTE chick provisioning study was conducted by observing 18 nests with a total of 495 nest hours of observation. There were a total of 1236 feedings observed with the primary prey items being sand lance (38.54%), herring (20.23%), and hake (10.52%) with an average feeding rate per nest of 2.50 feedings per hour (see table 3). Crustaceans and other invertebrates were also represented, comprising a total of 12.96% of the diet. Though not seen in the feeding studies, researchers also observed silversides, bluefish, cunner, and moonfish delivered to chicks in the colony.

Table 3. COTE Prey Item Summary

Prey Item	Count of Prey Item	Percent of Diet
Sand Lance	476	38.54%
Herring	248	20.08%
Hake	128	10.36%
Unknown	106	8.58%
Crustacean	78	6.32%
Unknown Fish	75	6.07%
Unknown Invert	68	5.51%
Hake or Herring	26	2.11%

Predator Activities and Control

Great Black-backed Gulls were a serious problem for Common Eiders, observed on several occasions taking chicks. One GBBG nest was destroyed on the south ridge and four GBBG were shot. Herring Gulls were a problem for Common Terns, observed on several occasions taking chicks. No Herring Gulls were successfully removed this year. Laughing Gulls began to kleptoparasitize terns carrying fish in mid-July. One LAGU was shot.

A Great Horned Owl was hunting the island at the onset of the field season, and an owl was trapped on the night of June 3. No evidence of a second GHOW was found.

A Peregrine Falcon adult was observed harassing the colony beginning June 24 and visited the island multiple times daily, taking both adults and chicks daily.

Other Island Notes

There were very few disturbances from island visitors in 2013. Groups of people attempted to land on the island on 5 occasions. All visitors quickly departed with minimal disturbance to the colony.

There was one bird sighting this season that was a first record for PINWR – a pair of Northern Shovelers in mid-July. Another notable sighting this year was a Black Tern on June 5.

Eastern Egg Rock, Maine

Maggie Lee Post, Island Supervisor, National Audubon Society

Summary

Census numbers for nesting Common, Roseate and Arctic Terns increased slightly on Egg Rock in 2013, while Laughing Gulls decreased. This year's tern success seemed to depend mostly on weather. Arctic Tern productivity doubled over 2012, while Common Tern productivity decreased and Roseate Tern productivity decreased, but still remained close to overall island averages.

Census

Arctic and Roseate Tern nests were identified between June 10 and June 21, with Roseates increasing from the 2012 count of 71 to 83 nests and Arctic Terns increasing from 57 to 68 nests, although both these are still lower than the 2011 nest counts. An island-wide Common Tern and Laughing Gull nest count was conducted from June 13 to June 15. Common Tern numbers increased slightly, with a raw total of 708 nests that was corrected with a Lincoln index of 1.032 to 831 nests, including the productivity plots, feeding studies, and carpet plots. Laughing Gull nesting decreased from 2065 nests in 2012 to 1848 in 2013, although this could be a low estimate due to pre-census nest destruction of over 200 Laughing Gull nests. Ninety-nine Common Eider nests were identified opportunistically during the census.

Larid Productivity

Tern productivity was conducted using both fenced and unfenced plots. The Common Tern plots comprised 58 total nests which hatched at a rate of 1.97 chicks per nest and fledged at a rate of 0.71 chicks per nest. Roseate Terns hatched 1.42 chicks per nest and fledged at a rate of 0.93 chicks per nest for the 83 nests followed. Similar to most seasons, Arctic Terns were hit hardest by predatory gulls. The 68 study nests fledged only 0.53 chicks per nest of the 1.20 chicks hatched/nest. For the sixth season productivity was conducted on Laughing Gulls in a fenced plot of 19 nests which hatched 1.68 chicks per nest and fledged 0.94 chicks per nest. With continued stretches of fog and rain, post-hatch weather seemed to be the highest cause of chick mortality in 2013. Post-fledge Common Tern deaths were observed, and were likely due to starvation.

Diet

Fourteen Common Tern nests were observed for a total of 363 hours. Hake was the most frequently fed item, comprising 51% of feedings, with herring at 13% and invertebrates at 7%. Seven Arctic Tern nests were observed for a total of 154 hours; hake were the most frequently fed item comprising 47% of diet followed by crustaceans at 14% and unknown invertebrates at 5%. Six Roseate Tern nests were observed over 153 hours; hake was the most frequently fed item at 37%, sand lance and pollock at 22% each, and herring at 8%.

Atlantic Puffins

This year there were 86 active puffin burrows on the island, not including large complexes. The fledging success rate of 0.91 chicks per nest was very high for the island. Hake comprised the largest proportion of puffin diet at 40% followed by herring at 28%, bluefish at 8%, and *Sebastes*, sp. at 7%. Hake averaged 1.13 bill lengths and was primarily delivered early in the season, while herring and bluefish averaged 2.17 and 2.10 bill lengths, and were more prevalent late in the season. Butterfish was not a significant source of food for the puffins this year.

Predation

Herring and Great Black-backed Gulls were the predominant tern predators. Nine Herring Gulls were shot over the course of the season. One pair of Great Black-backed Gulls was found to be nesting on the island, and its nest was destroyed and one of the pair shot. As part of an effort to reduce Laughing Gull numbers in the Gulf of Maine all Laughing Gull eggs were either poked or oiled during census and 201 adults were shot. In addition, a buffer zone was maintained within 10 meters of tern habitat in which all Laughing Gull nests were destroyed. Laughing Gulls still appeared to be a source of predation on Arctic and Common Tern eggs and young chicks.

Other

Productivity was conducted on Black Guillemots for the first time. 23 nests were followed and had an average hatch rate of 1.41 and a productivity of 0.81. This summer, Egg Rock welcomed 96 visitors, primarily media personnel, donors, and teen campers.

Census results, productivity estimates, and gull control at Eastern Egg Rock, 2009-2013.

	2009	2010	2011	2012	2013
COTE					
Census count	1036	714	829	817	831
Mean Clutch	2.3	2.36	2.32	2.58	2.53
Mean Hatch	1.97	2.08	1.85	1.65	1.97
Productivity	0.70	1.09	1.14	1.01	0.71
ROST					
Census count	101	82	90	71	83
Mean Clutch	1.93	1.89	1.83	1.80	1.90
Mean Hatch	1.34	1.72	1.33	1.52	1.42
Productivity	0.69	0.72	0.72	1.31	0.93
ARTE					
Census count	100	83	77	57	68
Mean Clutch	1.8	1.83	1.89	1.69	1.85
Mean Hatch	1.1	1.69	1.15	1.07	1.20
Productivity	0.37	0.64	0.40	0.26	0.53
LAGU					
Census count	2127	1553	2051	2065	1848
Mean Clutch	2.26	2.30	2.54	2.23	2.26
Mean Hatch	1.74	1.91	2.18	1.45	1.68
Productivity	0.74	0.87	1.5	1.09	0.94
ATPU					
Number of nests	107	123	123	104	86*
Fledge Success	0.79	0.86	0.92	0.74	0.91

BLGU					
Mean Clutch					1.64
Mean Hatch					1.41
Productivity					0.81
GULLS SHOT					
GBBG	1	2	3	1	1
HERG	6	12	4	8	9
LAGU	89	156	109	183	201
GULL NESTS DESTROYED					
GBBG	0	0	0	0	2
HERG	1	1	0	0	0
LAGU	2127	1553	2061	2046	1881

*ATPU nest count not final. Does not include burrow complexes.

Metinic Island

Amy Beich – Island Supervisor, Zak Pohlen - Island Technician

Census

The Gulf of Maine Seabird Working Group (GOMSWG) census was performed on June 19, 2013. A total of 325 tern nests were counted on the Northeast Point of Metinic and 20 Arctic tern nests in the South Cove. A correction factor of 1.017 was applied to the Northeast Point, and a species ratio of 63% COTE and 37% ARTE (n=101).

Metinic Island					
	2009	2010	2011	2012	2013
COTE					
# of Nests	387	406	300		209
Mean Clutch Size	2.37	2.32	2.19		2.8
Mean Hatch Success*	87%	84%	89% (81%)	0	78.6%
Mean Fledge Success*	47% (41)	44% (35)	68% (66%)	0	27.1%
Chicks fledged/Pair*	1 (0.8)	0.85 (0.70)	1.23 (1.08)	0	0.76

ARTE					
# of Nests	393	352	198		142
Mean Clutch Size	1.75	2.32	1.45		2.1
Mean Hatch Success*	81%	84%	36% (35%)	0	89.5%
Mean Fledge Success*	50% (41)	37% (35)	43% (37)	0	52.4%
Chicks fledged/Pair*	0.81 (0.64)	0.32 (0.29)	.23 (.22)	0	1.1

ROST					
# of Nests	0	1	0	0	

Chicks fledged/Pair	-	0	-	-	-
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South End					
ARTE and COTE nests	1	2	2**		
*when available, data in parenthesis includes fledglings later dead after the GOMSWG fledge date of 15 days					

**Unconfirmed

Productivity

Following last year's abandonment, this year's reproductive/fledging success was an improvement. However, Common Tern productivity was low overall – the lowest of the past 5 years and under the 1 chick/nest USFWS goal. Arctic Terns did much better than previous years, fledging on average more than one chick per pair. Low Common Tern success is believed to be largely due to Herring Gull predation on the exposed east side of the colony.

Provisioning

We followed 6 COTE nests and 7 ARTE nests this season for a total of 97 observational hours (557 nest hours) and 510 feedings. COTEs fed at an average rate of 0.57 feedings/hour, while ARTEs fed at 0.77 feedings/hour. Diet for both species was composed largely of hake and/or herring – 50.2% for Common Terns and 44.3% for Arctic Terns. Arctic Terns chick diets were on average more than 20% insects or other invertebrates – four of our provisioning nests were invertebrate specialists. In addition to hake/herring, pollock and sand lance were amongst the most frequent prey items brought back by Common Terns. Unlike in previous years, we did not see large amounts of butterfish or other inedible fish such as stickleback being fed to tern chicks.

	Total Nests	Feedings/ Hour	Hake Or Herring	Hake	Herring	Pollock	Insects	Butterfish	Other & Unknown
COTE	6	0.57	25.3%	15.7%	9.2%	14.0%	2.2%	2.6%	31%
ARTE	7	0.77	28.9%	10.0%	5.4%	0%	20.7%	2.1%	32.9%

Predators

- Although Merlin were seen early in the season (largely before May 25th) they did not prove a persistent problem, nor did they attempt to nest on the island this year. Merlins were sighted again during the last week of the season, most likely following migrating shorebirds.
- 138 Herring Gull and 2 Great Black-backed Gull nests were found on the North End of the island. Eggs were either puncture or oiled.
- A comparison study of poking and oiling in 40 Herring Gull nests indicated that ???
- Gulls were heavily deterred during the beginning of the season using pyrotechnics.
- Herring Gulls in particular were seen taking chicks, particularly in the second week after peak hatching. A total of 6 gulls, 5 HERG and 1 GBBG, were taken.
- 38 garter snakes, a known predator of Metinic's tern chicks, were removed from the island. One was found with a Savannah Sparrow chick in its mouth.
- Metinic's pair of Bald Eagles successfully hatched a chick for the first time this year, and appeared to feed heavily on gulls and possibly Common Eiders.

Guillemots

We monitored 42 guillemot nests and recorded a hatch success of 71.1% and egg depredation rate of 7.1%. Fledge rate is estimated as 31.0% based on the number of chicks that were over 300g at the time of the crew's departure. Overall productivity is estimated to be 0.22. A total of 21 chicks were found, and 18 were banded.

Petrels

We marked 69 Leach's Storm-petrel burrows early in the season based on calls. However, we were only able to find 6 active burrows (containing an adult, egg or chick) during our July productivity checks. Two of those burrows had a chick by the end of the season and four still contained an egg.

Common Eider

Eider numbers were low this year, averaging fewer than 50 eiders during morning counts. Previous years Eiders had averaged between 150 and 300 for morning counts. 57 observations of eider crèches were documented, composed of at least 5 separate crèches. No Common Eiders were banded this year.

Incidental Sightings

148 species of birds were sighted on Metinic this year, including Summer Tanager, Orchard Oriole, Gray-cheeked Thrush, Red Knot, Purple Martin, and Caspian Tern.

Matinicus Rock, Maine

Frank Mayer, Island Supervisor and Jess Steketee, Resident Intern, National Audubon Society

During the 2013 season Matinicus Rock received 5.8 inches of rain, our average air temperature was 58.5 degrees F and our average sea surface 52.9 degrees F. The food quality this year was good early in the season with the terns feeding mostly large hake that seemed to come from very near the island and Razorbills feeding large herring and Pollock. Later in the chick rearing period the food for Arctic Terns started to include a large number of amphipods and other invertebrates with the Razorbills feeding mostly large herring and the Atlantic Puffins feeding small hake. Predation from Herring, Great Black-backed, and Laughing Gulls was not a problem this season with the exception of a Herring Gull that preyed on tern chicks in the New Ken plot area. An immature female Peregrine Falcon visited the colony regularly from 17 July to 8 August and was seen to capture adult Arctic and Common terns as well as fledged ARTE, COTE, and LAGU.

Tern and Laughing Gull Census

Tern Census. The tern census was completed June 15-17. There were 519 Arctic Tern nests and 171 Common Tern nests for a species ratio of 75% ARTE and 25% COTE. Our Lincoln Index correction factor was 1.027.

Laughing Gull Census. We counted 579 LAGU nests this year which is a small increase of 3.9% from last year. We destroyed 114 LAGU nests prior to census in areas where they nested close to terns.

Productivity

Arctic Terns fledged 0.76 young per nest. Mean clutch was 1.78 for 51 nests. This is higher than in past years and represents the highest productivity on MR since 2003

Common Terns fledged 1.13 young per nest. Mean clutch was 2.5 for 30 nests. This is higher than in past years and represents the highest productivity for COTEs on MR since 2002.

Predation by gulls was not as major a factor this year as it was in years past however, we found that productivity was lowest in plots where LAGUs and terns nested in close proximity (.41) and highest where terns were in LAGU free areas (1.5). Predation by Herring and Great Black-backed Gulls was almost non-existent this year with the exception of a single Herring Gull which was seen eating chicks and eggs during a stretch of poor visibility and high winds.

Atlantic Puffin hatch success was 0.45 (n= 53) and productivity was 0.13 (n=48) chicks per nest, which is the lowest on record. When we did our first productivity check on 21 May we found very few eggs and peak lay was not until about 10 June. Peak hatch was around 10 July. Many chicks were found dead outside of their burrows indicating starving chicks.

Razorbill hatch success was 0.65 (n = 62), and productivity was 0.32 (n = 62) and fledge success was 0.5 chicks fledged/chicks hatched.

Leach's Storm Petrel hatch success was 0.73 (n = 15).

Black Guillemot productivity was 0.33 which is below the average of 0.42 from 2010 to 2012.

Manx Shearwaters were seen on the water in groups of as many as 10 regularly throughout the season and were heard calling from the northwest, west-central, and southwest areas of the island. We banded a single large, fat, and happy chick from the original burrow near the cannon wheel on the Sunset Strip.

Feeding Studies

Arctic Tern feedings in 2013 were 67% fish and 33% inverts. The most common food item was hake at 49% of the total diet followed by amphipods which were 25% of the total diet. We also saw a number of terns with snipefish and found lots of dropped moonfish after we ended feeding studies. The average feeding rate was 1.55 deliveries/hour.

Common Tern feedings in 2013 were 94% fish and 6% invertebrates. The most common food item overall was hake which constituted 64% of the diet followed by herring at 9%. Amphipods were the most common invert and comprised 4% of the total diet. The average feeding rate was 0.81 deliveries/hour.

Puffin bill loads in 2013 consisted mostly of hake (49%), herring (24%) and unknown fish (14%). Very few butterfish were seen this year and they only comprised 2.5% of the diet. After feeding studies were finished we began to find many burrows containing large uneaten bluefish. We commented on how they looked much like herring and how if they had been seen during a feeding study we mostly likely would have called them herring.

Razorbill feedings were hake (52%), unknown fish (18%), and herring (13%) with lesser amounts of Pollock (6%) and butterfish (4%).

Gull Control

Laughing Gulls

During census, all eggs in 579 nests were poked to prevent hatching. An additional 114 nests were destroyed before the census in a LAGU-free buffer zone, bringing the total number of nests destroyed to 693. An additional 99 re-nests were destroyed after the census. 124 adult Laughing

Gulls were shot on 21 June by FWS, with effort concentrated on parts of the island where LAGUs and terns nested in close proximity to each other. One additional LAGU was later shot.

Herring Gulls and Great Black-Backed Gulls

No Herring or Great Black-backed Gull nests were found this year. 6 Herring Gulls and 2 Great Black Backed Gulls were killed this year.

Unusual Birds

A **Dicksissel** was observed on 31 May and was the best bird of the year. Other interesting birds were 2 Cory’s Shearwaters on 4 June and a Black-billed Cuckoo on 30 May.

Our high count for **Common Murres** was 100 on 27 June. The decoys and sound system were moved to a new location this year after they were washed away from the loafing ledge in a large storm event last year. We chose an area in the southern part of the Razorbill colony and only saw one murre in the area. Murres still frequented the loafing ledge and the peak count there was 74 on 24 June. No eggs were observed this year.

Seal Island National Wildlife Refuge, Maine

Jennifer Howard, Island Supervisor and Julia Gulka, Resident Intern, National Audubon Society

Although the food supply seemed improved from last year—much higher numbers of hake and herring and very few observed feedings of butterfish!—tern and alcid productivity were much lower than in previous years. Puffin starvation over the winter and cool, rainy weather during the middle of the season were both large factors in the poor productivity.

Tern Census

Due to safety concerns on the island, a complete tern census was not performed in 2013. Similar to 2009-2012, a partial census was conducted on June 15th, (14 of 30 marked grid squares were counted). The total number of nests in these areas has been determined to consistently represent, on average, 57% of the total nest number of the colony over the last eleven years in which a complete census was performed (1996-2006). Arctic Terns have continued to expand into the southern periphery of the main colony, and the inclusion of an additional grid square in this area should be considered for future census protocols. The total estimated number of nests was 2,487 (after a Lincoln Index of 1.026 was applied), compared with 2,796 nests in 2012 and 3,038 nests in 2011. Species ratio was determined by marking a circle with a radius of 16 meters around each of 7 blinds and identifying as many nests to species as possible within that circle, in addition to the known species nests within 5 mixed species productivity plots. The species ratio has fluctuated throughout Seal Island history; the last five years showed a decreasing trend from 45.97% ARTE in 2008 to 34.31% ARTE in 2012, however, in 2013, this ratio jumped up to 41.77%.

Table 1. Number of nests per species from 2008-2013.

	2008	2009	2010	2011	2012	2013
Arctic Tern	1,084	991	1,238	1,201	959	1039
Common Tern	1,283	1,580	1,788	1,836	1,837	1448
Roseate Tern	0	0	2	0	1	0
Laughing Gull	0	0	0	0	0	0

Tern Productivity

Surprisingly, Arctic Terns fared better than Common Terns this year. Mean clutch was 1.99 for Common Terns and 1.78 for Arctic Terns. Many more one-egg COTE clutches were observed in 2013 than within the past two years. Mean hatch was found to be 1.35 and 1.5 for Common and Arctic Terns respectively. This was the second lowest mean hatch for COTE during SINWR history. ARTE productivity (0.65), although higher than the 2012 figure, was still one of the lowest for SINWR history. COTE productivity dropped to a record-smashing low of 0.28. Of the 136 tern nests (179 tern chicks) followed for productivity, 134 ARTE and COTE chicks died; only 19% died of starvation whereas 61% died due to poor weather.

Table 2. Number of tern chicks fledged per nest from 2008-2013.

	2008	2009	2010	2011	2012	2013
Arctic Tern	0.93	0.74	0.53	0.74	0.58	0.65
Common Tern	1.11	1.07	0.53	0.77	0.83	0.28
Roseate Tern	-	-	0.50	-	1.0	-

Tern Feeding

16 nests each of Arctic and Common Terns were watched for a cumulative total of >200 observation hours. COTE feeding rate was found to be 0.64 feedings/hour, and ARTE feeding rate was 1.02 feedings/hour. COTE and ARTE chick diet was composed predominantly of hake and herring. Similar to the past two years, there were several ARTE amphipod specialists during late June. Exposure was the main cause of chick mortality; tern chicks that survived the late-June and early July storms had excellent food and were almost guaranteed fledging.

Table 3. Major prey species and percentage of diet for Arctic and Common Terns (2013).

	Euphausiid	Amphipod	Butterfish	Hake	Herring
Arctic Tern	2.1	5.5	3.8	49.0	8.0
Common Tern	0.4	1.3	7.7	36.9	24.5

Predation and Kleptoparasitism

Laughing Gulls kleptoparasitized terns consistently through the season, and terns also kleptoparasitized Atlantic Puffins regularly through mid-July to August. A Peregrine Falcon was observed flying through the colony at least once a day during late May through August. Both gull censuses this season yielded high numbers of breeding Herring and Great Black-backed gulls. The overall downward trend of GBBG continued, though this was the second highest count of HERG nests in SINWR history. More immature and adult Bald Eagles were observed this year, disturbing the cormorants, eiders, terns, and gulls. Several were flushed from perched positions in Areas 3-5.

Table 4. Gull control measures in 2013 by species.

	# Nests Destroyed	# Shot
Herring Gull	256	12
Great Black-backed Gull	30	5
Laughing Gull	0	0

Atlantic Puffins

Only 13 new burrows were discovered this year for a grand total of 715 known burrows on Seal Island. A new reduced census method for Atlantic Puffins was created in 2011 and continued this season. Burrow status was determined for 93 burrows within 15 plots of 3 m radius spaced 25 m apart throughout the main colony in Area 1, and for 107 additional burrows outside of the main colony. The extrapolated census methods yielded only 345 of 715 known burrows as active, which is significantly lower than the previous increasing colony trend over the past 20 years. Extrapolation of these plots to the entire colony continues to be under discussion, especially as many of these burrows must be determined active by watching for feedings and during years of decreased hatch success, such as in 2013, the number of active burrows is probably artificially low. Hatch success in 2013 was only 0.55, whereas the previous seven-year average was a much higher 0.89 (range = 0.74 – 0.97). Correcting the total to account for the poor hatch success in 2013 yields an estimated 425 active burrows.

Our high count of puffins was 358, just half of the high count observed in 2012 (737). Puffins were not seen to be loafing on rocks as frequently or in as great of numbers as in past seasons, potentially due to the puffin starvation over the winter. Puffin productivity was estimated to be a dismal 0.09 chicks/pair (n = 69 active burrows) as compared to 0.77 chicks/pair in 2010 and 0.73 chicks/pair in 2011 (Table 5). This was even lower than last year's ATPU productivity of 0.31 chicks/pair. Hopefully, these two years of poor puffin productivity will not become a new trend. Only 20 puffin chicks were banded this season as many chicks hatched mid-July and were still too small to band when the crew left at the end of the season in August. In addition to hatching later, puffin chicks also seemed to be growing much slower and many, even at 30 days old, were still too small and downy to band.

Table 5. Number of ATPU chicks fledged per nest from 2008-2013.

	2008	2009	2010	2011	2012	2013
Atlantic Puffin	0.80	0.72	0.77	0.73	0.31	0.09

Puffin chick diet was monitored at two blinds for over 100 observer hours. Chick diet was composed of 39.72% hake, 33.88% herring and only 1.12% butterfish! Several large shrimp, polychaetes, and two feedings of puffer fish were observed. Observers used DSLR cameras with telephoto lenses to more accurately identify fish species and gain insight into new fish species.

The three geolocator units deployed in 2012 were recovered this year as all adults were again breeding on SINWR. Seven geolocators (four Migrate Tech tags and 3 Lotek tags) were deployed on adult Atlantic Puffins this year.

Black Guillemots

This was the seventh year that Black Guillemot productivity was tracked on the island. Productivity was determined to be 0.17 chicks/pair (n = 42), a significant decrease from last year's 0.47 chicks/pair. The primary cause for BLGU chick mortality was starvation.

Razorbills

A large number of Razorbills was seen loafing around the colony this year compared to 2011 and 2012, particularly at the Western Head. A total of 21 active Razorbill burrows were

found on the island this year, which is the highest counted on SINWR. Productivity was 0.57 chicks fledged per pair - the highest recorded SINWR alcid productivity number for 2013.

Common Eiders

A total of 159 COEI nests were counted in early June, a huge leap up from 56 in 2011 and 117 in 2012. However, a large portion of their main nesting area (Area 4) was not counted to minimize disturbance to the birds. Creches of 40+ ducklings were seen several times during mid-June and early July.

Great and Double-crested Cormorants

Great and Double-crested Cormorants were again nesting on Seal. Boat counts performed in May, June, and July by John Drury reported 25 GRCO nests.

Bird Sightings

114 bird species were observed on the island this summer, including a Wilson's Phalarope hanging out in the small pool by the cabin. The Red-billed Tropicbird was seen on the island for the ninth year in a row. It was first sighted on May 15 and was last sighted on August 7. It was seen on 56 days throughout the summer and was again seen loafing under a boulder in Area II.

Ship Island

Julia Gillis – Island Supervisor

Katie Rittenhouse – Technician 5/8 to 6/21

Jacob Shorty – Technician 6/25 to 7/24

Census

Ship Island was monitored by a two-person crew from May 8-July 24, 2013. During the GOMSWG census on June 14, we counted 457 common tern nests, yielding a total of 436 nests after applying a Lincoln Index of 1.0248 and abandonment correction factor of 6.8%.

Ship Island				
Common Terns	2010	2011	2012	2013
# of Active Nests	41	105	251	436
Mean Clutch Size	1.83	2.16	2.20	2.44
Mean Hatch Success	22.2%	55.6%	57.1%	72.5%
Mean Fledge Success	56.7%	24.9%	63.9%	46.4%
Chicks Fledged/Nest	0.33	0.53	0.82	0.80

Nesting and Productivity

The first nest was observed on May 27 and terns were continuing to copulate as of July 24. High monthly tides on June 25 and 26 washed away a considerable number of nests (possibly up to 150), and tern numbers sharply declined from 1000 to 700 terns during this period. Following this event, tern numbers continued to decrease. Peregrine falcon, merlin, and bald eagles maintained a presence throughout the breeding season; however, their presence did not seem to disrupt the overall stability of the colony.

Tern Provisioning

We observed an average of 16 total common tern nests for a total of 93.5 hours and 726 feedings. Average feeding rate was 1.04 feedings per hour. Atlantic Herring composed 46% of observed feedings. Sand lance made up 21%, and sand/shore shrimp and euphosids made up 10% together. A total of 19 definitive prey item species were observed in addition to unknowns and several other species observed in the colony but not in the provisioning plots.

Diet Item	% of COTE Diet			
	2010	2011	2012	2013
Atlantic Herring	23.3	24.4	79.4	45.6
Sand Lance	13.4	17.3	0.9	20.9
Crustaceans	--	--	--	10.5
Pollock	1.4	18.1	--	4.3
Invertebrates	31.2	1.7	1.6	5.7
Butterfish	2.6	0.4	--	1.7
Stickleback	4.9	10.7	0.2	1.5
Hake	2.2	0	--	1.1
Unknown	7.7	20.5	7.2	

Predator Control

The most significant predators during the 2013 season were merlins, peregrine falcons, and bald eagles. All species were observed successfully preying on terns on multiple occasions. At least 13 common tern adults and chicks were taken by these predators. Mink traps were set early in the season with an average of 19 traps maintained throughout the season, but no definitive signs of mink were observed. No great-horned owls were observed this year. Two owl traps were set on June 21 and maintained until the end of the season. Gulls did not present a significant predation risk this season and were deterred from loafing on any part of the island. Three herring gulls were lethally dispatched.

Species	Minimum # of Vists	Minimum # Terns Taken
Peregrine Falcon	7	3
Merlin	16	6
Bald Eagle	56	4

Foraging Directions

Foraging directions were observed from three locations on the island from June 5 to July 17 for a total of 32.25 hours. Terns were seen foraging in all directions, but the greatest number of foraging terns was recorded either departing to or arriving from 181-210°.

Petit Manan Island

Jordan Chalfant – Island Supervisor,

Jill Tengeres, Matthew Dickinson, and Andrea Santariello – Field Technicians

Census

The GOMSWG census was conducted on June 19 and 20, 2013 and 1,370 tern nests were counted and corrected with a 1.05% Lincoln Index to 1,433 tern nests. Tern census results in 2013 were 26.3% lower than 2012 (1,944 nests). To calculate species ratio, we identified 547 tern nests to species, 38% of all tern nests on the island. In 2013, the colony consisted of 57% common terns (312 marked nests) and 43% Arctic terns (235 marked nests), yielding total colony estimates of 817 common tern nests and 616 Arctic tern nests. Two pairs of roseate terns nested this year however both nests were abandoned before hatching. Additionally, 55 Common eider nests were counted during the census.

Petit Manan Island							
	2007	2008	2009	2010	2011	2012	2013
COTE							
# of Nests	1343	1307	1374	912	1138	1186	817
Mean Clutch Size	1.70	1.83	1.93	1.7	1.72	1.90	1.77
Mean Hatch Success	64.8%	85.3%	85%	47.9%	72.3%	78.8%	62%
Mean Fledge Success	76.7%	71.6%	56%	31.0%	36.1%	65.1%	48%
Mean Chicks Fledged/Nest	0.76	1.12	0.90	0.43	0.40	0.98	0.53
ARTE							
# of Nests	1038	1255	1268	688	558	758	616
Mean Clutch Size	1.53	1.55	1.68	1.6	1.46	1.73	1.49
Mean Hatch Success	51.9%	75.3%	78%	21.6%	56.8%	73.7%	66%
Mean Fledge Success	62.8%	81.3%	54%	20%	24.5%	70%	30%
Mean Chicks Fledged/Nest	0.45	0.95	0.70	0.21	0.22	0.89	0.29
ROST							
# of Nests	5	4	4	2	0	2	2
Mean Chicks Fledged/Nest	0.20	1.00	0.20	0.00	0	0.25	0
LAGU nests*	1350	1363	1171	270	735	811	750
ATPU nests	53	93	104	88	46	63	47
COEI nests	49	105	101	56	35	67	55
*7.5 % correction factor applied to LAGU nest counts							

Tern Productivity

Reproductive success for both tern species was much lower in 2013 than the previous season; however, numbers were comparable to 2011. A mean of 0.53 chicks fledged per nest for common terns and 0.29 for Arctic terns (these calculations include chicks that died after the 15-day GOMSWG fledge date). While there seemed to be adequate prey availability, many days of rain and fog contributed to the stresses on the tern colony this year. Great black-backed gulls moved into the colony and predated tern chicks whenever the weather was foul. Peregrine falcons maintained a presence throughout the breeding season; however, it did not seem to disrupt the overall stability of the tern colony. Bald eagles frequently land on the island and predated the laughing gull colony, however they did not impact the terns.

Tern Provisioning

We conducted provisioning observations for 22 common tern nests and 15 Arctic tern nests for a total of 759 hours and observed 497 prey deliveries. Atlantic Herring was the primary prey delivered to both Common Tern (34.6%) and Arctic Tern (49.7%) chicks. On average, tern adults delivered 0.7 prey items per nest per hour.

Diet Item	%	%
	COTE diet	ARTE diet
Atlantic Herring	34.6	49.7
Bluefish	7.8	6.5
Butterfish	4.2	5.9
Invertebrates	4.2	2.7
Hake	3.1	8.6
Sandlance	20.4	0.5
Other	2.2	4.2
Unknown	23.5	21.6

Arctic Tern Metapopulation Project

As part of the Arctic Tern metapopulation project we re-sighted 116 adult Arctic terns. Additionally, we trapped and banded 27 adult Arctic Terns and banded 56 Arctic Tern chicks.

Predator Control

Our predator control efforts were mainly focused in May and during the census. Peregrine Falcons were the most frequent visitors to the colony throughout the season. During the month of May we discouraged the Peregrine Falcons and other avian predators from perching on the island using bird deterrents. We took a less active role once terns began establishing nests in late May and early June. The terns appeared to adequately deter Peregrine Falcons from perching on the island by grouping together and chasing the predator. Great Black-backed Gulls presented a more serious threat to the colony this year, as a significant percentage of the tern chicks on the island were predated throughout the season. During the census, we poked or oiled the eggs of 607 Laughing Gull nests and destroyed 108 Laughing Gull nests. Lethal removal of avian predators thought to be specialists also occurred and included: 16 adult Laughing Gulls, 1 Herring Gull and 10 Great Black-backed Gulls.

Alcids

The highest alcid counts for the season were 135 Atlantic Puffins (26 June), 25 Razorbills (6 June), 6 Common Murres (14 June) and 296 Black Guillemots (18 May). We estimated the breeding population of Atlantic Puffins was 47 pairs based on the number of active burrows (i.e. burrows with either an adult, egg or a chick). This estimate is substantially lower than previous years, and the difference is thought to pertain to breeding fitness after a particularly strenuous winter. Puffin hatch success was 62% and number of fledged birds/nest was 0.56. We documented two active Razorbill burrows in 2013; and both chicks successfully fledged. Although Common Murres were observed loafing on the island, there was no evidence of any breeding attempts. Lastly, we estimated that the Black Guillemot breeding population was 58 pairs. We monitored a subset of the Black Guillemot population (22 nests) for productivity—weighing and measuring wing cord of chicks every 3 days. For these birds, average clutch size was 1.65, average hatch success was 1.39, and average number of chicks per pair was 1.13.

In addition to daily counts and productivity monitoring, a large portion of our time was spent reading Alcid bands and grubbing burrows. We re-sighted 48 individual Atlantic Puffins this field season. We banded 17 puffins this summer (3 adults and 14 chicks) and recaptured 3 adults. We banded two Razorbill chicks and one adult. Finally, we banded 71 Black Guillemots (6 adults and 65 chicks).

Other Research

In a continued effort to study the foraging behavior of the seabirds on Petit Manan Island and locate important offshore feeding grounds, four antennae arrays were installed on the viewing deck of the lighthouse, and 16 Arctic Terns and 14 Common Terns were equipped with nanotags. Directional data was retrieved from the antennae receiver which will provide directional data regarding how often and how far each species travels to forage. We also satellite tagged one Razorbill as part of a multi-island effort to document foraging behavior and the location of foraging habitat, and determine migration pathways, habitat use, and wintering areas for razorbills in the North Atlantic. In addition, Stantec once again installed two solar-powered Anabat detectors on the lighthouse to track migratory movement of bats through the Gulf of Maine.

Eastern Brothers Island

Mary Raikes – Island Supervisor, Jake Shorty/Katie Rittenhouse – Island Technicians

This was the 7th year of efforts to establish a new tern and alcid breeding colony on Eastern Brothers Island in Jonesport, Maine. The 17 acre island is currently utilized by black guillemots, common eiders, Leach’s storm-petrels, and common terns.

Black Guillemots

The number of guillemots on Eastern Brothers Island declined again this year with approximately 100 breeding pairs and a peak count of 380 individuals (Table 1). Declines are likely due to mink predation (28 dead adults found) and poor weather (11 burrows flooded and abandoned). A total of 18.3 inches of rain fell from May 22-August 8, much higher than 6.6 inches last season. Many burrows are out of reach, but the crew confirmed a minimum of 82 active guillemot burrows and regularly checked 63. Hatch success was low at 31.1% (total eggs hatched/total eggs) also due to predation and weather (Table2). At the end of the season, only 28.6% of the burrows monitored had chicks. Many of the chicks do not fledge before the crew leaves, so a true productivity estimate cannot be calculated (see Table 3, average fledge date).

Table 1. Eastern and Western Brothers Islands Black Guillemot survey results

Year	Average Daily Count	Max Adult Counts and Date	# Confirmed Active Burrows E. Brothers	# Confirmed Active Burrows W. Brothers	Estimated # Breeding Pairs (both islands)
2007	500	725 May 31	88	10	160
2008	482	733 June 6	95	12	250-300
2009	410	658 May 21	111	14	200-225
2010	480	625 May 16	61	11	240*
2011	244	380 Jun 1	70	1	122*
2012	234	340 Jul 14	65	6	117*
2013	202	380 May 28	82	5	101*

*Estimated by calculating half of daily average. Other estimates represent island supervisor’s best judgment

Table 2. Black Guillemot Nest Fate

Year	# nests	Hatch Success	Nest Fate at the end of the season					
			Nests with surviving chicks(N)	# chicks alive at end of season	Abandoned Nests	Predated Nests	Failed due to weather	Unknown
2007	88	25%	-	24 of 26	-	-	-	-
2008	?	28%	30.5% (25)	36 of 40	42.7% (35)	2.4% (2)	6.1% (5)	18.3% (15)
2009	82	39%	-	49 of 88	-	-	-	-
2010	19	26%	-	9 of 9	-	-	-	-
2011	68	34.2%	30.9% (22)	35 of 37	11.8% (8)	27.9% (14)	0	29.4% (20)
2012	60	54.1%	48.3% (29)	51 of 60	21.7% (13)	25.0% (15)	1.7% (1)	5.0% (3)
2013	63	31.1%	28.6% (18)	27 of 33	25.4% (16)	17.5% (11)	17.5%(11)	11.1%(7)

Table 3. Black Guillemot Nesting Chronology

Year	Eastern Brothers Island				
	First BLGU egg	First BLGU Hatch	Avg. Lay Date	Avg. Hatch Date	Avg. Fledge Date
2007	~June 8	July 5	June 13*	July 11	August 13*
2008	June 9	July 5	June 20*	July 18	August 20*
2009	June 8	July 5	June 18*	July 16	August 18*
2010	June 8	July 7	June 15*	July 13	August 15*
2011	May 25	July 16	June 17*	July 14	August 13*
2012	May 26	June 23	June 7*	July 5	August 6*
2013	May 25	June 24	June 19*	July 12	August 14*
Average	June 2	July 2	June 15	July 12	August 14

*for each nest, used hatch date to calculate lay (-28 days) and fledge dates (+33days)

Predator control

Three adult male mink were captured in 2013 on April 8, June 7, and June 19 using 110 conibear traps.

The crew maintained 45 traps on both islands combined and increased to 64 traps during the breeding season. Four BLGU were caught in traps incidentally. Bald Eagles (36 times), American Crows (25 times), and Merlin (20 times) were the most common predators sighted this season. It is suspected that gulls were accountable for the predated eggs at times of fog and rain. A total of two Herring Gulls were shot this summer (one on July 6th and the second on July 27th) as both were injured and flightless near the colony. We destroyed two HERG nests from Eastern Brothers Island and poked eggs in 5 HERG and 4 GBBG nests on Little Brothers Island, adjacent to Western Brothers.

Terns

A tern sound system, 53 tern decoys, and an electric fence to protect the tern nesting area from sheep were deployed on April 29th, 2013. Sheep grazed Eastern Brothers year-round for the fourth year since the mid-1990's and vegetation height and density across the island has been considerably reduced. The first common tern was observed on May 23rd. Small groups of 1-2 terns were seen regularly throughout the season, especially mid-June to mid-July. For the third consecutive year, a single adult common tern has resided in the decoy area throughout the

summer. He was frequently seen loafing, foraging, and attempting to feed herring and hake to the decoys.

Alcids

Alcid decoys and an alcid sound system were deployed on February 26, 2013. A second social attraction sound system was added on June 18. Small numbers of RAZO and ATPU were regularly seen floating and foraging near the island. In particular, one razorbill became a regular visitor and landed near the alcid speakers on several occasions and was even heard vocalizing. On July 7th a pair landed in the same area and on July 20th three were seen resting there. Razorbills were observed perched on the island on 10 different occasions this year. Throughout the season RAZO were sighted 315 times while ATPU were observed on only 20. One COMU was seen floating and foraging 100yds off the southwestern shore of Eastern Brothers on July 10th.

Machias Seal Island

Lauren Scopel, University of New Brunswick; Sydney Sheedy and Caitlin Smith, field technicians

This year was difficult for many seabirds. Rain was plentiful. Terns nested, but no chicks hatched. Alcids laid later than usual; ATPU were 2-3 weeks late, chicks grew slowly, and none had fledged by early August. Alcid chick diets featured herring, hake, haddock, and other gadoids that we have been unable to identify. ATPU appeared to feed less frequently than usual, and we found many dead one-week-old chicks throughout the colony. This will likely be the worst productivity year for ATPU since we started monitoring in 1995. RAZO had an average year and did not appear to endure the same difficulties as ATPU.

We collected blood samples from 27 ATPU and 16 RAZO in May to investigate their condition following a difficult winter. Becky Holberton is analyzing the samples. We also retrieved 12 of 26 geolocators deployed on ATPU last summer, but we have been unable to get any data off them, likely due to faulty waterproofing. Lotek is investigating the issue.

Terns

This was our eighth consecutive failure year, with predators again the obvious cause. We monitored 41 nests (35 ARTE, 1 COTE, 5 unknown) and estimate 90 total nests. Terns first landed on May 16. Courtship provisions were initially of very poor quality (invertebrates and larval fish), but by late May terns regularly brought in large hake. We found our first egg on May 25, and mean lay was June 11. Attendance varied throughout the season. Some pairs would incubate throughout the day, but most would attend the island at night and stay only part of the morning. Gulls depredated most tern eggs on the island in an event on June 2; many terns relaid. We conducted early morning gull watches around our living area, which reduced gull predation there (although the depredation rate outside of the living area is still near 100%). We also periodically had two PEFA visit to hunt seabirds, which agitated terns. Although terns initially would chase off PEFA and return to incubate, the increasing attendance by PEFA and unrelenting gull predation in June appeared to be too much for terns to overcome. On June 11, two PEFA stayed on the island during a storm, and although terns initially tried incubating, they eventually abandoned daytime incubation for two days. Most eggs were probably made inviable

at this time. A second wave of lay occurred around June 20, but attendance decreased in July, and no eggs hatched. 50% of all monitored eggs were depredated, down significantly from last year's 100% depredation.

Estimated Tern Nests (no formal census since 2006)

2009	2010	2011	2012	2013
150	175	75	50	90

Predator Control

As in previous years, we were equipped with a pellet gun, slingshot, and noisemakers to conduct non-lethal gull control. This year we were also given a paintball gun to use as a scare device, which was surprisingly effective (but only while we were in the colony). After an entreaty to CWS to consider lethal gull control following the June 2 depredation event, CWS agreed to permit a contracted predator control specialist to remove problem gulls on June 22-23. We removed 11 HERG and 1 GBBG during this time. The potential for future lethal control will be evaluated by CWS after this season. Immediately following lethal control, gulls were wary. Without the continued presence of the gun, however, gulls re-established their hierarchy and gradually reverted back to their original behaviour. Gulls were frequently seen scavenging dead ATPU chicks and stealing fish from alcids in July. We removed 3 additional HERG and 1 GBBG that were injured or in poor health during the season.

Gulls nested on Gull Rock (0.25 km away) and near the NW shore of MSI itself; for the second consecutive year, more gulls nested on MSI than Gull Rock. Heavy swells overwashing Gull Rock in May and June may have forced gulls to nest on MSI. We found 43 nests on MSI and poked 60 eggs. We found 16 nests on Gull Rock and poked 30 eggs. All nests were HERG, save one 3-egg GBBG nest on MSI. We saw two large, downy gull chicks on Gull Rock in late July, which suggests that more eggs might have been laid after our last trip on June 22.

Alcids

No formal census was conducted for ATPU or RAZO. We counted 219 COMU nests in July, but this is likely an underestimate. Details of alcid productivity, growth and (identified) diet are described in the tables below. Diet data are percent by number, not biomass. This is the first year we have conducted systematic observations of COMU.

	Monitored Burrows	Mean Lay	Mean Hatch	Burrow Occupancy	Hatching Success (hatch/active nest)	Nesting Success (fledge/active nest)	Linear Growth Rate (mass)
ATPU	160	27 May	7 July	0.73	0.60	N/A	3.3 grams/day
RAZO	88	22 May	27 June	0.75	0.58	0.41	4.7 grams/day

	N	Herring	Hake	Krill	Butterfish	Sand Lance	Larval Fish	Other
ATPU	1610	23.1	38.2	4.8	1.2	1.1	1.1	30.5
RAZO	758	62.7	19.1	0.1	0.8	4.1	0.4	12.8
	N	Haddock	Rock Eel	Pollock	Unknown Gadoid	Butterfish	Herring	Other
COMU	228	13.2	10.1	23.7	35.5	2.6	13.2	1.7

Other Species

We conducted a full COEI census for the first time since 2009, finding 121 nests. Thirteen large ducklings were seen in early August. NOGA did not nest this year, but did loaf on the island in July. LHSP were also breeding on the island, but we did not monitor them this year.

North Brother Island, Nova Scotia

North Brother Island is a managed island, supervised by local steward, Ted D'Eon with support from the Canadian Wildlife Service. The island was visited by Ted sixteen times between April – July 2013. The information in this report is compiled from Ted's island visits reports found on-line at <http://teddeon.com/tern13.html>. Terns did not nest on South Brother Island again this year and have not since 2003.

Census

The tern census was conducted on June 10 2013. A total of 680 terns nest were counted. The majority of these were COTE, with approximately 40-50 and ARTE nests and 34 ROST nests. An additional four ROST nests were documented during the season bringing the total count to 38 nests.

Current population estimates of breeding terns on North Brother Island are the fourth highest since 1990. However, from 2005 to 2010 there was 43% decline in the number of ROST breeding on North Brother. Since 2010, the number of ROST has been relatively stable between 34-38 pairs.

ROST Productivity

Tern productivity is not monitored. The mean clutch size for ROST on North Brother Island was 1.52 ± 0.51 (n= 38 nests). ROST productivity is unknown, although 17 ROST chicks were banded on July 10.

Predator Control

No major predation events were documented but evidence of avian predation on older chicks was observed. One Great Black-backed Gull nest was destroyed on North Brother Island on June 10. On South Brother Island, four Great Black-backed Gull nests were destroyed on May 28.

Common Eiders

Five Common Eider nests were found on N. Brother Island and two Common Eiders nests on South Brother Island.

Feeding

Feeding studies were not conducted. Of note, several uneaten Butterfish (*Peprilus triacanthus*) were found in the colony.

Habitat Management

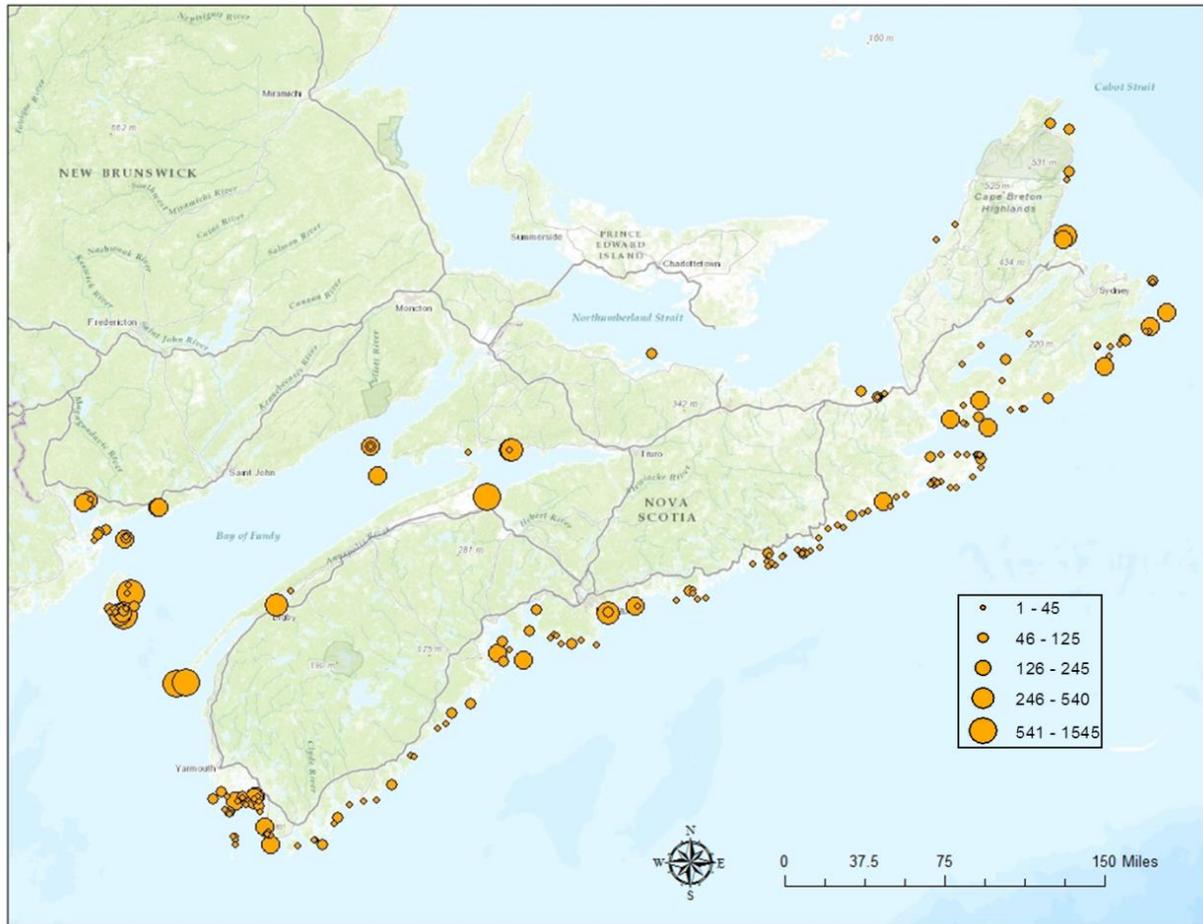
The majority of ROST & COTE nest in areas where habitat was modified with weed barrier to keep habitat open. ARTE are nesting in the bare cobble habitat on the perimeter of the island. Otherwise, waist-high wild radish, mustards, knotweed and ragweed have taken over the island. Dead tern chicks were found caught in the wet weeds. The Canadian Wildlife Service is exploring options to address the vegetation issue.

An overview of large gull surveys in the Bay of Fundy

Prepared by Sabina Wilhelm, Canadian Wildlife Service, Atlantic Region

Complete coastal aerial surveys were initiated by the Canadian Wildlife Service (CWS) in the 1970s in all four Atlantic Provinces (New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador) to document the status and trend of the widely dispersed populations of large gulls (Herring, Great Black-backed and Ring-billed Gulls). These aerial surveys are coupled with ground surveys at a subset of colonies to obtain a species ratio for mixed colonies and a correction factor to calculate number of breeding pairs based on counts of individuals from the aerial surveys. Currently, CWS aims to conduct comprehensive surveys of all waterbird colonies at a minimum 10-year interval in each Province.

To date, complete coastal surveys within the Bay of Fundy, including both Nova Scotia and New Brunswick coastlines, have been conducted three times: 1971, 1987, and 2013. Additional surveys in the Bay of Fundy were conducted in the Grand Manan archipelago in 1998 and 2001 and along the coast of Nova Scotia in 2002. The location and relative size of gull colonies (Herring and Great Black-backed Gulls combined) observed during the 2013 aerial survey within the Bay of Fundy and along the remaining shores of Nova Scotia, including Cape Breton, are shown in Figure 1. Specific to the Bay of Fundy, more gull colonies were observed in 2013 (76 colonies) compared to the 1987 survey (59 colonies). However, the average colony size was smaller in 2013 (137 individuals) compared to 1987 (389 individuals). In addition, the total number individual gulls observed by air in the Bay of Fundy was half (10,434 individuals) of the total counts reported in the 1987 survey (22,948 individuals). Hence, preliminary results of this survey suggest a significant decline in the large gull population in the Bay of Fundy, consistent with trends of large gull populations in the other Atlantic Provinces. These negative trends are believed to be linked to the ground-fish moratorium of 1992, which has dramatically reduced the amount of fish offal available to large gulls, and to the more recent widespread closures of dumps and overall better waste-management practices in landfills, which also reduces human-related food sources.



Prepared by Sabina Wilhelm, Canadian Wildlife Service, Atlantic Region
5 September 2013

Figure 1. Distribution and relative size of large gull colonies (Herring and Great Black-backed Gulls combined; size categories represent individuals) observed during the 2013 aerial surveys.

Afternoon Session

Presentations:

Unusual Winter Mortality Events in Multiple Atlantic Seabird Species – *Tony Diamond, University of New Brunswick*

Arctic Tern Breeding Dispersal: Analyzing Metapopulation Dynamics Amidst Ecosystem Change – *Lauren Scopel, University of New Brunswick*

Tracking Herring Gulls using GPS Loggers – *Christa DeRaspe, US Fish and Wildlife Service*

Satellite Tagging Razorbills Breeding on Matinicus Rock – *Linda Welch, US Fish and Wildlife Service*

Update on tern nanotagging, gull and cormorant census, and shearwater satellite tagging efforts – *Linda Welch, US Fish and Wildlife Service*

Using live cams and social media to engage new audiences in seabird conservation – *Janine Parziale, National Audubon Society*