Gulf of Maine Seabird Working Group
31st Annual Meeting

Roseate Tern photographed at Monomoy National Wildlife Refuge. Photo Credit: Kaiti Titherington 2014

Hog Island, Bremen, Maine
10 August 2015

Visit the website at www.gomswg.org

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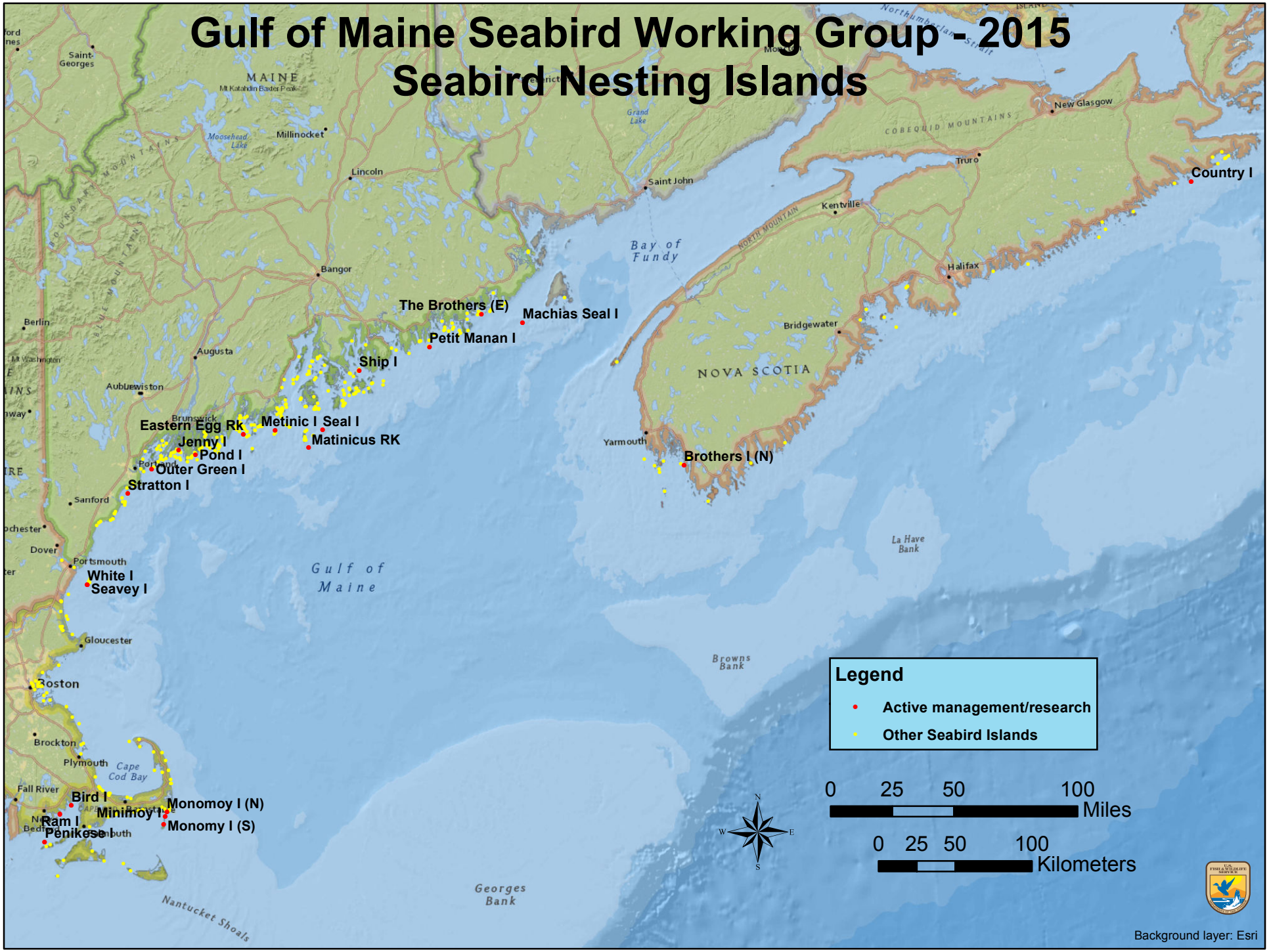
Gulf of Maine Seabird Working Group - 2015
Seabird Nesting Islands
The Brothers (E)
Machias Seal I
Petit Manan I
Ship I
Metinic I
Seal I
Matinicus RK
Eastern Egg Rk
Jenny I
Pond I
Outer Green I
Stratton I
White I
Seavey I
Bird I
Minimoy I
Ram I
Penikese
Monomoy I (N)
Monomy I (S)
Brothers I (N)
Country I
Legend
Active management/research
Other Seabird Islands
0 25 50 100
Miles
0 25 50 100
Kilometers
Background layer: Esri
BHouston 28 Oct 2015 Map #622

Gulf of Maine Seabird Working Group
Annual Meeting, Hog Island, Bremen, Maine
August 10, 2015

INTRODUCTION

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 31 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. A table with 2015 GOMSWG census results will be distributed when it is complete.

ISLAND REPORTS

MASSACHUSETTS

Monomoy National Wildlife Refuge

Kaiti Titherington – Biological Science Technician, U.S. Fish & Wildlife Service
Kate Iaquinto – Wildlife Biologist, U.S. Fish & Wildlife Service

North Monomoy Island

Common Tern Census and Productivity
The North Monomoy Island tern census was conducted on 15 June and 3 common tern nests were counted. Productivity was not monitored throughout the season but general observations suggest that no nests hatched or fledged, likely due to coyote predation.

Wading Birds
A wading bird census on North Monomoy Island was conducted on 15 May. Observers counted 145 black-crowned night heron nests, 75 snowy egret nests, and 11 great egret nests.

South Monomoy Island

Common Tern Census and Productivity
The South Monomoy Island tern and gull census was conducted on 10 and 11 June. The nesting area has been delineated into $60m^2$ grids, and all nests were tallied by grid number. The total number of common tern nests counted was 8,692. To compensate for error we performed a Lincoln Index for a final adjusted estimate of 9,203 nests for South Monomoy Island. A B-census was not conducted, however based on the number of nests initiated in productivity plots after June 20^{th}, we estimated there to be an additional 1,416 nests in the colony after 20 June.

The reproductive success of common terns on South Monomoy Island was excellent based on 364 A-count nests in 35 fenced productivity plots. The reproductive success for the plots monitored was 1.50 chicks fledged per nest. 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: 2013 to 2015

	2013	*2014*	**2015**	**Standard Deviation**	**Standard Error**	**Sample Size**
Average Clutch Size	*2.42 eggs/nest*	*2.38*	2.72	0.50	+/- 0.03	364
Average Eggs Hatched Per Nest	*2.20 eggs hatched/nest*	*2.17*	2.40	0.83	+/- 0.04	364
Hatching Success	*90.9%*	*91.0%*	88.3%			
Fledging Success	*67.3%*	*73.0%*	61.0%			
Reproductive Success	*1.65 chicks/nest*	*1.58*	1.50	0.93	+/- 0.05	364

Table 2. Number of Pairs and Reproductive Success of Common Terns on South Monomoy Island 2013 to 2015

	2013	*2014*	**2015**
Number of Pairs	*7526*	*8526*	9203
Reproductive Success	*1.65*	*1.58*	1.50

Common Tern Feeding Stints

Staff conducted seven 1-hour long common tern feeding stints from 2 July - 20 July. Seven nests with small to medium chicks were marked by the observer. Prey item and prey length were recorded during each stint. Observers recorded 55 total feedings during seven hours of stints. Sand lance was the most common prey item (83.6%). Other delivered prey items included herring (5.5%), flounder (1.8%), and unknown fish (9.1%). The average prey length was 1.78 culmen-lengths. Prey species observed within the colony but not during feeding stints included butterfish, bluefish, hake, squid, and killifish. Observers recorded dropped prey within the colony, a total of 254 butterfish, 81 large five to six inch bluefish, and 30 squid were documented.

Common Tern Trapping and Banding

Seventy-three adult common terns were trapped this season during banding efforts. Of the 74 captured, 52 were previously banded and 21 were affixed with new bands. Of the 52 previously banded adults, 26 were originally banded at Monomoy NWR and the remaining were as follows; Brazil (2), Cuttyhunk Island, MA (4), Great Gull Island, NY (7), Mattapoisett, MA (3), Punta Rasa, Argentina (4), Wareham, MA (4), Manomet, MA (1), and White Island, NH (1), and 1 from an undetermined location. In addition to the trapped birds, 28 adult common terns with plastic field readable (PFR) bands from previous work in 2013 and 2014 were resighted in the colony in 2015.

Roseate Tern Census and Productivity

Eleven roseate tern nests were counted during the census window on South Monomoy Island. This was an increase of three pairs compared to 2014. A total of 14 chicks hatched and all chicks were considered fledged based on GOMSWG standards. Observations stints to find roseate terns were continued until 3 July but no additional nests were located. A B-census was not conducted this year.

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: 2013 to 2015

	2013	*2014*	**2015**	**Standard Deviation**	**Standard Error**	**Sample Size**
Number of Pairs	*8*	*8*	11			
Average Clutch Size	*1.63 eggs/nest*	*2.13*	2.00	0.89	+/- 0.27	11
Average Eggs Hatched Per Nest	*1.50 eggs hatched/nest*	*1.38 eggs*	1.27	0.79	+/- 0.07	11
Hatching Success	*92%*	*64.71%*	63.64%			
Fledging Success	*100%*	*100%*	100%			
Reproductive Success	*1.50 chicks/nest*	*1.38*	1.27	0.79	+/- 0.24	11

Roseate Tern 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 has been continued annually and in 2015 two sound systems were placed near the main nesting colony along with artificial nesting structures, which consisted of six artificial nest boxes covered by a piece of plywood, and teepee chick shelters (modeled after those used by the Massachusetts Natural Heritage and Endangered Species Program on Ram Island). Six pairs of roseate terns nested under the artificial nesting structures, four of which were under the same structure, and eight pairs nested within 10 meters of a sound system. This is the third year 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. In 2015, three "new" pairs of roseate terns nested on South Monomoy Island. Using band resighting it was determined that all three of the new pairs nested within 10 meters of the sound systems. It was also noted that a returning pair moved nesting locations from the busy main colony to the lower colony where a sound system was located.

Roseate Tern Restoration Project

A Cooperative Recovery Initiative grant funded roseate tern habitat restoration project was initiated on South Monomoy Island in 2014 to increase roseate nesting habitat in and around the colony. In 2014 a total of 2,175 seaside goldenrod seedlings were planted during two planting events. The plantings were focused on three 180 by 60 m^2 study areas, each containing a different density of nesting common terns. In 2015 the plantings were documented by taking photos at predetermined locations, three times throughout the summer. Many of the plants in the main nesting colony did very well. Some plants even went to seed. Plantings in the lower colony, where vegetation is consistently sparse, did not do as well. This was likely due to topography and other factors. Eight of the eleven pairs of roseate terns nested within the study areas in 2015.

Roseate Tern Trapping and Banding

Four roseate tern adults were captured using Potter traps, one had been previously banded and three were new captures. The service band was removed from the previously banded adult because of the size and condition of the band. Blue PFRs with white lettering were added to all trapped birds and the 14 newly hatched chicks. The bands were reported to Bird Banding Lab and Jeff Spendelow of USGS. Seven of the eight adults affixed with PFRs in 2014 returned to breed in 2015.

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 were performed on four days between 22 July and 29 July.

Least Tern Census and Productivity

Least terns nested in two main areas in several smaller colonies on South Monomoy Island. The A-period census was conducted on 16 and 19 June. A total of 522 nests were counted during the A-period census window. There was no B-period census conducted this year because the number of terns present on the refuge remained relatively consistent throughout the nesting season. Productivity was not quantitatively monitored, but was estimated to be good overall. Many fledglings were seen in some of the denser nesting areas at the end of the nesting season.

Black Skimmer Census and Productivity
Two pairs of skimmers were spotted on South Monomoy and Minimoy Islands throughout the season; however neither pair nested on refuge. One black skimmer pair did nest on adjacent South Beach in Chatham, but did not hatch or fledge any chicks.

Laughing Gull Census and Productivity
During the tern census, which took place June 10th and 11th, 1424 active laughing gull nests were counted, compared with 983 in 2014, and 974 in 2013. This increase is likely due to an increase in available habitat since vegetation in the colony has been getting thicker since the last burn, and a lack of nest destruction in recent years. Productivity of laughing gulls was not monitored; however it was estimated to be qualitatively good based on the number of chicks and fledglings seen throughout the season.

Laughing Gull Kleptoparasitism
Stints were continued this year to monitor the number of kleptoparasitism attempts by laughing gulls on common terns. Eighty kleptoparasitism observational stints were conducted this year for a total of 78.47 hours. Kleptoparasitism events were observed during 69 of the 80 stints, with the lowest number occurring between 7 and 14 June. During stints, a total of 1858 kleptoparasitism attempts were recorded, with an average of 23.58 per hour. Laughing gulls were successful 32.9% of the time, the outcome was unknown 38.9% of the time, common terns were successful 20.3% of the time, and prey items were dropped during 7.9% of the attempts. Trends from many years of data collection have shown that the number of laughing gulls involved in a kleptoparasitism event affects the outcome. When laughing gulls were most successful at kleptoparasitizing fish from terns, there was on average seven laughing gulls involved. When common terns were successful, the average number of laughing gulls was five.

Minimoy Island

Common Tern Census and Productivity
The Minimoy Island tern census was conducted on 19 June when 1 common tern nest was counted. A B-census was not performed. Productivity was not monitored throughout the season but general observation suggested that no chicks hatched or fledged, likely due to gull predation. Four eggs were found predated by gull; one on 6/19/15, two on 7/10, and one on 7/18/15, which suggests there may have been more than one pair or renest attempts made.

Roseate Tern Census and Productivity
No roseate tern nests were found on Minimoy this field season. Productivity on Minimoy Island was zero.

Least Tern Census and Productivity
There were a total of 10 A-nests counted on Minimoy Island. A B-census was not performed. One fledgling was counted on 7/10/15 and one chick was found dead on 7/18/15. Productivity was not monitored throughout the season but general observations suggested that productivity was poor, likely due to overwash. Nine eggs were found overwashed on 6/19 and six eggs were found overwashed on 7/18.

Great Black-backed Gull and Herring Gull
Two great black-backed gulls were removed from South Monomoy Island during 2015. Great black-backed gulls were observed in the colony a total of 22 times, herring gulls were seen a total of 78 times, and ring-billed gulls were observed 5 times. A total of 38 common tern eggs on South Monomoy and one American oystercatcher nest were predated by gull species.

Northern Harrier
Northern harriers were observed at the South Monomoy Island tern colony twice throughout the season, once in mid-May and second time in late July.

Coyote
A total of 14 coyotes were removed from South Monomoy Island in 2015. Scat, tracks and sightings of coyotes were seen in and around the tern colony frequently as well as throughout the islands. One coyote was seen during a night stint; a shot was fired but missed. Overall coyote predation was moderate but it did not significantly impact tern or plover productivity (22 common tern chicks and fledglings where predated by coyotes). Coyotes were a major

impact on American oystercatchers with at least 9 nests taken. It is likely that the same one or two individuals swam from the main land to the islands.

American Crow
American crows were observed on South Monomoy Island throughout the season however none were seen within the colony. Four crows were removed from the south end of the island. One piping plover nest was likely lost due to crow predation.

Common Grackle
Twenty-nine common grackles were removed from South Monomoy Island. Common grackles likely have little to no impact on nesting common terns. However, common grackles are primarily a problem for nesting piping plover and potentially least terns on the island.

Wading Birds
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 black-crowned night-herons on South Monomoy Island 24 times throughout the season and a small amount of depredation was observed in the tern colony.

Owls
Seven owl pellets were found and will be dissected. Bones and feathers were found in all, but species have not been determined.

Peregrine Falcon
Peregrine falcons were documented flying over the colony twice. One sighting was shortly after three decapitated adults with plucked bodies were found. It is likely that at least four adult common terns were taken by a peregrine.

NEW HAMPSHIRE

Isles of Shoals

Dan and Melissa Hayward-Terns LLC
Juliana Hanle and Johanna Pedersen- Shoals Marine Lab Research Interns

Seavey and White Islands

Tern Census
A-wave COTE census was conducted on June 12. 2,228 COTE nests were counted, and adjusted with the Lincoln Index to 2,262. The addition of the nests found on White Island, 250, and the nests monitored in productivity plots, 174, brought the A-wave to 2,686, the highest A-wave census in the colony's eighteen years. On Seavey, we extrapolated the B-wave COTE census figure, 135 nests, from the number of B-wave nests initiated in productivity plots. On White, the B-wave was counted at 60 nests. Our COTE season total came to 2,881 nests, 9 more than in 2014, and the highest season total to date.

On June 20 Seavey Island had 68 ROST nests, 1 less than in 2014. 6 B-wave ROST nests brought the season total to 74 nests, two less than last year's. On June 20, Seavey and White islands combined had 2 ARTE nests, a decrease of 1 from 2014. A single B-wave ARTE nest, laid in the location of a failed A-wave nest, brought the ARTE season total to 3 nests.

A dog on White island, restricted by an electric fence, discouraged nesting within the grassy yard surrounding the lighthouse keeper's cottage. Nests initiated in the area were slowly moved to the perimeter, but not monitored.

Census

Species	COTE	ROST	ARTE
Date	6/12/2015	6/20/2015	6/20/2015
A-Wave (Seavey)=	2262	**68**	**2**
+ Plots (174)+			
White Is(250) =Total	**2686**	After 6/20/15	After 6/20/15
B-Wave (195)		**6**	**1**
Season Total Nests	**2881**	**74**	**3**

Five Year Population Comparison (at A-Wave Census)

Species/Year	2010	2011	2012	2013	2014	2015
COTE (prs)	2251	2447	2044	2269	2548	2686
ROST	48	42	51	51	69	68
ARTE	6	3	4	2	3	2

Five Year Population Comparison (Season Totals)

Species/Year	2010	2011	2012	2013	2014	2015
COTE (prs)	2615	2811	2577	2619	2873	2881
ROST	53	50	63	59	76	74
ARTE	6	5	5	2	3	3

Productivity

COTE A-wave productivity increased from .81 fledglings per nest to 1.11 fledglings per nest from 2014 to 2015. The clutch size, however, decreased from 2.15 to 2.06. Mean hatch also decreased from 1.65 to 1.57. ROST A-wave productivity increased from .94 fledglings per nest in 2014 to .99 fledglings per nest in 2015. Clutch size also increased from 1.49 to 1.62. As did average hatch, changing from 1.01 to 1.24 in 2015. 67 ROST A-wave chicks were confirmed fledged.

COTE B-wave productivity increased from .61 fledglings per nest in 2014 to 0.85 in 2015. The clutch size increased slightly from 1.91 to 1.93, and mean hatch remained the same at 1.0 eggs per nest.

6 ROST nests were initiated after June 20. ROST B-wave productivity decreased from 0.57 fledglings per nest in 2014 to 0.33 in 2015. The average hatch decreased from 0.57 to 0.50 chicks. At the end of ROST B-wave, 2 chicks had fledged.

In total, COTE productivity increased significantly from .78 fledglings per nest in 2014 to 1.10 in 2015. The mean clutch size decreased from 2.12 to 2.04 and mean hatch number decreased from 1.57 to 1.52. ROST productivity, however, decreased slightly from .91 fledglings per nest in 2014 to 0.93 in 2015. ROST mean clutch size increased, from 1.45 to 1.58, as did hatch rate, from 0.97 to 1.20.

Only 3 ARTE nests were found this summer, 2 A-wave and 1 B-wave, which, while consistent with the totals for the last three years, is a lower figure than those of the preceding three.

June was wet, with a rainfall of: 6.49 inches.[1] Some chick death occurred, particularly in the days following the 21st, 23rd, and the 28th, but not large numbers. July was dry with a rainfall of 1.72 inches—which caused the island's vegetation to rapidly diminish by mid-month and exposed some chicks on the edge of the island to gull predation. The island's vegetation also showed the effects of a controlled burn conducted last September. After a wet June, many grasses, wild radish, and yarrow grew rapidly, and covered much of Seavey in one to three feet of vegetation. Where the burn was conducted, this veg was often riddled with unproductive, scorched earth, which seemed to provide a good mix of access and cover for the terns. A-wave nest density decreased by 22.30% from 2014, and the complete season nest density decreased by 17.13% to the lowest figure, 13.21 nests per plot, in six years.

[1] Rainfall data is for Portsmouth, from *www.weather-warehouse.com*.

Gull presence was minimal for most of the season, increasing in mid and late July. Some predation of fledged chicks occurred: gulls took them from the edge of Seavey and flew off, often into the water or to stand on an exposed ledge.

Additionally, GPS tracking of 23 adult COTEs took place during the two weeks immediately prior to the beginning of hatch. Island biologists assisted UNH master's student Jess Carloni as she trapped incubating birds, sutured GPS tags onto their backs, and removed them 24 hours later. The biologists also followed said birds, both immediately following suture and through the breeding season, and noted that they did not seem to react negatively to the process. Very little excessive preening and no nest abandonment was observed immediately following the suturing. The nests were generally successful, likely due to the fact that the birds selected were among the earliest to clutch, with the most eggs.

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

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Peak Hatch Period	6/19-6/23	6/23-6/28	6/15-6/21	6/22-6/28	6/19-6/24	6/17-6/24
Peak Day	6/20	6/25	6/18	6/25	6/20	6/24
Standard Deviation	4.10	3.25	3.83	5.25	4.62	**5.5**

COTE A-Wave Totals [Season Totals]

Year	2010	2011	2012	2013	2014	2015
Nests Monitored	184[189]	184[212]	163[235]	162[190]	200[223]	167[188]
Mean Clutch	2.68[2.62]	2.29[2.22]	2.70[2.43]	2.40[2.32]	2.15[2.12]	2.06[2.04]
Mean Hatch	2.37[2.26]	2.05[1.91]	2.02[1.40]	2.06[1.86]	1.65[1.57]	1.57[1.52]
Fledglings/Nest	1.81[1.67]	1.36[1.22]	0.94[0.80]	1.30[1.22]	0.81[0.78]	1.11[1.10]
Total Fledglings	4074[4393]	3328[3429]	1921[1649]	2950[3195]	2064[2241]	2981[3169]

ROST A-Wave Totals [Season Totals]

Year	2010	2011	2012	2013	2014	2015
Nests Monitored	48[53]	42[50]	51[63]	51[58]	69[76]	68[74]
Mean Clutch Size	1.90[1.87]	1.98[1.86]	2.0[1.89]	1.69[1.64]	1.49[1.45]	1.62[1.58]
Mean Hatch	1.44[1.38]	1.38[1.22]	1.25[1.06]	1.22[1.21]	1.01[0.97]	1.24[1.20]
Fledglings/Nest	1.31[1.27]	1.21[1.16]	0.98[0.86]	1.14[1.12]	0.94[0.91]	0.99[0.93]
Total Fledglings	64[66]	51[58]	50[54]	58[64]	65[69]	67[69]

ARTE A-Wave Totals [Season Totals]

Year	2010	2011	2012	2013	2014	2015
Nests Monitored	6	3[5]	4[5]	2	3	2[3]
Mean Clutch Size	2.00	2.00[2.00]	2.00[1.80]	2	1.67	1.5[1.33]
Mean Hatch	1.83	1.00[0.60]	1.5[1.20]	2	1.67	.5[.67]
Fledglings/Nest	1.5	0.33[0.20]	0.50[0.44]	2	1.3	.5[.33]
Total Fledglings	9	1[1]	2[2]	4	4	1

Tern Provisioning

In the beginning of the season, Hake and Sand Lance were the most common fish observed in feedings. Though Hake remained common through the season, Sand Lance numbers decreased significantly at the end of June. Herring numbers rose through the end of June and through mid-late July. The amount of fish brought into the colony dropped as chicks fledged through July.

Tern Provisioning

Nest Hours	Feeding Rate/hr
616hrs 33mins	0.80

Species	Hake	Herring	Unknown Fish	Sand Lance	Silverside
% of Diet	42.71	18.62	13.97	12.35	4.66

Predator Activities and Control Efforts

On arriving on site, biologists found a pair of greater black backed gulls nesting on Seavey Island. The eggs and nest were destroyed. One herring gull was taken with lethal means. Regular use of pyrotechnics along with dawn and dusk tours by the biologists discouraged loafing and roosting gulls.

Predator Control

Species	Nests Destroyed	Eggs Destroyed	Adults Taken
GBBG	1	3	2
HERG	0	0	1

Gull Control (May 19-Aug 1)

Control Method	Average/Day
Human Control	1.36
Screamer	1.19
Banger	0.13
Cap	0.10

Other Nesting Species

Both Common Eider and Spotted Sandpipers were found nesting on the island.

Other Nesting Species

Species	COEI	SPSA
# Of Nests	22	4

Other Tern Sightings, Rare Bird, and Interesting Observations

Atlantic Puffin – 6/2 (2), 6/3 (1), 6/4 (2)
Glossy Ibis – 7/27 (2)
Great Cormorant – 6/6 (1)
Great Egret – 7/26 (6)
Northern Gannet – 5/24 (1), 5/28 (1), 7/25 (25), 7/27 (4), 7/30 (4)
Razorbill – 6/12 (2)
Royal Tern – 5/29 (1)

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, and private donors.

MAINE

Stratton Island

Kristina McOmber, Island Supervisor – National Audubon Society Seabird Restoration Program

Tern Census

Roseate Terns increased from 2014 levels to 108 nests for the GOMSWG census and 116 total nests for the season. Arctic Terns nests increased from 8 in 2014 to 12 in 2015. An island-wide Common Tern nest count was conducted

on 12 and 16 June. The Common Tern nest count of 1302 nests was corrected with a Lincoln index of 1.0274, to 1338 nests, and the addition of 57 productivity and feeding study nests brought the total count to 1395 nests. This is an increase from 1314 nests in 2014. A total of 81 Least Terns nests were found on Stratton Island in 2015.

Table 1. GOMSWG census results on Stratton Island, 2010-2015.

Year	COTE	ARTE	ROST	LETE
2010	854	12	35	76
2011	960	11	51	59
2012	1033	0	71	86
2013	1284	3	93	92
2014	1314	8	103	97
2015	1395	12	108	81

Tern Productivity

Tern productivity was determined from both fenced and unfenced plots. The 57 nests in the Common Tern plots fledged at a rate of 0.89 chicks per nest. Roseate Tern productivity was 1.38 chicks fledged per nest for the 80 nests followed. Least Terns produced no chicks in 2015, due to predation by Black-crowned Night Herons. From the 12 Arctic Tern nests, 3 chicks fledged, for productivity of 0.25 chicks fledged per nest. Predation by Black-crowned Night Herons was the major contributing factor to low productivity this year.

Table 2. Tern productivity on Stratton Island, 2011-2015.

	2011	2012	2013	2014	2015
COTE					
Mean clutch	2.50	2.60	2.02	1.95	2.09
Mean hatch	2.23	2.40	1.83	1.69	1.75
Productivity	1.70	2.04	1.41	1.29	0.89
ROST					
Mean clutch	1.94	1.80	1.88	1.49	1.83
Mean hatch	1.82	1.45	1.52	1.10	1.49
Productivity	1.24	1.32	1.27	0.99	1.38
ARTE					
Mean clutch	1.91	-	2.00	2.00	1.83
Mean hatch	1.45	0	0	1.22	1.08
Productivity	0.36	0	0	0.22	0.25
LETE					
Mean clutch	1.88	1.96	1.97	1.86	-
Mean hatch	1.50	1.48	1.65	1.52	-
Productivity	0.38	0.65	0.72	0.38	0

Tern chick provisioning

Sixteen Common Tern nests were observed in 2015 with a total of 424 feedings. Sand lance was the primary prey item offered to chicks, comprising 50% of the diet, with hake following at 23% and herring at 7%. Fourteen Roseate Tern nests were observed with a total of 1209 feedings. Sand lance made up 70% of their diet, with hake being the second most common item at 6% and herring at 3%. The remainder was made of up unidentified fish, and a single butterfish. No Least Tern feeding study was conducted this year, as no chicks survived more than two days.

Predation

Herring and Great Black-backed Gulls continue to prey on tern eggs and chicks and to have a devastating impact on Common Eider chick success. 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 Bluff Island were poked, and all gull nests found on Stratton Island were destroyed. Seven Great Black-backed Gull nests were found on Stratton and destroyed and 29 Herring Gull and 72 Great Black-backed Gull nests were poked on Bluff Island. Two Herring Gulls and 7 Great Black-backed Gulls were lethally removed from Stratton Island.

Black-crowned Night Herons had significant impact on tern productivity this year, with at least three individuals observed predating chicks in the colony. Two were lethally removed from the island.

Wading Birds
A census of the wading bird colony on Stratton Island was conducted on May 20-21. A total of 143 Glossy Ibis, 31 Black-crowned Night Heron, 52 Great Egret, and 52 Snowy Egret nests were found.

Common Eiders
A complete census of Common Eider nests was conducted on Stratton and Bluff Islands in late May, the first count since 2012. A total of 306 nests were found, which is a sharp decline from 649 nests in 2012.

American Oystercatchers
Three pairs of American Oystercatchers nested on Bluff and Stratton Islands in 2015. Three fledglings were confirmed.

Black Guillemots
Three active Black Guillemot burrows were confirmed in 2015. Two were on East Beach on Stratton Island and one was on Bluff Island. A high count of 20 adult Black Guillemots occurred on July 18.

Double-crested Cormorants
On June 7, 99 Double-crested Cormorant nests were counted on Bluff Island by visual estimate from a boat and by spotting scope from Stratton Island. On August 1, a walk-through of the cormorant colony on Bluff Island found 241 nests, many of which would not have been visible by boat.

Visitors
In 2015, Stratton Island had 144 documented visitors. Visitors included USFWS and National Audubon personnel for research purposes, Maine Audubon Society field trips, a Prout's Neck Audubon Society field trip, A York County Audubon Society field trip, and visiting kayakers and boaters.

Notable Birds
A pair of Piping Plovers was present on the sand beach from May 27-30, but left when an injured gull began frequenting the beach. Other notable birds include a Little Egret on August 9 and a Rufous Hummingbird on July 22.

Outer Green Island

SJ Kwiatkowska, Island Supervisor – National Audubon Society Seabird Restoration Program

Tern Census
The 2015 Gulf of Maine Seabird Working Group (GOMSWG) tern census was conducted on Outer Green Island on June 15. A total of 1271 Common Tern (*Sterna hirundo*) nests were counted. The inclusion of 40 productivity study nests, 28 feeding study nests, and a Lincoln correction index of 1.011 resulted in a corrected total of 1353 nests. This is a record number for Outer Green Island, up by 214 nests from 2014. There were no known Roseate or Arctic Tern (*S. dougallii* and *paradisaea*, respectively) nests on the island this year, though a number of Roseate Terns were observed loafing around the island throughout the season and one was observed in flight with fish. One pair of Roseate Terns was observed prospecting for nesting sites in June and July, but no known nesting ensued. A lone banded Roseate Tern was observed circling and landing in the colony frequently in June. A high count of 5 Roseate Terns was observed on May 21, but a potentially larger number were heard calling after dusk on July 12.

Table 1. GOMSWG annual census on Outer Green Island, 2010-2015

Year	COTE	ROST	ARTE
2010	1151	15	0
2011	1067	0	0
2012	1034	0	0
2013	1143	0	0
2014	1139	0	0
2015	1353	0	0

Tern Productivity

The first Common Tern egg was laid on May 23. The average number of eggs per nest was 2.03 (n=69), which is the lowest clutch size that has been recorded on this island. The first hatch was on June 14, and peak hatch lasted approximately from June 18-26. The average number of eggs hatched per nest was 1.83, and the average number of chicks fledged per nest (productivity) was 1.36.

Table 2. Outer Green Island annual Common Tern productivity, 2010-2015

Year	Mean Clutch	Mean Hatch	Productivity
2010	2.81	2.63	2.09
2011	2.43	1.98	1.77
2012	2.81	2.19	1.42
2013	2.60	2.27	1.15
2014	2.13	1.92	1.42
2015	2.03	1.83	1.36

Tern Provisioning

Chick provisioning was observed at 27 Common Tern nests this season over 1078 nest hours. A total of 1043 feedings to chicks were recorded for an average feeding rate of 0.97 items per hour, which is lower than the 2014 feeding rate of 1.73 items per hour. The most frequently observed prey item was hake species (*Urophycis sp*.), which made up 30% of the observed diet. Herring species (*Clupeidae sp*.) was the second most frequently observed prey item, at 26% of the observed diet.

Predation

Early in the season, Ruddy Turnstones (*Arenaria interpres*) were opportunistically preying on eggs. Throughout the season, at least four individual Great Black-Backed Gulls (*Larus marinus*) hunted in the colony at dawn and dusk and during poor weather conditions, and favored the southern end of the island. Deterrence methods included gull walks and lethal control. Two adult Great Black-Backed Gulls and one juvenile Herring Gull (*Larus argentatus*) were killed. On neighboring Junk of Pork Island, four Great Black-Backed Gull and four Herring Gull nests were destroyed. On Outer Green Island, one Great Black-Backed Gull nest was destroyed.

Weather

The season's weather was characterized by frequent consistently damp mornings, hot and humid middays, and chill, windy evenings. Early heavy rainfall events resulted in flooding and abandonment of Common Tern nests located in depressions within the cliff-top habitat. Air temperatures ranged from 42°F to 81°F, with an average temperature of 53.6°F in May, 58.4°F in June, and 64.7°F in July. Sea surface temperatures (SST) were cool this year, ranging from 45°F to 65°F, with an average SST of 48.3°F in May, 53.5°F in June, and 58.6°F in July. Precipitation was recorded on 44 days this season for a season total of 6.4 inches.

Black Guillemots

This year, one new Black Guillemot (*Cepphus grylle*) burrow was found, raising the island total to 21 burrows. This year, 13 burrows were active, but only 12 were followed for productivity due to one laying late on June 25. Of the 12 productivity burrows, one contained what is considered a supernormal clutch of 3 eggs. Only one chick from this clutch survived (out of one hatched), and was found with a bloody head wound on July 6, likely from an adult. This

chick was still alive and growing well during the last productivity check on July 22. The average clutch size was 2.0, the average number of eggs hatched per nest was 1.33, and the estimated productivity (based on healthy chick growth at approximately 20 days alive) was 1.08.

Jenny Island

Aspen Ellis, Island Supervisor – National Audubon Society Seabird Restoration Program

Tern Census

The annual Gulf of Maine Seabird Working Group (GOMSWG) census was conducted on June 13. A total of 1,147 Common Tern (*Sterna hirundo*, COTE) nests were counted, with clutches ranging between 1 and 5 eggs. A Lincoln index mark/recapture correction of 1.05 was applied to the uncorrected count. The addition of 59 productivity plot and feeding study nests brought the total to 1,268 nests (Table 1).

15 Roseate Tern (*Sterna dougallii*, ROST) nests were found during the GOMSWG census window, and no B-wave nests were later found.

Table 1. GOMSWG census results on Jenny Island, 2009-2015.

Year	COTE	ROST
2009	578	3
2010	854	32
2011	753	8
2012	948	11
2013	946	7
2014	1,120	12
2015	1,268	15

Tern Productivity

For Common Terns, four productivity plots containing 39 nests and 3 feeding study plots with 21 nests were used to determine productivity, and 13 of the 15 Roseate Tern nests were monitored for productivity, a summary of which follows in Table 2.

Table 2. Tern productivity on Jenny Island in 2015. Data for 2014 shown in parentheses.

Species	Mean clutch size	Mean hatch	Productivity	Nests monitored
COTE	2.05 (2.24)	1.87 (1.98)	1.35 (1.69)	60 (58)
ROST	1.92 (1.47)	1.17 (0.93)	0.88 (0.80)	13 (15)

Tern Provisioning

19 Common Tern nests in three feeding study plots were monitored in 2015. A total of 1,173 feedings were observed during 666 nest-observation hours, producing an average feeding rate of 1.76 deliveries per hour (compared with 1.90 deliveries per hour in 2014). Average prey size was 57.06mm. Atlantic herring was far less common in 2015 than is standard for Jenny Island, at 17.9%. Hake (including white hake and four-bearded rockling) numbers were up significantly compared to 2014, as were those of sand lance and silverside. Butterfish were 1.7% total feedings, as compared to less than 1% in 2014.

Table 3. Principal prey items in COTE chick diet on Jenny Island in 2014.

Prey item	Number of Items	% of Diet
Hake	221	18.8
Herring	210	17.9
Sand lance	178	15.2
Silverside	112	9.5
Butterfish	20	1.7

Predator Activities and Control Efforts

Four Laughing Gulls (*Larus atricilla*, LAGU) were observed entering the colony regularly and actively kleptoparasitizing adult terns. A pair was seen carrying nesting material early in the season, though no nests were found.

Great Black-Backed Gulls (*L. marinus*, GBBG) and Herring Gulls (*L. argentatus*, HERG) were observed landing on the north and south ends of the island and loafing. Though several eggs and chicks went missing throughout the season, no GBBG were ever observed in the colony. One juvenile HERG with a broken wing was found predating eggs on the north end and was removed. GBBG were seen taking some COEI chicks.

Common Eiders

4 Common Eider (*Somateria mollissima*, COEI) nests were found during the GOMSWG census, though the majority of the nests on the island hatched before the census window.

Pond Island National Wildlife Refuge

Ravin Thomasson, Island Supervisor – National Audubon Society Seabird Restoration Program

Tern Census

Tern census was conducted on June 14. The unadjusted nest count for Common Terns was 598 (not including study nests). The Lincoln Index was 1.03. The adjusted count, including study nests, was 685. This is slightly higher than 2014 (see Table 1).

There were six confirmed Arctic Tern nests on Pond Island in 2014. Although Roseate Terns had a near daily presence on Pond Island in 2015, no pairs laid eggs.

Table 1. GOMSWG census results on Pond Island, 2009-2015.

Year	COTE	ROST	ARTE
2009	438	0	3
2010	590	0	3
2011	586	2	0
2012	596	0	0
2013	692	0	0
2014	612	0	4
2015	685	0	6

Tern Productivity

Common Tern productivity was measured by following 56 nests in both fenced productivity plots and unfenced feeding study plots. All nests were monitored from egg until fail/fledge. Mean clutch size was 2.39 with 1.54 chicks produced per pair (see Table 2). All six Arctic Tern nests were monitored; mean clutch size was 2.0 and productivity was 0.83 chicks produced per pair.

Table 2. Tern productivity on Pond Island in 2015. Data for 2014 shown in parentheses.

Species	Mean clutch size	Mean hatch	Productivity	Nests monitored
COTE	2.39 (2.37)	1.98 (1.78)	1.54 (1.27)	56 (60)
ARTE	2.00 (1.75)	1.17 (1.25)	0.83 (1.25)	6 (4)

Tern Provisioning

A Common Tern chick provisioning study was conducted by observing 17 nests from hatching through fledging. There were a total of 2463 feedings observed. The primary prey items delivered were sand lance, hake, and herring (see Table 3). Flying ants (2.25%) and shrimp sp. (2.05%) were also seen in the feeding studies. Butterfish made up a small proportion of observed feedings (0.08%). 24% of prey items were not identified to species.

Table 3. Principal prey items in Common Tern chick diet on Pond Island in 2015.

Prey item	Number of items	% of diet
Sand lance	1455	59.1
Hake	146	5.9
Herring	144	5.8

Predator Activities and Control Efforts

Two Great-horned Owls were removed from the island, one on June 6 and one on June 30, and each was removed within one day of being detected on the island. On July 5 the colony experienced nocturnal abandonment that persisted until July 16. During this time no other signs of a predator were found or seen besides daily visits from a Peregrine Falcon. Owl traps were set on a nightly basis but no owl was caught. Though nocturnal abandonment is associated with owl predation a definitive predator was not identified.

American Crows were a serious problem for Common Eiders and were observed on several occasions predating eggs. Great Black-backed and Herring Gulls were also seen predating both Common Eider and Common Tern eggs and chicks, although none were removed from the island this year. Bald Eagles were also seen on many occasions predating eider chicks. A Peregrine Falcon was a regular visitor to the colony starting in late June and was observed taking birds mid-flight. It was seen on several occasions swooping and taking large tern chicks from the ground.

Eastern Egg Rock

Marie Collette Lauzau, Island Supervisor – National Audubon Society Seabird Restoration Program

Census

Arctic and Roseate Tern nests were identified between June 12 and June 20, with Roseate Terns increasing from 65 nests in 2014 to 77 nests and Arctic Terns increasing from 62 to 75 nests. Six B-wave and late Roseate Tern nests were identified after census, bringing the season total to 83 Roseate Tern pairs. An island-wide Common Tern and Laughing Gull nest count was conducted from June 15 to June 17. Common Tern numbers were up considerably from the last few years. The total of nests counted across the island was 787. The Lincoln index of 1.0355 with the additional productivity and feeding study nests brought the total to 894 nests. The number of Laughing Gull nests remained high, at 1943 nests, despite increased control measures over the past several years.

Table 1. GOMSWG census results on Eastern Egg Rock, 2010-2015.

Year	COTE	ARTE	ROST	LAGU
2010	714	83	82	1553
2011	829	77	90	2051
2012	817	57	71	2065
2013	831	68	83	2083
2014	698	62	65	1934
2015	894	75	77	1943

Larid Productivity

Common Tern productivity was calculated from 78 nests in both fenced productivity plots and unfenced feeding study plots. Productivity was 1.30 chicks fledged per nest. Arctic and Roseate Tern productivity was calculated from unfenced nests. Roseate Terns fledged 1.19 chicks per nest and Arctic Terns fledged 0.91 chicks per nest. Productivity of Arctic Terns was affected heavily by predatory gulls, including Laughing Gulls, and flooding. Productivity of Laughing Gulls was determined from a fenced plot of 25 nests which fledged 1.30 chicks per nest. This fledge rate is unique to this plot, as Laughing Gull egg oiling took place on the rest of the island.

Table 2. Tern and Laughing Gull productivity on Eastern Egg Rock in 2015.

Species	Mean clutch size	Mean hatch	Productivity	Nests monitored
COTE	2.03	1.77	1.30	78
ARTE	1.80	1.20	0.91	40
ROST	1.83	1.26	1.19	76
LAGU	2.32	1.48	1.30	24

Tern Provisioning

Twelve Common Tern nests were observed over a total of 453 hours with an average feed rate of 1.62 feedings per hour. Hake was the most frequently fed prey item, comprising 33% of feedings, with herring at 17% and sand lance at 7%. Six Arctic Tern nests were observed for a total of 144 hours with an average feed rate of 1.96; hake were the most frequently fed item comprising 35% of diet followed by amphipods at 33%. Eight Roseate Tern nests were observed over 150 hours, averaging 2.56 feedings per hour; hake was the most frequently fed item at 35%, followed by herring at 14%, sand lance at 9%, and pollock at 2%.

Table 3. Principal prey items (percent) in tern chick diet on Eastern Egg Rock in 2015.

Prey item	COTE	ARTE	ROST
Herring	17	0	14
Hake	33	35	35
Pollock	5	3	2
Sand lance	7	4	9
Invertebrates	0.4	33	0

Atlantic Puffins

This year there were 150 active puffin burrows on the island, the highest recorded for the island and a slight increase over the 148 burrows in 2014. The fledging success rate, based on chicks being fed for at least 21 days, was 0.92, which was high to average for the island. Hake comprised the majority of puffin diet at 59% followed by sand lance at 20% and haddock at 8%. Butterfish was also present in the diet at 6%

Table 4. Active burrow count and fledge success for Atlantic Puffins on Eastern Egg Rock, 2010-2015.

ATPU	2010	2011	2012	2013	2014	2015
Active Burrows	123	123	104	112	148	150
Fledge success	0.86	0.92	0.74	0.91	0.94	0.92

Predator Activities and Control Efforts

Herring and Great Black-backed Gulls were the predominant tern predators, though neither species attempted to nest. Four Herring Gulls and two Great Black-backed Gulls were shot over the course of the season. All Laughing Gull eggs, with the exclusion of nests within a fenced productivity plot, were oiled during census to prevent hatching. In addition, a buffer zone was maintained within 10 meters of tern habitat in which all Laughing Gull nests were destroyed periodically throughout laying. Laughing Gulls still appeared to be a source of predation on Arctic and Common Tern eggs and young chicks.

Table 5. Gull control measures at Eastern Egg Rock in 2015.

	GBBG	HERG	LAGU
Gulls Shot	2	4	0
Nests Destroyed	0	0	1918

Other Notes

Productivity was monitored for Black Guillemots for the third year. Twenty-five nests were followed with a mean clutch of 1.88 and productivity of 0.92 chicks fledged per nest, a lower fledge rate than the 1.11 chicks fledged per nest in 2014.

Leach's Storm-petrels were monitored for the first time this year. 31 nests were followed with a hatch rate of 0.65.

This summer, Egg Rock welcomed 71 visitors, primarily media personnel, donors, and teen campers from the Hog Island Camp.

Matinicus Rock

Frank Mayer and Jess Steketee, Island Co-supervisors – National Audubon Society Seabird Restoration Program

Tern and Laughing Gull Census

The GOMSWG census was conducted 17 June but was not completed because of the large number of hatching eggs. Our total Arctic Tern census number is an extrapolation based upon the 4 sectors we were able to count before stopping. The total of the 4 sectors counted represent on average over the past 5 years 67% of the total count. The extrapolation came out to a total of 701 Arctic Tern nests. We directly counted a total of 206 Common Terns. The Lincoln Index correction factor was 1.07. We counted 0 Laughing Gull nests this year which is a decrease of 100% from last year.

Table 1. GOMSWG census results on Matinicus Rock, 2009-2015.

Year	ARTE	COTE	LAGU
2009	1,278	359	1,161
2010	674	253	958
2011	859	258	778
2012	711	268	557
2013	519	171	579
2014	564	223	689
2015	701	206	0

Tern Productivity

Arctic Terns fledged 1.19 young per nest. Mean clutch was 1.68 for 47 nests. Productivity was higher than in past years and represents the highest productivity since 2002. Common Terns fledged 1.32 young per nest and mean clutch was 1.79 for 28 nests. While mean clutch was lower than in past years, productivity was the second highest since 2002, when the COTE productivity study began.

Table 2. Tern productivity on Matinicus Rock in 2015. Data for 2014 shown in parentheses.

Species	Mean clutch size	Mean hatch	Productivity	Nests monitored
ARTE	1.68 (1.73)	1.38 (1.20)	1.19 (0.96)	47 (49)
COTE	1.79 (1.96)	1.5 (1.69)	1.32 (1.38)	28 (26)

Tern Provisioning

The most common food item in the Arctic Tern chick diet was hake at 41.4% of the total diet, followed by sand lance which were 20.2% of the total diet. The average feeding rate per nest was 1.32 feedings per hour. The most common food item in the Common Tern chick diet was hake which constituted 28.5% of the diet followed by sand lance at 24.3% and larval sand lance at 22.7%. Amphipods were the most common invertebrate and comprised 7.9% of the total diet. The average feeding rate was 1.5 deliveries per hour which was the same as last year's.

Predator Activities and Control Efforts

Predation by gulls was not an issue at all this year. No large gulls were found nesting on the island and they were never observed feeding on tern chicks or eggs. Also no Laughing Gulls were nesting on the island during the tern egg stage and a very few nested far from the terns later in the tern chick rearing period. A Merlin was observed from late July till leaving on 7 Aug but was never seen catching a tern.

During census, no Laughing Gull nests were found. After the census a total of 4 Laughing Gull nests were found and destroyed. 33 adult Laughing Gulls were shot from 7 May to 7 August. No Herring or Great Black-backed Gull nests were found this year. 4 Herring Gulls and 2 Great Black Backed Gulls were shot.

Atlantic Puffins
Puffin hatch success was 0.71 (n= 64) and productivity was 0.64 chicks fledged per nest (n=64). Puffin bill loads delivered to chicks in 2015 consisted mostly of sand lance (53.3%), haddock (13.8%), redfish (9.2) hake (10.2%) and herring (8.4%). No butterfish were observed during feeding studies, although they were observed occasionally in burrows and being brought in by adults.

Razorbills
Razorbill hatch success was 0.64 (n = 62), and productivity was 0.46 chicks fledged per nest (n = 62). The first Razorbill chick was heard on 7 June. Razorbill chick diet consisted of sand lance (38.5%), hake (27.7%), and larval sand lance (12.4%) with lesser amounts of herring (11.7%).

Black Guillemots
Mean clutch size was 1.63(n=38), mean hatch was 0.81 hatched per nest (n=38), and productivity was 0.66 chicks fledged per nest (n=38).

Common Murres
The high count for Common Murres in 2015 was 80. The decoys and sound system were in place in early May but the sound did not work. The sound system began to work on 18 May and failed on 3 June. On three occasions, 9 July, 10 July, and 13 July, individual murres were observed carrying fish in their bills (at least 2 different individuals were confirmed carrying fish, one bridled the other not). On many occasions murres were also observed flushing out from under rocks in Area 3, although no eggs or chicks were confirmed.

Leach's Storm Petrels
Hatching success was 0.78 (n=18).

Manx Shearwaters
Manx Shearwaters were seen on the water regularly throughout the season in groups of as many as 19, and were heard calling from the northwest, west-central, and southwest areas of the island. We banded two large, fat, and happy chicks from the original burrow near the cannon wheel on the Sunset Strip and from the area below Texas blind.

Unusual Birds
A Yellow-headed Blackbird and Prairie Warbler were both observed on 5 August. Other good birds were Scarlet Tanager on 12 May and a Sharp-tailed Sparrow on 4 June.

Seal Island National Wildlife Refuge

Keenan Yakola, Island Supervisor – National Audubon Society Seabird Restoration Program

Tern Census
A partial tern census was conducted on June 14, where 14 of the 30 grid squares were surveyed, as in the 2009-2014 censuses, due to safety concerns on the island. The censused area has been determined to 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). We extrapolated that there were 2,247 nests on Seal Island (after a Lincoln Index of 1.0465 was applied). On June 18 the species ratio of the colony was determined by marking a 16 meter radius around nine blinds and identifying as many nests to species as possible within each circle. With this, in addition to the composition of four productivity plots on the island, the species ratio was estimated at 40.14% Arctic Terns and 59.86% Common Terns (n=583). These data suggest that the colony was similar in size and composition as the 2014 season (Table 1).

Table 1. Adjusted number of tern nests found on Seal Island from 2010-2015.

Year	COTE	ARTE
2010	1,788	1,238
2011	1,836	1,201
2012	1,837	959
2013	1,448	1,039
2014	1,383	855
2015	1,345	902

Tern Productivity

The average clutch size for both Common and Arctic Terns decreased from 2014. However, even considering the decrease in average clutch size, mean productivity was the highest on Seal Island since 2002 (Table 2). Roseate Terns were observed preforming courtship displays and exploring possible nesting sites from July1 to July 10 but, no nesting attempts were made.

Table 2. Tern productivity on Seal Island in 2015. Data for 2014 shown in parentheses.

Species	Mean clutch size	Mean hatch	Productivity	Nests monitored
COTE	1.78(1.89)	1.55(1.70)	1.17(1.03)	64(65)
ARTE	1.73(1.84)	1.35(1.43)	1.08(0.86)	37(37)

Tern Provisioning

10 Arctic Tern nests were observed for 483 cumulative hours. The average feeding rate was 2.05 feedings per nest per hour. 12 Common Tern nests were observed for 463 cumulative hours and the average feeding rate was 1.64 feedings per nest per hour. A large amount of both Arctic and Common Tern chick provisioning was made up of sand lance and hake (Table 3). Compared to previous years, the abundance of both herring and euphausiids was relatively low. In the end of June, schools of sand lance were observed close to the island and represented a large percentage of feedings.

Table 3. Principal prey items (percent of diet) in tern chick diet on Seal Island in 2015. Total number of prey items observed n=992 for ARTE and n=759 for COTE.

Prey item	ARTE	COTE
Sand lance	43.75	44.53
Hake	22.18	18.05
Herring	4.44	16.21
Euphausiid	8.26	0.10

Predator Activities and Control Efforts

This year gulls were not a serious threat to the colony. A few individuals began to regularly enter the colony after hatching began. An effort was made to eradicate the problem gulls however control was difficult due to their reluctance to land within shooting range. Gull control efforts also included the poking of eggs in all gulls nests found during the gull census (Table 4). Gull census showed a slight increase in Herring Gull nests but a serious decline in Great Black-backed Gull nests. This, in conjuncture with observations throughout the season suggests a lower population of Great Black-backed Gulls on the island than in previous years. Other predators included Peregrine Falcons, Merlins, and Bald Eagles, which were largely observed in the colony towards the end of the season. Laughing Gulls were observed daily and several pair attempted to breed amongst the tern colony. We believe that one pair nested successfully and fledged a single chick. Laughing Gulls were observed kleptoparasitizing terns throughout the season, and terns were also observed kleptoparasitizing Atlantic Puffins in July and August.

Table 4. Gull control measures by species on Seal Island in 2015.

Species	# Nests destroyed	# Shot
Herring Gull	249	3
Great Black-backed Gull	34	1
Laughing Gull	5	2

Atlantic Puffin

There are a total of 752 known burrows on Seal Island, including 20 discovered this season. Puffin census was performed by determining the activity of 15 circular plots within the main colony, each six meters in diameter and each spaced 25 meters apart. The activity of all burrows outside of the main colony was also determined. From observations of incubating adults, eggs, chicks, and feedings, it is estimated that there are a minimum of 446 active burrows this year. This number is down from last year's estimate of 492 active burrows. We believe that due to late nesting puffins that it is possible some burrows that were active went undetected during the season.

Puffin productivity this year was 0.81 chicks fledged per pair and hatch success was 0.94 (Table 5). Unlike last year, egg laying and hatch dates were later than usual. 81 puffin chicks were banded in 2015. 66 pufflings were banded between July20 and August 7 (Regular Season) and 15 from August 13 to 28 (Post Season). Many chicks were still being fed into the end of August and several more into the beginning of September. Three of the six adults deployed with geolocators in 2014 were recaptured this season. In addition an adult deployed with a geolocator in 2013 was also recaptured.

Table 5. Atlantic Puffin hatch success and productivity on Seal Island from 2010-2015.

	# Burrows monitored	Hatch Success	Productivity
2010	61	0.91	0.77
2011	66	0.80	0.73
2012	78	0.74	0.31
2013	69	0.55	0.09
2014	71	0.83	0.75
2015	62	0.94	0.81

Puffin chick diet was monitored approximately 52 hours throughout July and August. Sand lance was the dominant prey item for most of the observation period. However, later in July bill loads comprised of single large herring or haddock were common. Overall, sand lance and herring made up over 77 percent of observed diet (Table 6); other species included haddock and white hake. There were remarkably few butterfish observed during feeding studies, and a large percentage of nutrient rich species.

Table 6. Principal prey items in Atlantic Puffin chick diet on Seal Island in 2015. Total prey items n=730

Prey item	% of diet
Sand lance	55.21
Herring	21.78
Pollock	9.45
Haddock	3.01
White hake	2.32

Black Guillemot

Black Guillemot productivity was monitored throughout the course of the field season. Average hatch was 1.45 and productivity was 0.92 chicks per pair (n=38).This is the highest productivity recorded on Seal Island NWR since monitoring began in 2007 and marks a significant increase from 0.61 chicks per pair in 2014.

Razorbill

An expanding colony of Razorbills is present on Seal Island. A high count of 102 individuals was observed this season compared to 72 individuals in 2014. A total of 32 active Razorbill burrows were located on the island,

however, it is likely several went undetected. 19 Razorbill burrows were monitored for productivity in 2015. Average hatch success was 0.61 with a productivity of 0.58 chicks per pair.

Common Eider
On May 30, 63 nests were counted, though there are likely many more. Common Eider nest across the island and a large portion nest in high grasses where there is potential unexploded ordinance. There were many large crèches observed throughout the season, however, predation from gulls was high. However, based on reports from previous years it seemed like there were more chicks around later in the season. Also, we observed many young chicks into the beginning of August suggesting that there were many "late" nests this year.

Cormorants
Both Great and Double-crested Cormorants nest on the western head of Seal Island. On May 29, a visual estimate of the colony was conducted from a boat. 17 Great Cormorant nests were counted and 6 Double-crested Cormorants were counted. The field crew attempted to walk the length of the island to the Area 4/5 boundary to deter lurking Eagles away from the colony on a regular basis. Eagles we observed on 11 days throughout the field season. If observed they were pursued until they had left the island.

Bird Sightings
A record-breaking 151 bird species were observed on Seal Island from the beginning of May to the beginning of August. Highlights included Bohemian Waxing, Orange-crowned Warbler, multiple Clay-colored Sparrows, Dickcissel, Northern Fulmar, and an Albatross sp., in addition to the resident Red-billed Tropicbird that was seen again this year, for the eleventh year since first being observed on the island in 2005.

Maine Coastal Islands National Wildlife Refuge

Metinic Island

Derek LaFlamme (Supervisor) and Meaghan Hall (Site Intern)

Common and Arctic Tern Census Results
The Metinic Island GOMSWG census was conducted on June 18, 2015. A total of 593 tern nests were found. A Lincoln Correction Factor of 1.018 was applied to the raw count (Lincoln Index Correction Factor), resulting in 603 pairs, and after including nests in productivity plots, we estimate 643 tern pairs were actively nesting during the 2015 GOMSWG census.

Marking 175 nests by species observed to be incubating the eggs, the species ratio was found to be 56.57% Common Terns and 43.43% Arctic Terns. After applying the species ratio to the corrected tern census total and adding productivity plot nests, we estimate 358 COTE pair and 285 ARTE pair were Metinic in 2015.

Metinic Island					
	2011	**2012**	**2013**	**2014**	**2015**
COTE					
# of Nests	300	0	209	214	358
Mean Clutch Size	2.19	0	2.8	2.67	2.26
Mean Hatch Success	89%	0	78.6%	84.5%	77.36%
Mean Fledge Success	68%	0	27.1%	78.51%	85.37%
Chicks fledged/Pair	1.23	0	0.76	1.68	1.52

ARTE					
# of Nests	198	0	142	257	285
Mean Clutch Size	1.45	0	2.1	1.90	1.94
Mean Hatch Success	36%	0	89.5%	89.8%	94.74%
Mean Fledge Success	43%	0	52.4%	81.1%	86.11%
Chicks fledged/Pair	.23	0	1.1	1.39	1.63

ROST					
# of Nests	0	0	0	0	0
Chicks fledged/Pair	-	-	-	-	-

Provisioning: At any one time, 5 Arctic Tern and 6 Common Tern nests were followed for provisioning studies. 108 feedings occurred during 21 hours of watches for Common Terns (0.86 feedings/hour per nest), and 173 feedings occurred during 30 hours of Arctic Tern watches (1.15 feedings/hour per nest). The primary prey item for both species was hake, which made up 59% of both their diets. Sand lance was the 2nd most consumed prey item, at 11% of ARTE diets and 4% of COTE diets. Herring was consumed 3% of the time for both species. Pollock and butterfish made up less than 4% of the diet for each species. No other prey items were identifiable.

	Total Nests	Feedings/ Hour	Herring	Hake	Sand Lance	Pollock	Butterfish	Other & Unknown
COTE	6	0.86	3%	59%	4%	4%	3%	27%
ARTE	5	1.15	3%	59%	11%	1%	2%	24%

Predators

- Herring Gulls were not believed to have any major contributions to tern predation in 2015, unless they were entering the colony late at night when they wouldn't illicit a major response from the colony. A single HERG was shot on May 18th due to it having a broken wing.
- Great Black-backed Gulls were seen in the colony on 5 separate occasions, 4 of which were in July when the tern chicks were quite large. They were believed to have eaten both eggs and chicks.
- A single American Crow was seen in the intertidal rocks on June 2nd. It was believed to be eating tern eggs.
- A Common Raven was seen on the ground in the colony on June 5th. They would also be seen flying towards the colony in the evenings sporadically through the season, but were easily spooked.
- A total of 30 Garter Snakes were removed from the island in 2015. They were seen consuming a Spotted Sandpiper chick as well as a sparrow fledgling.

Black Guillemots

We monitored 29 guillemot nests and recorded a hatching success of 44%. Fledging rates are estimated to be 0.59/nest based on the number of chicks that were present at their last weighing. 24 chicks were found, 7 of which were banded.

Leach's Storm Petrels

We marked 30 Leach's Storm-petrel burrows in May via smell and sound. However, only 5 could be confirmed as active on June 30th. As of July 28th, 13 burrows were thought to be active.

Common Eider

A total of 19 eider nests were located on the island, however many more were presumed unseen. The first eider ducklings were seen on June 3rd. The largest crèche seen contained 26 adults and 70 ducklings. Crèches containing large ducklings continued to be seen through the end of the field season in late July.

Incidental Sightings

A total of 82 bird species were identified on Metinic Island in 2015. Rarities included a Rusty Blackbird and a very lost Long-tailed Duck. 12 species of shorebird were seen, along with many migrant songbirds.

Ship Island

Mark Baran – Island Supervisor
Sarah Guitart – Island Technician

Census

Ship Island was monitored by a two-person crew from May 7-July 30, 2015. During the GOMSWG census on June 17, we counted 673 common tern nests for a total of 680 after applying a Lincoln Index of 1.01. Five eggs were counted as abandoned, washed up, or predated, but were not counted in the nest total.

	Ship Island				
Common Terns	**2011**	**2012**	**2013**	**2014**	**2015**
# of Active Nests	105	251	436	405	680
Mean Clutch Size	2.16	2.20	2.44	2.26	2.16
Mean Hatch Success	55.6%	57.1%	72.5%	81%	72.3%
Mean Fledge Success	24.9%	63.9%	46.4%	72.8%	87.7%
Chicks Fledged/Nest	0.53	0.82	0.80	1.44	1.45

Nesting and Productivity

The first nest was observed on May 30 and terns were continuing to copulate as of July 23. New nests continued to form throughout the season. Overall tern numbers remained stable once the colony became established. Fair weather coincided with the majority of the hatching and critical rearing stages, which led to a comparatively high hatching and fledging success this year.

Tern Provisioning

We observed an average of 14.4 total common tern nests for a total of 121.5 hours and 1352 feedings. Average feeding rate was 0.79 feedings per hour. Atlantic Herring composed 53% of observed feedings, sandlance 21%, unknown fish 13%, Pollock 4%, unknown 4%, hake 3% and all others less than 1%, including insects, stickleback, and sand shrimp. A total of 4 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**				
	2011	**2012**	**2013**	**2014**	**2015**
Atlantic Herring	24.4	79.4	45.6	60.8	53.2
Sandlance	17.3	0.9	20.9	1.0	21.4
Crustaceans	--	--	10.5	--	0.9
Pollock	18.1	--	4.3	10.0	4.1
Invertebrates	1.7	1.6	5.7	0.7	0.5
Butterfish	0.4	--	1.7	--	--
Stickleback	10.7	0.2	1.5	--	0.5
Hake	--	--	1.1	6.6	2.5
Unknown	20.5	7.2	--	1.0	3.9

Predator Control

The most significant predators observed during the 2015 season were Peregrine Falcons, Great Black-backed Gulls, and Bald Eagles. While Bald Eagles were seen nearly daily, no attempts were seen made at terns. Peregrine Falcons successfully predated at least 13 common tern adults and chicks, while Great Black-backed Gulls took 3 large chicks. Despite the peregrine falcon visitation, their presence did not seem to disrupt the overall stability of the colony.

Species	Minimum # of Visits	Minimum # Terns Taken
Peregrine Falcon	29	13
Merlin	1	0
Bald Eagle	27	0
Great Black-backed Gull	3	3

Mink traps were set early in the season with an average of 13.64 traps maintained throughout the season, but no definitive signs of mink were observed. No great-horned owls were observed this year. Gulls were deterred from loafing on any part of the island. One herring gull and one laughing gull were lethally dispatched.

Petit Manan Island

Wayne MacCabe and Julia Gillis, Island Managers – USFWS
John Fatula and Laura Bollert, Island Interns - USFWS

Census

The GOMSWG census was conducted on June 17 and 18, 2015 and 1,068 tern nests were counted and corrected with a 1.045% Lincoln Index to 1,187 tern nests. Tern census results in 2015 were 1.4% lower than 2014 (1,203 nests). To calculate species ratio, we identified 662 tern nests to species, 56% of all tern nests on the island. In 2015, the colony consisted of 60% Common Terns and 40% Arctic Terns. We estimate of 706 Common Tern nests and 481 Arctic Tern pairs nested in PMI in 2015. Pairs were calculated by applying the species ratio to the corrected nest count and adding this to productivity plot nests (with known species). No Roseate pairs nested this year. Additionally, 62 Common Eider nests and 620 (7.5% correction factor) Laughing gull nests were counted during the census.

Table 1. Number of tern nests found on Petit Manan Island from 2007-2015

Year	COTE	ROST	ARTE	LETE
2007	1343	5	1038	0
2008	1307	4	1255	0
2009	1374	4	1268	0
2010	912	2	688	0
2011	1138	0	558	0
2012	1186	2	758	0
2013	817	2	616	0
2014	670	0	533	0
2015	706	0	481	0

Tern Productivity

Reproductive success for both tern species was significantly higher in 2015 than in previous seasons; however, overall numbers are continuing to decline. Common tern productivity was 1.22 chicks fledged per nest and Arctic tern productivity was 0.95 chicks fledged per nest. There appeared to be adequate prey availability and no severe storms occurred during peak hatch this year.

Table 2. Breeding parameters for seabirds nesting on Petit Manan Island in 2015.

Petit Manan Island									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
COTE									
# of Nests	1343	1307	1374	912	1138	1186	817	670	706
Mean Clutch Size	1.70	1.83	1.93	1.7	1.72	1.90	1.77	1.94	2.09
Mean Hatch Success	64.8%	85.3%	85%	47.9%	72.3%	78.8%	62%	61.4%	85.1%
Mean Fledge Success	76.7%	71.6%	56%	31.0%	36.1%	65.1%	48%	45.2%	73.7%
Mean Chicks Fledged/Nest	0.76	1.12	0.90	0.43	0.40	0.98	0.51	0.54	1.22
ARTE									
# of Nests	1038	1255	1268	688	558	758	616	533	481
Mean Clutch Size	1.53	1.55	1.68	1.6	1.46	1.73	1.49	1.70	1.87
Mean Hatch Success	51.9%	75.3%	78%	21.6%	56.8%	73.7%	66%	30.9%	81.7%
Mean Fledge Success	62.8%	81.3%	54%	20%	24.5%	70%	30%	63.3%	75.9%
Mean Chicks Fledged/Nest	0.45	0.95	0.70	0.21	0.22	0.89	0.35	0.33	0.94
ROST									
# of Nests	5	4	4	2	0	2	2	0	0
Mean Chicks Fledged/Nest	0.20	1.00	0.20	0.00	0	0.25	0	0	0
LAGU nests*	1350	1363	1171	270	735	811	750	560	620
ATPU nests	53	93	104	88	46	63	47	73	77
COEI nests	49	105	101	56	35	67	55	54	62
*7.5 % correction factor applied to LAGU nest counts									

Arctic Tern Metapopulation Project

As part of the Arctic Tern metapopulation project we re-sighted 107 adult Arctic Terns. Additionally, we banded 25 new adults, 174 chicks, recaptured 16 Arctic Tern adults.

Tern and Puffin Provisioning

We conducted provisioning observations for 10 Common Tern nests and 11 Arctic Tern nests for a total of 720 hours and observed 1296 prey deliveries. Hake was the primary prey delivered to Arctic Tern chicks (34%) while hake and sandlance both were the primary prey items of Common Tern chicks (26%). On average, tern adults delivered 1.8 prey items per nest per hour.

This season we began a preliminary puffin provisioning study in three sections of the island, observing as many feedings as possible. In total, the crew spent 48 hours in blinds observing 320 prey deliveries. Sand lance made up the majority (40%) of prey items fed to puffin chicks.

Table 3. Principal prey items (percent) in tern and puffin chick diet on Petit Manan Island in 2015. *n* is the total number of prey items observed.

Prey item	COTE	ARTE	ATPU
Herring	13% (n=68)	2% (n=13)	6% (n=18)
Hake	26% (n=130)	34% (n=265)	29% (n=92)
Sand Lance	26% (n=130)	17% (n=133)	40% (n=129)
Butterfish	6% (n=28)	1% (n=10)	0% (n=1)
Pollock	1% (n=6)	1% (n=5)	1% (n=2)
Stickleback	1% (n=3)	2% (n=13)	0% (n=0)
Amphipod	2% (n=9)	18% (n=141)	0% (n=0)
Larval Sandlance	1% (n=7)	5% (n=42)	5% (n=16)
Haddock	2% (n=12)	2% (n=14)	6% (n=19)
Redfish	0% (n=0)	0% (n=0)	1% (n=3)

Predator Control

Peregrine Falcons were the most frequent non-gull visitors to the colony throughout the season. During the field season we discouraged the Peregrine Falcons and other avian predators from perching on the island using bird deterrents. In late July the Peregrine Falcon became a recurring predator preying mostly on tern fledglings, coming multiple times per day. We found the remains of 21 tern adults and fledglings that were taken by the Peregrine, but suspect the actual number taken to be significantly higher. One specialist Great Black-back Gull preyed opportunistically on tern chicks, eating young and fledgling chicks, often without landing. At his nest site on adjacent Green Island we discovered the remains of at least 25 tern fledglings. Bald Eagles were a regular visitor to the island but mainly preyed on the Laughing gull colony. During the census, we poked the eggs of 507 Laughing Gull nests and destroyed 70 Laughing Gull nests. Lethal removal of avian predators thought to be tern or kelptoparasitism specialists also occurred and included: 28 adult Laughing Gulls, 2 Herring Gulls and 2 Great Black-back Gulls. In addition, we performed 36 hours of night stints from 6 June to 14 June to observe predator activity at night during tern hatch. No owls or mammalian predators were observed this season on Petit Manan.

Alcids

The highest alcid counts for the season were 161 Atlantic Puffins (22 June), 60 Razorbills (22 June), 27 Common Murres (23 June) and 346 Black Guillemots (14 May). We estimated the breeding population of Atlantic Puffins to be at least 77 pairs based on the number of active burrows (i.e. burrows with either an adult, egg or a chick). This estimate is nearly equivalent to 2014 (73 burrows), with similar productivity as well. Puffin hatch success was 74%, fledge success was 82% and number of fledged birds/nest was 0.62. We documented 5 active Razorbill burrows in 2015 which produced 2 chicks. Although Common Murres were observed loafing on the island, and in two instances copulating, there was no evidence of any breeding attempts. Lastly, we estimated that the Black Guillemot breeding population was 88 burrows, an increase from last year's 74 burrows. We monitored a subset of the Black Guillemot population (27 nests) for productivity—weighing and measuring wing cord of chicks every 5 days. For these birds, average clutch size was 1.89, average hatch success was 1.41, and average number of chicks per pair was 1.41. This is substantially higher than the 2014 estimate where hatch success was 0.51 and chicks per pair was 0.81.

In addition to daily counts and productivity monitoring, a large portion of our time was spent reading Alcid bands. We re-sighted 101 individual Atlantic Puffins this field season. As well as re-sighting, we recaptured adult puffins by grubbing burrows and setting box and noose traps. We banded 41 puffins this season (16 adults and 25 chicks), replaced 7 pairs of bands, and recaptured 25 adults. Finally, we banded 100 Black Guillemots (8 adults and 92 chicks) and recaptured 9 adults.

Other Research

We began conducting puffin feeding studies for the first time this season on Petit Manan Island. Additionally, we collected ant and insect samples using pitfall traps and opportunistically collecting individuals for Amy Arnett's study at Unity College.

Eastern Brothers Island

James Heuschkel and Nathan Skvorak - Island Technicians

This was the 9th 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, common terns, Leach's storm-petrels, razorbills, and Atlantic puffins.

Black Guillemots

We observed a season high count of 493 guillemots on both islands and in the surrounding waters on May 29th with an average of 234 guillemots during our morning counts. Predation was low compared to previous years. For example, in 2014, 2 mink were captured compared to 1 in August of 2015. There were also no obvious signs of any mink predation throughout the breeding season. Peregrine falcons were seen attempting to predate black guillemot burrows on 2 occasions but none were successful. We witnessed a Common Raven attempt to predate a guillemot burrow on August 1st. In early August three nests went missing chicks and contour feathers were left behind, however, we were unable to confirm the cause but suspect a Raven or mink could be the culprit. Many burrows are out of reach, but the crew found 87 burrows, with a peak of 82 active at one time and regularly checked them all. Hatch success was slightly higher than all previous years at 57% (total eggs hatched/total eggs, see Table 3). At the end of the season 51.8% 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.

Table 1. Average number and high counts of black guillemot counts during morning surveys on Eastern and Western Brothers Island from 2007-2015.

Year	Daily Count Avg.	High Count and Date	Active Burrows E. Brothers	Active Burrows W. Brothers	Maximum # Breeding Pairs*	Minimum # Breeding Pairs
2007	500	725 May 31	88	10		160
2008	482	733 Jun 6	95	12		250-300
2009	410	658 May 21	111	14		200-225
2010	480	625 May 16	61	11	227	114**
2011	244	380 Jun 1	70	1	357	179**
2012	234	340 Jul 14	65	6	310	155**
2013	202	380 May 28	82	5	339	169**
2014	166	260 Aug 3	69	7	243	122**
2015	234	493 May 29	83	4	336	168**

*Average of the monthly high counts
**Estimated by calculating half of the average monthly high count. Other estimates represent island supervisor's best judgment.

Table 2. Nesting chronology of black guillemots at Eastern Brothers Island 2007-2015

Year	First BLGU Egg	First BLGU Hatch	Avg. Lay Date*	Avg. Hatch Date	Avg. Fledge Date*
2007	8-Jun	5-Jul	13-Jun	11-Jul	13-Aug
2008	9-Jun	5-Jul	20-Jun	18-Jul	20-Aug
2009	8-Jun	5-Jul	18-Jun	16-Jul	18-Aug
2010	8-Jun	7-Jul	15-Jun	13-Jul	15-Aug
2011	25-May	16-Jul	17-Jun	14-Jul	13-Aug
2012	26-May	23-Jun	7-Jun	5-Jul	6-Aug
2013	25-May	24-Jun	19-Jun	12-Jul	14-Aug
2014	31-May	30-Jun	12-Jun	10-Jul	12-Aug
2015	31-May	2-Jul	14-Jun	11-Jul	14-Aug
Average	**1--Jun**	**3-Jul**	**15-Jun**	**12-Jul**	**13-Aug**

*used date found or hatched to calculate avg. lay (-28 days from hatch) and fledge dates (+33days)

Table 3. Black guillemot nest fate, The Brothers Islands 2007-2015.

Year	# Nests	Hatch Success	Nest Fate (at the end of the season)					
			Chicks Alive	Nests with surviving chicks (N)	Abandoned Nests	Predated Nests	Failed due to Weather	Unknown or Active
2007	88	25%	93.3% (24 of 26)	-	-	-	-	-
2008	82?	28%	90.0% (36 of 40)	30.5% (25)	42.7% (35)	2.4% (2)	6.1% (5)	18.3% (15)
2009	82	39%	85.9% (49 of 88)	-	-	-	-	-
2010	19	26%	100% (9 of 9)	-	-	-	-	-
2011	68	34.2%	94.5% (35 of 37)	30.9% (22)	11.8% (8)	27.9% (14)	0%	29.4% (20)
2012	60	54.1%	85.0% (51 of 60)	48.3% (29)	21.7% (13)	25.0% (15)	1.7% (1)	5.0% (3)
2013	63	32.1%	82.3% (28 of 34)	30.2% (19)	22.2% (14)	22.2% (14)	12.7% (8)	17.5% (11)
2014	46	39.2%	64.5% (20 of 31)	30.4% (14)	28.2% (13)	41.3% (19)	0%	0%
2015	87	57.5%	89.0% (76-86 chicks)	58.6% (51)	29.9% (26)	3.4% (3)	1.1% (1)	6.9% (6)

Predator Control

The first mink traps were set on the Brothers Islands on March 25 through proactive predator control efforts, 41 traps including snares and conibear's were maintained throughout the season. Refuge staff trapped a mink on Western Brothers in mid-August after the research crew departed the island (August 28). Trapping efforts in 2015 were expanded to nearby islands in an effort to trap mink before they had the opportunity to reach the Brothers. Trapping efforts on Anguilla were initiated on March 24th and ran until August 28th for a total of 2,522 trap nights. This effort proved to be highly successful, and two mink were trapped on Anguilla Island (March 3st and April 8th). Traps were also set on Ram Island, where mink tracks were observed in the snow in March, but we did not catch any mink on that island. Traps were set on Ram Island on June 26th and ran through August 28th for a total of 480 trap nights. Bald eagles, merlins, peregrine falcons, and a northern harrier frequented the island. To deter gulls, we destroyed 3 nests on Eastern Brothers (2 HERG, 1 species unknown) and destroyed 2 nests on "Little Brothers" (1 HERG and 1 GBBG)

Terns

A tern sound system and 40 tern decoys were deployed on (May 7, 2015). Although 4 to 5 COTE were residents of the island throughout the breeding season their numbers increased to an average of 6 in mid-July with a high count of 11 on July 23rd. Two pairs of COTE nested on Eastern Brothers Island and each pair had three chicks successfully hatch. Tern productivity was 2.5 chicks per pair. The chicks from the first nest all fledged and were seen in flight. Two of the chicks from the second nest fledged and one chick likely died. The dominate fish species in the four chicks diet was Herring (40%) and Hake (13%)

Atlantic Puffins and Razorbills

Refuge staff deployed over 100 alcid decoys on March 31, for a total of 68 puffins and 65 razorbills (133 decoys). Two alcid sound systems were deployed (May 27 and June 4). Beginning the first week of June, we routinely observed razorbills around Eastern and Western Brothers Islands until we departed the island in early August.

Many times they were observed near the two sets of floating decoys. Atlantic puffins were a common visitor to Eastern Brothers and the waters surrounding the island, with 1-3 observed almost daily.

In the 2015 season we saw 1-3 puffins almost daily from the end of June through the beginning of August for a total of 62 sightings (103 birds). Puffins were seen perched on the island on 12 different days with an average of 3.2 birds/day. Razorbill sighting were much less frequent with 57 total sightings (39 birds) and were seen perched on the rocks on 5 days (1.8birds/day).

CANADA

Machias Seal Island

Stefanie Collar - island supervisor; Jenn Symons, Michelle Valliant - field technicians; Stephanie Symons-MSc. Student, University of New Brunswick

A combination of favorable weather, ample food supply and successful limited lethal predator control resulted in a productive breeding season for all monitored species on Machias Seal Island in 2015. Terns had their most successful year on MSI since 2001, though numbers of nesting pairs remain low. The start of ATPU breeding was delayed, and this year's mean ATPU lay date is 10 days later than the 20-year average (13 May). A census was completed for both ATPU and RAZO, and found an increase in RAZO nesting pairs and a decrease in ATPU nesting pairs. Geolocators deployed in 2014 were successfully recovered from both ATPU and RAZO. Masters student Stephanie Symons continued her study of foraging distribution during chick rearing, and deployed GPS tags on ATPU and RAZO.

Terns

Terns were already present around MSI on May 10. On May 12 terns were seen landing on the island and engaging in courtship behaviors, and quickly began establishing nests. The first egg was found May 25, mean lay date was June 6. The first chick hatched June 18, mean hatch date was June 30. Many nests were depredated by gulls the first week of June, including 5 productivity nests, but there was an island-wide second wave of nesting during the second week of June. Unlike past years, the terns were aggressive towards predators and people alike, and were often seen mobbing marauding HERG, GBBG and PEFA. The terns were very successful this year! There were 51 ARTE nests monitored within productivity plots and the core of the island. COTE were also seen nesting on the island, though not within the productivity plots. Chicks hatched per nest (0.87) was the highest since 2004, and fledging success (0.61) was the highest on MSI since 2001. For the first time since 2003, productivity nests successfully fledged two chicks (n=5). A tern census was not conducted this year, but it is estimated that there were up to 150 attempted nests island-wide, with a probable species distribution of 94% ARTE and 6% COTE, similar to last year. We performed 39 hours of feeding watches on a total of 7 tern nests (see table below).

Estimated Tern Nests on MSI (formal census in 2014 only)

2011	2012	2013	2014	**2015**
75	50	90	187	**150**

Diet (% by number, not biomass) for ARTE on MSI

n	**Hake**	**Haddock**	**Sandlance**	**Stickleback**	**Pollock**	**Larval**	**Other**
256	25	< 1	38	5	1	21	9

Other: predominately unknown gadoids

Breeding Success of ARTE on MSI

Year	n	Clutch Size	Chicks hatch/nest	**Chicks/nest alive at Day 15**	Chicks/nest alive at Day 20	Fledglings/nest
2003	100	1.51(0.54)	0.94	0.70	0.56	0.50
2004	170	1.42 (0.50)	0.84	0.38	0.30	0.05
2005	183	1.42 (0.50)	0.57	0.03	0.02	0.01
2014	42	1.68 (0.53)	0.57	0.11	0.08	0.08
2015	**51**	**1.69 (0.55)**	**0.87**	**0.71**	**0.63**	**0.61**

Predator Control

Non-lethal gull control was conducted this year using paintball guns, with limited success. Lethal gull control was again conducted by a contracted predator control specialist on May 29-30, June 6-7 and June 13-14. A total of 17 gulls were removed, 15 adult HERG, 1 juvenile HERG and 1 juvenile GBBG. There was a decline in egg depredation for 3-5 days following each session of lethal control, but nest depredation continued throughout the season. Gull Rock (0.25 km away) was visited twice during the season, on June 4 and June 14. In all, 13 gull nests, 12 HERG and 1 GBBG, were found and a total of 41 eggs were shaken and poked. Only 1 gull nest was found on MSI this season, a HERG nest with 2 eggs, both of which were shaken and poked.

Alcids

A census was conducted for both ATPU and RAZO this year. Alcid censuses are performed using staggered quadrats (ATPU) or 2m-wide transects (RAZO) over each east-west gridline of our 30x30m grid system. Nesting totals are extrapolated from the counts. The ATPU nesting census was conducted June 16 and 17. There were 137 active burrows, and 220 total burrows, a 62% rate of occupancy. This is down from the overall average of 76% occupancy. The numbers sampled extrapolate to over 5000 pairs or 22% below the average 2000-2011. The areas of the island most heavily occupied by ATPU mirror those from the 2011 census, but number of total burrows is lower by about 20%. ATPU had high growth rates (8.0 g/day) and excellent chick survival (0.91 fledge/chick) this season, and fledging success was high (0.72 fledge/egg).

The RAZO census was conducted June 19 and 20. There were 170 total burrows (161 eggs, 4 broken eggs, 5 chicks), extrapolating to 2550 nests, representing a 30% increase over the last census in 2011, an increase of over 5 times since the first census in 2000. Occupancy was slightly higher in 2015 compared with 2011, with the increase in nesting concentrated in the southwest section of the colony. This season 4 burrows formerly occupied by ATPU were taken over by RAZO, and there is concern that the increase in RAZO nesting pairs may be partly responsible for the decline in ATPU nesting on MSI.

There were 71 COMU eggs and 72 chicks counted in July, for a total of 145 nests in 18 caves, but this is certainly an underestimate as it was conducted after peak fledging, and is lower than found in previous years. The details of alcid productivity, growth and (identified) diet are described below. Diet data are % by number, not biomass.

	Monitored Burrows	**Mean Lay**	**Mean Hatch**	**Burrow Occupancy**	**Hatching Success (hatch/ active nest)**	**Nesting Success (fledge/ active nest)**	**Linear Growth Rate (mass)**
ATPU	98	23 May	3 July	0.68	0.78	N/A	7.9 grams/day
RAZO	84	22 May	27 June	0.75	0.67	0.48	7.5 grams/day

	n	**Hake**	**Larval**	**Euphausiid**	**Sandlance**	**Herring**	**Butterfish**	**Other**
ATPU	1540	3	25	1	65	2	< 1	5
RAZO	1087	11	19	< 1	49	12	1	8

	n	**Herring**	**Butterfish**	**Gadoid**	**Sandlance**	**Squid**	**Rock Gunnel**	**Other**
COMU	115	49	10	23	7	6	3	3

Tagging effort
Thirteen geolocators were successfully retrieved, of the 31 deployed in 2014, 10 from ATPU (38% of deployed) and 3 from RAZO (60% of deployed). The tags were in good condition, though 4 ATPU tags had chunks of seaweed tangled within the zip-tie attachments upon recovery. The tag attachment method likely allowed this fouling, as there was a sizable gap between the zip-tie and the field readable band. Vegetation was not found in any of the recovered RAZO tags. We deployed 5 types of tags on RAZO, ATPU and LHSP at MSI this season. Geolocators were deployed on both RAZO and ATPU in an effort to determine alcid wintering distribution and diving activity; nanotags were deployed on RAZO in collaboration with Rob Ronconi to investigate RAZO wintering distribution along the Eastern coast of North America; geolocators were attached to LHSP to gather data on foraging locations during the breeding season.

Other Species
It is estimated that COEI nesting on MSI was low this year (< 50), but no formal census was conducted. Ducklings were first seen in mid-June, and were still present around the island in early August, both small, newly-hatched ducklings and pre-fledge. LHSP were also breeding on MSI, and 23 active nests were opportunistically grubbed for banding and geolocator tag deployment. NOGA were present throughout the season, with 1-3 loafing on the south end of the island almost every day between mid-May and August. They were often seen displaying and occasionally seen carrying nesting material, but no nesting attempts were made.

The Brothers Islands Wildlife Management Area, Nova Scotia

North Brother Island and South Brother Island

Ted D'Eon, Island Steward and Julie McKnight, Canadian Wildlife Service – Environment Canada

Tern Census
The tern census was conducted on North Brother Island on 12 June with four observers. In total, 722 nests were counted of which 35 were Roseate Terns (ROST). Seven additional ROST nests were found over the season bringing the year-end total count for ROST to 42 pairs. 41 of 42 nests were constructed in nest shelters (36 under typical 3-sided box shelters, three in new 'Coquet Island'-style shelters, and two under salvaged plywood).
No terns nested on South Brother Island in 2015.

Table 1. Number of tern nests found on The Brothers Islands from 2000-2015

Year	Terns*	ROST
2000	491	86
2001	880	70
2002	833	90
2003	750	86
2004	526	76
2005	445	68
2006	616	67
2007	365	68
2008	590	55
2009	546	42
2010	714	38
2011	725	38
2012	658	34
2013	680	38
2014	731	38
2015	722	42

*Combined count for Arctic, Common, and Roseate Terns

Predator Activities and Control Efforts
North Brother Island: Nine dead adult Common Terns were discovered during the census trip on 12 June. The evidence collected confirms Great Horned Owl predation ((GHOW) e.g., many adults decapitated, splintered beaks,

dropped GHOW rectrix). Frequent checks were made during the following weeks but fortunately, no further evidence of predation was found.

One Great Black-backed Gull (GBBG) nest with three eggs was found on North Brother on 12 June and all eggs were destroyed. Minor egg predation was seen in the colony but appeared to lessen once the GBBG eggs were removed.

South Brother Island: Five GBBG nests were discovered on 25 May. Four nests were completely constructed but without eggs and a fifth contained three GBBG eggs and one Common Eider (COEI) egg, but no down.

Common Eiders
North Brother Island: One nest was found with six eggs on 21 May. One dead female COEI was discovered on 4 June and GHOW predation was suspected.

South Brother Island: Three completely constructed nests were found on 21 May as well as one GBBG nest (three eggs) containing one COEI egg and one COEI nest in the seaweed with two eggs but no eider down.

Other Notes
We captured 11 adult ROST: five unmarked individuals and six recaptures (all banded as chicks: five from North Brother Island and one from Country Island). One of these was missing its USGS band (metal field readable band 920E was still present). One bird (0802-04956 | 765N) sustained a band-induced injury to its left leg due to its USGS band (sprung slightly open and migrated below the hallux) which was removed with a band-cutting tool on 10 July. This bird retained its foot but was observed six days post-removal still not placing weight on the foot.
In addition to the six recaptured birds, 30 individual ROST were resighted on North Brother Island in 2015. 26 of these were originally banded on North Brother Island (10 as chicks, 16 as adults) and two were originally banded on Country Island, NS (one as a chick, one as an adult). Two observed ROST were foreign-banded as chicks on Great Gull Island, NY (1998) and Bird Island, Buzzards Bay, MA (2011).

We banded 21 ROST chicks with USGS and plastic field-readable bands (PFRs) on 10 July, 2015.
See www.teddeon.com/tern15.html for a full account of the tern season.

Country Island

Kristin Rostad, Island Coordinator
Amie MacDonald & Orla Osborne, Island Assistants
Contact – Jen Rock, Canadian Wildlife Service, Jen.Rock@ec.gc.ca

Population
A first census on June 16-17 resulted in1061 terns counted (Table. 1). To account for late nesters, 50% of the colony was re-sampled on July 9-12 and counts were adjusted using a Lincoln index of 1.274 resulting in a corrected colony size of 1351 tern nests, including 6 Roseate Tern nests[1]. Tern colony species composition[2] was similar to previous years, comprising 59% Arctic and 39% Common Tern.

Overall, tern numbers were low compared to the previous four years and this is consistent with 2015 predation events (see predator activities below). Low counts of Roseate Terns may be explained by movement of birds to other sites. Waterbird surveys in the vicinity revealed at least 6 pair of ROST nesting at new site, Western Island (~25 km NE of Country), and at least two of these birds were banded at Country Island.

Table 1. Number of tern nests found at peak laying (1st census) at Country Island, NS from 2011-2015

Year	ARTE[‡]	COTE[‡]	ROST[1]	Total tern colony
2011	n/a	n/a	27	1501
2012	754	492	18	1263
2013	868	426	16	1309
2014	754	502	15	1270
2015	622	420	6	1061

Productivity

Table 2. Mean hatch success ± SE (eggs hatched / eggs laid per nest) at Arctic, Common and Roseate Tern nests at Country Island, N.S. from 2011-2015

Year	ARTE			COTE			ROST		
	Hatch success	SE	n	Hatch success	SE	n	Hatch success	SE	n
2011	0.92	0.03	55	0.95	0.02	36	0.88	0.06	25
2012	0.94	0.02	79	0.93	0.02	79	0.78	0.09	18
2013	0.95	0.02	59	0.94	0.02	64	0.91	0.05	16
2014	0.89	0.04	60	0.91	0.03	60	0.77	0.11	15
2015	0.94	0.03	62	0.92	0.02	58	0.83	0.17	6

For all three tern species productivity was among the highest values recorded since monitoring began in 1997.

Table 3. Mean Productivity ± SE (chicks fledged[3] / pair) at Arctic, Common and Roseate Tern nests at Country Island, N.S. from 2011-2015

Year	ARTE			COTE			ROST		
	Productivity	SE	n	Productivity	SE	n	Productivity	SE	n
2011	0.67	0.08	46	0.61	0.09	31	0.83	0.10	24
2012	1.37	0.08	79	1.78	0.09	79	1.06	0.16	17
2013	1.43	0.09	46	1.59	0.10	51	1.13	0.09	16
2014	1.51	0.10	43	1.79	0.11	42	1.33	0.14	12
2015	1.43	0.11	40	1.95	0.14	37	1.60	0.10	5

[3] For ARTE, COTE and ROST chicks are considered fledged at 15 days

Chick feeding rates

Table 4. Feeding rates for Arctic and Common Terns at Country Island, Nova Scotia, 2015

Arctic Tern delivery/hour/chick				Common Tern delivery/hour/chick			
Mean	SE	N (nests)	Hours	Mean	SE	N (nests)	Hours
0.66	0.06	30	308	0.80	0.07	25	258

In 2015 chick feeding rates were below the 1998 to 2015 average (ARTE mean ± SE: 0.96 ± 0.35; COTE mean ± SD: 0.83 ± 0.29) however this did not appear to impact chick growth rates (grams per day) or productivity which were among the highest values observed since monitoring began.

Chick diet composition

Chick diet composition was described for nests that had ten or more prey items delivered and where at least 50% of items were identified.

Table 5.Principle prey items (percent) delivered to tern chicks at Country Island in 2015

Prey item	Arctic Tern	Common Tern
White hake	51	49
Sand lance	4	8
Atlantic herring	5	7
Invertebrates	4	2
Other fish species[4]	0	4
Not identified	36	31
Number of nests followed	12	7

[4]'Other fish species' is a pooled category including Atlantic saury (*Scomberesox saurus*), pollock (*Pollachius* sp.), silverside (*Atheriniformes* sp.), snipefish (*Macroramphosus* sp.), mackerel (*Scomber scombrus*), redfish (*Sebastes fasciatus*), and lumpfish (*Cyclopterus lumpus*), all accounting for less than 0.6% each.

Predator Activities

Only one gull nest was destroyed at Country Island, belonging to a Great Black-backed Gull.
Mink, river otter and Merlin were active on Country Island in 2015 and were responsible for the death of at least 964 nesting birds including 718 Leach's Storm Petrel, 225 terns (Common and Arctic – no Roseate), 16 Black Guillemot, 4 Willet, and 1 Spotted Sandpiper. The mink was likely responsible for the majority of predation events and was 'at large' for roughly 8 weeks, overlapping with the tern nesting period (nest establishment, incubation and chick rearing). The river otter was removed within a week following detection and before terns had had settled in the colony. We are grateful to L. Welch at USFWS who provided valuable information on trapping mink in seabird colonies.

Common Eiders

In 2015 at least 224 Common Eiders nested on Country Island. For the past four years over 200 Common Eider nests have been counted during a single census conducted the 2nd week of June.

Black Guillemots

Since tern colony restoration was initiated in 1998 the number of Black Guillemots detected during daily surveys has continued to increase from a maximum of 19 individuals in 2001 to 579 in 2014. Black Guillemots have been confirmed breeding at the colony however the number of nesting pairs is unknown.

Roseate Tern Banding

As part of a collaborative effort to gain a better understanding of ROST movement and survival, Canadian Wildlife Service continued to band adults and chicks with plastic field readable bands; this initiative has been ongoing since 2011. In 2015, two adult ROST and all eight chicks were marked with red field readable bands.

[1]ROST nest totals are based on the maximum number of pairs detected on the island over the entire breeding season.
[2] Species ratios for ARTE and COTE were calculated at 20% of nests, randomly selected, stratified by four main habitat types. To determine species composition for the colony, ratios were extrapolated to the colony based on nest densities by habitat type.

ABSTRACTS: Afternoon Presentations

Changes in the diet and survival of mid-coast Maine puffin chicks

Stephen Kress, National Audubon Society Seabird Restoration Program
Paula Shannon, National Audubon Society Seabird Restoration Program
Chris O'Neal, Synovus

We studied changes in the diet of puffin chicks at three mid-coast Maine colonies from 2005-2014 and examined changes in hatching success and productivity during this period at two colonies. We also compared chick condition at banding at one of the colonies with recruitment of adults back to the regional population to understand the relationship between chick growth and survival.

We found that Atlantic Puffins feed primarily on white hake, *Urophysis tenuis*, Atlantic herring, *Clupea harengus*, and sand lance, *Ammodytes spp*. We found that puffins in each colony feed their chicks a distinct 'signature diet' and that many of the species in the puffin chick diet have changed over the past ten years. White hake is now by far the most frequently delivered prey, while Atlantic herring has decreased in the puffin chick diet. In recent years, butterfish, *Peprilus triacanthus*, haddock, *Melanogrammus aeglefinus*, and redfish, *Sebastes spp*., have increased in the puffin diet, though in most years they still make up only a small fraction of the diet.

From 2010-2013, a period that included extreme warming, puffin hatching success and overall productivity declined by an average of 10.5% and 19.2% at Matinicus Rock and an average of 11.4% and 24.5% at Seal Island. Likewise, the body weight/wing length ratio (a measure of chick condition) of puffin chicks at Matinicus Rock declined at the rate of 0.0299 units/year from 1993-2009 with a greater decline in the years following 2002. Also, surviving puffins (those resighted in subsequent years) had, on average, a 7% greater weight/wing ratio than non- survivors. We discuss our findings in relation to warming waters, recovery of haddock and redfish stocks and ecosystem regime change in the Gulf of Maine.

The Phenology of breeding Sterna Sp. in the Gulf of Maine

Keenan Yakola, National Audubon Society

Long-term data sets concerning seabirds are exceptionally valuable to assist future management and conservation efforts. The Audubon Seabird Restoration Program has collected data concerning diet and growth rate of the three Sterna sp. breeding in the Gulf of Maine since 1993. We present preliminary analyses focusing on the diet and associated growth of Arctic Tern chicks over the past 12 years on Seal Island National Wildlife Refuge. In addition we discuss how climate change may negatively be affecting the phenology and demography of the Sterna populations in the Gulf of Maine. Future research must be conducted to better understand changes in phenology in order to conserve these important indicator species. A partnership between UMass Amherst, the Northeast Climate Science Center and National Audubon's Project Puffin will begin a significant step towards understanding these changes in the phenology through a master's thesis beginning in January 2016.

Ecological segregation between two closely related species: exploring Atlantic Puffin and Razorbill foraging hotspots

Stephanie C Symons, Atlantic Laboratory for Avian Research, University of New Brunswick, Fredericton, NB E3B 4A5 Canada. stephanie.c.symons@gmail.com

Niche theory states that a species range is restricted first by physiological tolerances and second by biotic interactions. The competitive exclusion principle builds on niche theory, remarking that two species cannot coexist if they overlap in all dimensions of their niche. Machias Seal Island is a migratory bird sanctuary bordering the Gulf of Maine and the Bay of Fundy. This island is home to several seabird species during the breeding season, including the Atlantic Puffin and Razorbill. Puffins and Razorbills, belonging to the auk family, are long-lived, pursuit-diving, central place foragers that feed on a similar diet. Relatively little is known about how these two species are partitioning resources in the Gulf of Maine/Bay of Fundy area. Generally, seabirds partition resources by foraging habitats, foraging depths, and/or interspecific differences in prey. Using a mix of GPS technology and long term data collected over the past 20 years, my thesis project aims to determine which of these strategies are being used by these seabirds in order for them to exist sympatrically during the breeding season. In addition, locating and describing foraging hotspots could serve as a valuable base for delineating marine protected areas in the Gulf of Maine and the Bay of Fundy.

The Early Life Histories of fishes of the Gulf of Maine; Urophycis tenuis, white hake

Mike Fahay, National Marine Fisheries Service (retired)

No single paradigm adequately describes early life history patterns of marine fishes. Subtle or marked differences in spawning patterns, passive larval drift, active migration, presence or absence of a pelagic-juvenile stage, and settlement to demersal habitats differ between Gulf of Maine fish species. Furthermore, many important prey species

are spawned in waters away from the Gulf of Maine. The white hake, *Urophycis tenuis*, is usually at or near the top of the list of prey species utilized by Puffins and 3 species of Terns. The white hake does not spawn within the Gulf of Maine. Ichthyoplankton surveys spanning several decades (1960s to present) indicate that spawning of one population occurs along the continental shelf of the U.S., usually in submarine canyons where large adults are found. Following a pelagic larval stage, the highly specialized pelagic-juveniles actively swim across Georges Bank and into the GOM, usually beginning in May or June. The role of nesting birds as the sole "samplers" of the young stages of a second (Scotian Shelf) cohort is discussed.

Evaluating the Burn effective vegetation control on Seavey Island, Isles of Shoals

Juliana Hanle, Johanna Pedersen, Terns LLC, Shoals Marine Laboratory

Nest density on Seavey Island, which is located five miles offshore of Rye, New Hampshire and is nesting site to roughly 5,500 common terns and 150 roseate terns, has been increasing over the last five years. Island managers attributed some of this increase to unfavorably dense vegetation. In order to eliminate that vegetation and reduce litter, New Hampshire Fish and Game conducted a controlled burn last September on Seavey. This summer we evaluated the quality and composition of the island's vegetation according to the protocol established by a pre-burn survey. The aim was not only to evaluate the effects of the burn on COTE and ROST productivity, but also to start a new long-term data set.

As desired, litter decreased within the burned areas. Additionally, vegetation composition of burned areas changed favorably: tall grasses and bramble decreased, lower herbaceous plants increased. Overall COTE density decreased and ROSTs nested in new areas due to the burn. The burn may have opened up new areas to both common and roseate terns, or increased favorability of other areas.

Common Tern GPS tags at White and Seavey Islands

Johanna Pedersen, Terns LLC, Shoals Marine Laboratory

The use of seabirds as ecological indicators to determine what is occurring within the marine environment is becoming more widely accepted throughout the scientific community. In order to research these taxa to their potential, the use of GPS locators and other forms of tagging are used in order to dictate where they are moving & etc.; but does this come at a price? The excessive handling of any taxa can cause stress, but it is unclear if these practices affect the overall productivity of these individuals. In observing the productivity (lay, hatch and fledge dates) of common terns *(Sterna hirundo)* tagged on Seavey Island, NH, a conclusion may be derived on how much the human interaction is affecting them. Correlating general productivity with feeding observations helped determine that those individuals that were tagged were not significantly affected by the addition of a GPS tag. This suggested that GPS tags, when applied correctly and onto fit individuals, show little/null interference with the success of rearing chicks.