Gulf of Maine Seabird Working Group (GOMSWG) 40th Annual Summer Meeting Report

Meeting held virtually and in-person at Hog Island Audubon Camp, Bremen, ME, on August 9, 2024

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Introduction

The Gulf of Maine Seabird Working Group (GOMSWG) is a collaborative effort among state and federal 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 40 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 included summaries of island activities, reported in geographical order from Canada south to Massachusetts, and a series of short research presentations in the afternoon. A table with 2024 GOMSWG census results will be distributed concurrently with this report and/or made available at the GOMSWG website (gomswg.org).

Island and Site Reports

Canada

Machias Seal Island

Catherine Lee-Zuck, Island Supervisor; Daniel Oliker, field technician and MSc Candidate – University of New Brunswick; and Maddy Talpt, field technician and MSc candidate – University of New Brunswick.

Tern Census

A census was completed on June 15-17 with an estimated total of 318 ARTE and 0 COTE nesting on MSI.

Table 1. Estimated Number of Tern Nests on MSI (formal census in 2014 and 2018).

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
175	75	50	90	187	150	175	300	476	500	0
2021	**2022**	**2024**								
-	116	318								

Productivity

Upon the crew's arrival on May 13th no terns were present on island and no nests were found, although shortly thereafter numerous terns were seen flying and eventually landing on the island. Few COTE were seen flying (<1 per day) around the island and none were seen nesting. The first nest was found on May 29th and mean lay date was June 1st.

We monitored 45 nests for productivity (45 ARTE, 0 COTE) for a total of 74 eggs. The average clutch size was 1.64±0.53. Of the 74 eggs, 6 eggs were depredated (8% predation rate), 11 went missing (15%), and 45 chicks hatched for an overall hatch success of 68%. First hatch was June 18th with a mean hatch of June 23rd. Of the 50 chicks that hatched, 11 (22%) were found dead, 26 chicks fledged successfully (35% fledge/egg; 52% fledge/chick).

Table 2. Breeding parameters as means ±SD for Common, Arctic, and Roseate terns on Machias Seal Island in 2024.

Species	Clutch Size	Hatching Success	Fledging Success	Nests Monitored
COTE	0	0	0	0
ARTE	1.64±0.5	68	52	45
ROST	NA	NA	NA	NA

Tern Provisioning

We completed 9 hours of ARTE chick provisioning observations on a total of 7 nests in 1 plot. These observations were made between July 12 and July 16. A total of 97 individual prey were observed to be fed to the monitored chicks. Prey was predominantly Euphausiids, Hake, and larval fish.

Table 3. Principal prey items (percent) in tern chick diet on Machias Seal Island in 2024 (*n* is the total number of prey items identified).

Prey Item	COTE	ARTE	ROST
N	0	97	NA
Euphausiid	0	35	NA
Hake	0	22	NA
Larval fish (Species unknown)	0	16	NA
Unknown fish	0	6	NA
Butterfish	0	5	NA
Larval hake	0	4	NA
Unknown prey	0	4	NA
Dragonfly	0	2	NA
Unknown invertebrate	0	2	NA
Haddock	0	1	NA
Moth	0	1	NA

Predator Activities and Control Efforts

Non-lethal gull control continued in 2024, using paintball guns to deter individuals actively hunting and kleptoparasiting alcids in the colony. A total of 10 HERG were killed by our nuisance wildlife control officer from June 04-06. A total of 1 HERG nest was found on MSI this season and 3 eggs were destroyed via the shake and poke method. One LAGU nest was found during our Tern and Eider census but was not monitored further.

Gull Rock, an adjacent island with a persistent breeding colony of HERG and GBBG, was visited once this season: June 02. A total of 25 gull nests (species unknown), were found and destroyed by shaking and poking eggs (n = 60).

Common Eiders

A census was completed on June 15-17 with an estimated total 158 nests.

Counts were conducted weekly starting May 16. Our highest count was a total of 324 individuals (201 males, 123 females, and 0 ducklings) on May 23. Our highest count of ducklings occurred on July 11 with 62 ducklings counted.

Alcids: Atlantic Puffin

No formal ATPU census was conducted in 2024.

A total of 130 burrows were monitored for productivity this season, out of which 118 had eggs. In total 28 eggs went missing, 6 eggs were found dead, and 76 hatched (64% hatch success). Of the hatched chicks 13 went missing, 7 were found dead, and 48 fledged (41% fledge/egg; 63% fledge/chick). Linear growth rate this season was 8.3 ± 0.5 g/day. A total of 52 productivity chicks were banded with BBL and field readable bands. An additional 318 chicks were banded from non-productivity burrows. An additional 20 nests were located during incubation for blood sampling (these nests were not monitored for productivity).

A total of 91 hours of ATPU chick provisioning stints were conducted. ATPU prey was generally of moderate to high quality throughout the season, comprising primarily of haddock and hake.

Alcids: Razorbills

No formal RAZO census was conducted in 2024.

A total of 105 burrows were monitored for productivity this season, out of which 92 had eggs. In total 16 eggs went missing, 17 eggs were found dead, and 54 hatched (61% hatch success). Of the hatched chicks 13 went missing, 11 were found dead, and 26 fledged (30% fledge/egg; 51% fledge/chick). Linear growth rate this season was 4.9 ± 1.2

g/day. A total of 27 productivity chicks were banded. An additional 28 chicks were banded from non-productivity burrows.

A total of 35 hours of RAZO chick provisioning stints were conducted. RAZO prey was generally of moderate to high quality throughout the season, comprising primarily of herring and hake.

Alcids: Common Murre

A minimum count of 539 active nests were estimated (224 eggs, 315 chicks) from June 25-July 1. Census counts started after chicks had begun fledging, so counts of chicks are under the real total. A total of 130 chicks were banded this year and a total of 38 hours of COMU chick provisioning stints were conducted with diet consisting mainly of herring.

Table 4. Breeding parameters for Atlantic Puffins and Razorbills on Machias Seal Island in 2024.

	n	**Mean Lay**	**Mean Hatch**	**Burrow Occupancy**	**Hatching Success (hatch/ active nest)**	**Nest Success (fledge/ active nest)**	**Linear Growth Rate (mass)**
ATPU	130	May 6	June 17	91%	66%	36%	8.3 ± 0.5
RAZO	105	May 25	June 8	88%	61%	31%	4.9 ± 1.2

Table 5. Principal prey items (percent) in alcid chick diet on Machias Seal Island in 2024; *n* is the total number of prey items identified.

Prey Item	**ATPU**	**COMU**	**RAZO**
n	723	241	150
Euphausid	6.64%	0.00%	1.33%
Fish Scrap	0.14%	1.66%	1.33%
Hake	24.48%	1.24%	37.33%
Haddock	31.95%	11.62%	1.33%
Pollock	0.97%	3.32%	1.33%
Larval hake	2.21%	0.41%	0.67%
Larval haddock	2.21%	0.41%	0.67%
Larval sandlance	3.46%	0.00%	0.67%
Larval unknown fish	8.16%	1.24%	2.00%
Rock eel	0.14%	11.62%	0.00%
Squid	0.41%	0.00%	0.00%
Herring	2.21%	40.66%	36.00%
Radiated shanny	0.00%	0.41%	0.00%
Red fish	0.00%	0.41%	0.00%
Rosefish	0.00%	0.41%	0.00%
Sandlance	11.89%	0.41%	12.67%
Butterfish	2.35%	17.84%	0.00%
Unknown	0.14%	0.00%	0.00%
Unknown fish	4.70%	4.15%	5.33%

Country Island – Nova Scotia

Jen Rock, Wildlife Biologist – ECCC-CWS, Sarah Neima, Wildlife Technician – ECCC-CWS, Ruby Schweighardt, Crew lead / M.Sc. student – Acadia University

Tern Census

The annual tern nest census was conducted on 13 June 2024 with eight observers. The entire colony is covered by 10x10m grid squares, which are walked systematically and all nests are counted. Following the census, we observe a subset of grid squares based on habitat type to determine the attending adult species, and then extrapolate that to the whole colony to get final counts by species. All ROST nests are identified and counted individually. We counted a total of 1112 nests during the census, including 5 nests found in a separate part of the island during a waterbird census. This is a decrease from the peak of 2049 pairs in 2018, but well within the range of counts over the last 20 years. This year is the lowest count of ROST pairs since 2001 and is a marked decrease from recent years (range 13-18 pairs, 2016-2023).

Table 1. Number of tern nests found on Country Island from 2019-2024

Year	COTE	ROST	ARTE	LETE
2019	722	13	1041	-
2020	*	*	*	-
2021	*	*	*	-
2022	*	*	*	-
2023	982**	14	792**	-
2024	381	4	727	-

* no census conducted in 2020-2022 due to COVID-19 and HPAI concerns

** high abandonment rates early in the season in 2023 resulted in a small sample size for determining species ratios, likely skewing the results. Country Island typically has more ARTE than COTE (avg. 63% ARTE, 36% COTE).

Tern Productivity

The first tern eggs were found on May 24, three days earlier than average. Reproductive success is monitored at a subset of ARTE and COTE nests and all ROST nests. Hatch success in 2024 was lower for all species than average (mean 81%, 1997-2024). Productivity was near zero for the second year in a row. Of all chicks monitored, only a single ARTE and single COTE chick fledged. The three ROST chicks that hatched were all found dead before reaching 15 days. Most of the monitored chicks were recorded as disappeared or died.

There was a mass mortality event after two days of rain on June 30-July 1, with some chicks having blood around the nares and bruising and/or blood on the legs. Gull predation of chicks was also observed and it is likely that at least some of the disappeared chicks were predated, although it is unknown if this is a result of active predation or scavenging of deceased chicks. Feeding watches observed high-quality prey items delivered to chicks, but feeding rates seemed low. Adults began abandoning the colony around July 2, and by July 10 there was only one pair of ROST actively defending in the colony.

Table 2. Reproductive Success for Common, Arctic, and Roseate terns on Country Island from 2019-2024.

Species	Year	Clutch size	Hatching success	Productivity	Nests monitored
COTE	2019	2.30	0.93	0.52	38
	2020	*	*	*	*
	2021	*	*	*	*
	2022	*	*	*	*
	2023	2.41	0.65	0.00	49
	2024	**2.00**	**0.74**	**0.01**	**49**
ARTE	2019	1.98	0.96	0.38	48
	2020	*	*	*	*
	2021	*	*	*	*
	2022	*	*	*	*
	2023	1.94	0.81	0.01	50
	2024	**1.59**	**0.68**	**0.01**	**51**
ROST	2019	1.82	0.95	0.50	11
	2020	*	*	*	*
	2021	*	*	*	*
	2022	*	*	*	*
	2023	1.21	0.71	0.32	14
	2024	**1.00**	**0.75**	**0.00**	**4**

* no field crew was present to monitor productivity in 2020-2022 due to COVID-19 and HPAI concerns

Tern Provisioning

A total of 35, 39 and 16 (ARTE, COTE, ROST) feeding watches were conducted in 2024. Tern delivery rates have fluctuated over the years (0.52-1.79) with an average of 1.05 prey items/hour/chick across all years (1997-2024). In 2024, delivery rates were 1.14, 0.71 and 0.38 prey items/hour/chick for ARTE, COTE and ROST, respectively.

Table 3. Principal prey items (percent) in tern chick diet on Country Island in 2024.
***n* is the total number of prey items observed.**

Prey item	COTE	ROST	ARTE
Herring	0	0	1%, n=1
Hake	44%, n=34	58%, n=7	39%, n=34
Sand Lance	0	17%, n=2	0
Pollock	3%, n=2	0	1%, n=1
Other fish	7%, n = 5	0	3%, n=3
Unidentified fish	27%, n=20	25%, n=3	18%, n=16
Invertebrates	18%, n=13	0	38%, n=33

Predator Activities and Control Efforts

Predator management ceased in 2020 due to the COVID-19 pandemic and subsequent HPAI outbreak and has not resumed. As a result, gulls and corvids have returned to nest on the island and, since the seasonal crew's return in 2023, CWS has taken this opportunity to reassess the need for predator control and to consider alternate strategies.

In 2024, gulls were added to the waterbird nest census for the first time and 108 nests were counted. This, however, underestimates the total number of nesting gulls since the timing of the census was later than the average gull hatch date which resulted in earlier nests being missed. Trends of gulls frequenting the island have been assessed annually by calculating the average number of gulls that are seen each month during general island surveys. In 2024 and 2023 the average number of gulls counted was 2 – 3 times higher than in past years, likely owing to the presence of nesting pairs.

Common Eiders

As in previous years, a nest census was conducted on the entire island outside of the tern colony to search for Common Eider and other waterbird nests. Only 17 Common Eider nests were found on Country Island in 2024 which is by far the smallest number ever recorded (162 ± 65, mean ± sd). High river otter activity in 2024 (anecdotal) may explain reduced COEI nesting effort on Country Island, with regular sightings of otter disturbing the tern colony and likely putting pressure on other nesting waterbirds.

Other Notes

Multiple tracking projects are underway on Country Island. In collaboration with SEATRACK, 50 geolocators have been deployed on ARTE in 2023/2024 (11/30 deployed in 2023 have been retrieved). We have deployed 30 GSM tags on Herring Gulls to better understand movements (e.g. home range, site fidelity) and effects of nest treatments (e.g. destroyed vs undestroyed eggs). Finally, we deployed 10 GPS tags on COTE to look at breeding and post-breeding movements aiming to inform conservation planning (e.g. offshore wind development, marine emergency response) in collaboration with other researchers in the Western Atlantic.

Two students are currently conducting graduate (M.Sc.) research on Country Island. Ruby Schweighardt is examining long-term tern demographic data with consideration for Roseate Tern recovery, and Katie Ryder is investigating diet and behaviour of gulls to assess relative predation pressure on the island's at-risk seabird species.

North Brother Island, Nova Scotia

Ted D'Eon, Alix d'Entremont, Kathleen MacAulay – Island stewards; Julie McKnight – ECCC-CWS; Luc Bilodeau, Shawn Craik, Daphnée Ouellet– Université Sainte-Anne; Alexis Saulnier, Mark Mallory – Acadia University; Nova Scotia Department of Natural Resources and Renewables

Tern Census

The annual tern nest census was conducted on June 11th, 2024 with five observers. We surveyed all suitable nesting habitat by making systematic sweeps through the colony and placed wooden craft sticks in each nest upon discovery to avoid counting individual nests more than once. We report in Table 1 nest total for ROST (census + year-end) and the number of COTE and ARTE nests counted during the census. A total of 724 tern nests were counted during the nest census. The number of tern nests counted during this year's count was higher compared to last year's count of 587; this increase was seen for all three species of terns, though it is worth mentioning the 37.7% increase in ARTE nests from last year to this year (38 in 2023 and 61 in 2024).

The first COTE eggs were laid during May 15th - 17th and the first ARTE and ROST eggs were laid during May 17th - 21st, which represents similar nesting phenology for all three tern species relative to last year's dates.

Table 1. Number of tern nests found during nest surveys on North Brother Island from 2019-2024. The survey is conducted during peak tern nesting.

Year	COTE	ARTE	ROST	LETE
2019	372	35	47 (year end: 52)	-
2020	664		49[1]	-
2021	771	65	46 (year end: 51)	-
2022	855	134	43 (year end: 50)	-
2023	587	38	51 (year end: 61[2])	-
2024	595	61	63 (year end 68[3])	-

[1] The count of 49 nests includes a nest attended by a hybrid COTE x ROST pair

[2] The count of 61 nests includes a nest attended by a hybrid COTE x ROST pair

[3] The count of 68 nests includes a nest attended by a hybrid COTE x ROST pair

Productivity

Fledging success was not measured. See Table 2 for other reproductive parameters.

Table 2. Reproductive parameters for Common, Arctic, and Roseate terns on North Brother Island from 2019-2024.

Species	Year	Clutch size	Hatching success	Fledging success	Nests monitored
COTE	2019	2.53	0.63	-	30
	2020	-	-	-	-
	2021	2.52	0.94	-	25
	2022	2.40	0.79	-	30
	2023	2.47	0.46	-	30
	2024	**2.39**	**0.74**	**-**	**30**
ARTE	2019	2.00	0.74	-	36
	2020	-	-	-	-
	2021	2.00	0.78	-	23
	2022	2.00	0.75	-	30
	2023	1.76	0.08	-	37
	2024	**1.90**	**0.66**	**-**	**31**
ROST	2019	1.46	0.95	-	52
	2020	1.30	0.86	-	49
	2021	1.67	0.92	-	51
	2022	1.61	0.94	-	50
	2023	1.43	0.63	-	61
	2024	**1.54**	**0.86**	**-**	**68**

Tern diet

Below we summarize diets of chicks and adults on North Brother Island, using two methods: GoPro footage and observations of adults arriving with food.

Table 3. Tern diet (chick, partner and self) on North Brother Island, 2024, collected from GoPro footage.

	ARTE		COTE		ROST	
PREY	**n**	**%**	**n**	**%**	**n**	**%**
Hake	4	31%	7	54%	26	24%
Herring	3	23%	6	46%	62	58%
Sand lance	0		0		11	11%
Smelt	0		0		1	1%
Butterfish	0		0		2	2%
Unidentified fish	6	46%	0		3	4%

n ; sample size

Table 4. Tern diet (chick, partner and self) on North Brother Island, 2024, collected by directional observations from central blind.

	ARTE		COTE		ROST	
PREY	**n**	**%**	**n**	**%**	**n**	**%**
Hake	6	18%	53	8%	5	11%
Herring	15	45%	251	40%	16	36%
Sand lance	0		4	1%	6	13%
Smelt	0		2	1%	0	
Butterfish	0		1	1%	0	
Eel	0		1	1%	0	
Mummichog	0		12	2%	0	
Silverside	0		6	1%	0	
Stickleback	0		3	1%	0	
Fish bits	0		3	1%	0	
Marine invertebrate	0		1	1%	0	
Unidentified fish	12	36%	223	36%	18	40%
Unidentified invertebrate	0		55	9%	0	
Unidentified prey	0		13	2%	0	

n ; sample size

Chick Provisioning

Table 5. Data for tern chick provisioning on North Brother Island, 2024, collected from GoPro footage.

	ARTE		COTE		ROST	
PREY	**n**	**%**	**n**	**%**	**n**	**%**
Hake	4	36%	1	14%	21	22%
Herring	1	9%	6	86%	56	60%
Sand lance	0		0		11	12%
Smelt	0		0		1	1%
Butterfish	0		0		2	2%
Unidentified fish	6	54%	0		3	3%

n ; sample size

Chick Feeding Rates

Assessed by GoPro footage, estimates of chick provisioning rates were based on observation blocks of 35 minutes 24 seconds (as permitted by the clips uploaded from the GoPro cameras). Most video footage was recorded between 9:45am and 13:30pm which coincided with visits to the island. Data collection began once the first hatched chick (COTE) was observed on June 6th and up until July 3rd when the colony became too fragile for us to disturb them with camera placement. After high rates of COTE chick mortality on June 19th, cameras were exclusively placed on ROST nests.

Table 6. Data for chick feeding rates per 35 min 24 s observation blocks on North Brother Island, 2024, collected from GoPro footage.

		ARTE	COTE	ROST
CHICK FEEDING RATE	***Max***	**4**	**2**	**5**
	Average	**1.8**	**0.4**	**1.0**
	Standard deviation	**1.6**	**0.7**	**1.3**
	Standard error	**0.7**	**0.1**	**0.1**
	Sample size	**5**	**17**	**80**
FISH PER CHICK RATE	***Max***	**2**	**2**	**4**
	Average	**1**	**0,3**	**0,7**
	Standard deviation	**0.8**	**0.6**	**0.9**
	Standard error	**0.4**	**0.1**	**0.1**
	Sample size	**5**	**17**	**80**

Predator Activities and Control Efforts

No gulls nested on North Brother Island and South Brother Island was not visited during the 2024 breeding season.

Common Eiders

Eight Common Eider nests were recorded on North Brother Island. Clutch sizes (at their respective peaks) were of 6, 4, 6, 5, 4, 5 and 1. One nest was observed with three chicks while another was found with four of six hatched eggs. One nest was confirmed to have failed while the other nests' fates were unknown.

Other Notes

Similar to 2023, high rates of chick mortality were observed on NBI. A group of fresh specimens was transported to the Atlantic Veterinary College on Prince Edward Island for analyses. All chicks tested negative for HPAI, and as of August 2024, a full necropsy report has not been obtained.

Ten adult COTE were fitted with GPS tags during the incubation period. This work is part of an international effort to quantify movements of COTE throughout their breeding cycle.

Islands in the Lobster Bay and surrounding area were surveyed for nesting terns around the time of peak tern nesting. This work is led by Alix d'Entremont.

Alix d'Entremont and Kathleen MacAuley conducted regular at-sea surveys for foraging Roseate Terns south of the North Brother Island colony. They confirmed tern foraging at several key sites throughout the breeding period.

A MSc study is underway (Alexis Saulnier) and focuses on a comparison of diet, foraging routes, and foraging habitat use by ROST, COTE, and ARTE breeding on North Brother Island.

Maine

Stratton Island, Maine

Benjamin Becker, Island Supervisor – National Audubon Society Seabird Institute

Tern Census

An island-wide Common Tern nest count was conducted on June 5-7. Arctic and Roseate Tern nests were found and counted throughout the season. The Common Tern nest count of 1033 nests was corrected with a Lincoln index of 1.086 to 1125 nests, and the addition of 47 marked study nests brought the total count to 1,172 nests. 94 Roseate Tern nests were found during the season, including 30 nests that were on Little Stratton. Arctic Terns had 5 active nests during the GOMSWG census. On June 14, in coordination with the statewide survey, 106 Least Tern nests were counted, with 36 chicks present. 128 Least Tern nest starts were recorded throughout the season, though some were likely relays.

Table 1. GOMSWG census results on Stratton Island, 2019-2024.

Year	COTE	ARTE	ROST	LETE
2019	1244	9	125	84
2020	1159	5	114	0
2021	1315	10	140	63
2022	1369	8	138	91
2023	1065	4	86	76
2024	**1172**	**5**	**94**	**106**

Tern Productivity

Tern productivity was determined from both fenced and unfenced plots. The 63 nests in the Common Tern plots fledged 0.97 chicks per nest. Roseate Tern productivity was calculated at 1.4 chicks fledged per nest using the B-chick weight method. From the 5 Arctic Tern nests followed, 1 chick was seen successfully fledged, giving a minimum productivity of 0.25, though there is little evidence to doubt it would be higher. Least Terns hatched chicks from 95 nests, and July 11 had the highest Least Tern fledgling count with 17 fledglings seen, and another high count of 13 fledglings 2 weeks later, suggesting a minimum productivity of 0.32. Least Tern chicks faced very high predation from Black-crowned Night Herons this season.

Table 2. Tern productivity on Stratton Island, 2021-2024.

Species	Year	Clutch size	Hatched per nest	Fledged per nest	Nests monitored
COTE	2021	2.56	2.46	0.71	79
	2022	2.23	2.03	1.31	65
	2023	2.00	0.63	0.42	46
	2024	**2.09**	**1.89**	**0.98**	**63**
ROST	2021	1.83	1.47	1.02	95
	2022	1.82	1.52	1.25	92
	2023	1.63	1.32	0.96*	65
	2024	**1.75**	**1.43**	**1.40**	**64**
ARTE	2021	1.69	0.92	-	13
	2022	2.00	1.63	0.75	8
	2023	1.75	1.25	0.25	4
	2024	**2.00**	**2.00**	**0.25**	**5**

*Productivity number does not account for significant amounts of predation that affected the Roseate colony in 2023.

Tern chick provisioning

12 Common Tern nests were observed with a total of 835 feedings. Chick diet primarily consisted of hake, sandlance, and amphipods, comprising 24%, 13%, and 12% of deliveries, respectively. 16% of prey items were not

identified to species. 12 Roseate Tern nests were observed with a total of 826 feedings. Diet primarily consisted of sandlance at 55% of deliveries, with 29% of prey items not identified to species.

Predation

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 early in the season. 69 Herring Gull nests totaling 189 eggs, and 19 Great Black-backed Gull nests totaling 56 eggs were poked on Bluff Island. These nest counts remain relatively consistent with the past 2 years. 3 Great Black-backed Gull nests were found Little Stratton, and 1 on Stratton. All nests were removed. A Great Black-backed pair and at least one Herring Gull were witnessed predating tern chicks, but attempts at lethal control were unsuccessful.

Black-crowned Night Herons were a significant predator in 2024. Signs of predation began on Stratton as chicks began to hatch, with loud tern disturbances at night, and missing chicks from marked nests. At least one individual was witnessed actively predating the colony every night during the month of June and early July. The most significant predation occurred on Little Stratton, where marked Roseate Tern nests showed missing chicks, and significantly diminished Common Tern presence despite starting with 100 nests. On July 1, most Least Tern chicks were predated, reduced from an estimated count of 60-70, to 25 chicks. After the night heron was detected, attempts at non-lethal deterrence were made, with solar-powered lawn-lights placed around vulnerable parts of the colony, and night stints from 2030-0000 conducted every night, weather permitting, from June10 to July 10. Non-lethal deterrents were ultimately ineffective, and camera traps revealed the heron predating endangered Roseate and Least Terns. On the night of July 1, after receiving permission from state biologists, one night heron was shot with a .22 night-vision rifle. Signs of at least one more night heron were witnessed after, but discontinued after July 8. Night-heron activity typically started between 9-10pm, and continued throughout the night, and one individual was witnessed predating Least Tern chicks in the daytime.

In late July and early August, at least 2 young Peregrine Falcons were witnessed actively hunting the colony throughout the days, stopping to roost or eat in the forest and cliffs on the northern parts of the island. One adult individual was also witnessed during these times.

Wading Birds

The 2024 wading bird census was conducted on May 20 and 21. Researchers use mirror poles to view nest contents and egg templates to identify nests to species. 184 Glossy Ibis, 100 Snowy Egret, 55 Great Egret, and 10 Black-crowned Night-Herons nests were identified on Stratton and Bluff. Chicks were present in nests in much more significant numbers than in previous years across all species.

Common Eiders

A Common Eider census was conducted on Stratton and Bluff, finding 455 nests, a total egg count of 1,922, and an average clutch size of 4.69. This count is relatively similar to 2021 (474 nests).

American Oystercatchers

2 American Oystercatcher nests were identified on Little Stratton and 1 on Stratton. Additional nests were suspected on Bluff Island. Chicks were seen on Stratton on May 24, and 4 fledglings were seen later in the season.

Black Guillemots

3 Black Guillemot burrows were confirmed in 2024, with 2 on Stratton Island, 1 on Little Stratton, and more suspected on Bluff Island. Prey was observed being brought back to Bluff, and 2 juvenile guillemots were seen between the islands in August.

Double-crested Cormorants

Double-crested Cormorant nest census was conducted on June 7. The nest estimate was determined from averaging counts from five observers counting via boat. An estimate of 214 DCCO nests was found on Bluff Island, up from 124 in 2023.

Visitors

In 2024, Stratton was open for visitation. York Co. Audubon had out 12 guests for their teen birding tour on July 7. On July 21, Prout's Neck Yacht Club brought out 25 visitors. Several small VIP groups were also brought out over

the course of the season. Only a handful of unscheduled visitors landed on island, primarily individuals on small watercraft.

Outer Green Island, Maine

Sejal Prachand, Island Supervisor – National Audubon Society Seabird Institute

Tern Census

The GOMSWG tern census was conducted on 5 June by Sejal Prachand, Ariana Raschid Farrokhi, Susan Schubel, Paula Shannon, Kelly Bell-Brown, and Jacquie Gage. We counted 1,650 Common Tern nests with a Lincoln Index correction factor of 1.074. With the addition of 111 monitored nests at the time of census, the final corrected total number of Common Tern nests in the census window was 1,883 nests. We did not encounter Roseate Tern nests during census or at any other point during the field season.

Table 1. Number of tern nests found on Outer Green Island from 2019-2024.

Year	COTE	ROST	ARTE
2019	1727	0	0
2020	1775	0	0
2021	1661	2[1]	0
2022	1994	0	0
2023	1741	0	0
2024	**1883**	**0**	**0**

[1]One ROST nest was laid after the census period

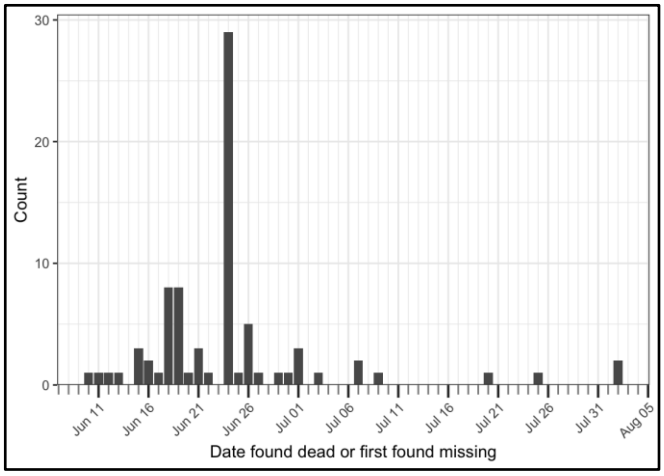
Tern Productivity

In 2024, the average clutch size for Common Terns was 1.98 eggs/nest (N = 96 nests) with an average of 1.64 hatches/nest. The first recorded hatch was on 5 June, 6 days earlier than the first hatch in 2023. Peak hatch was approximately 9-16 June (≥10 hatches per day during every day in this period). The average number of chicks fledged per nest (productivity) was 0.80, which is below the 2019-2023 average of 0.87 (N = 402 nests) but greater than last season's productivity (productivity = 0.44, N = 80 nests).

Table 2. Reproductive Success for Common Terns on Outer Green Island, 2019-2024.

Year	Clutch size	Mean Hatch	Productivity	Nests monitored
2019	2.12	1.81	1.37	75
2020	2.12	1.93	0.74	76
2021	2.21	1.93	0.54	89
2022	2.33	1.99	1.27	81
2023	1.89	1.28	0.43	80
2024	**1.98**	**1.64**	**0.80**	**96**

Of the 80 chicks that hatched but failed to fledge, the predominant fates were exposure (30 chicks), disappearance (22 chicks), and starvation (15 chicks). The primary mortality event of the season, and the only major mortality event, was a spell of cool, rainy weather from the evening of June 21 through June 23. When plot checks resumed on June 24, we found 29 dead or missing chicks, making up 36% of all chicks that hatched but failed to fledge. The remaining 51 chick deaths and disappearances occurred across 25 different days (see right).



Tern Provisioning

Over the season, we observed 1,893 Common Tern chick feedings over 292.1 stint hours. Tern chick diet

was primarily fish (74%; *n* = 1,409 observations), with invertebrates making up 14% of the diet (*n* = 263 observations) and the remaining 12% unidentified (*n* = 221 observations). Hake and herring made up the majority of tern feedings, with 20% herring and 16% hake. The next most common identified prey was amphipods, making up 3% of observed feedings. This is notably different from the 2023 diet composition, which was primarily (37%) sandlance. Other notable feeding observations include a high proportion of euphausiids in the adult diet in the early season (~June 5-10); a mackerel run in early July (~July 7-12) where terns were flying around with almost exclusively mackerel; and a late-season predominance of pufferfish seen in adult bills post-fledging.

Predator Activities and Control Efforts

At the beginning (pre-hatch) and end (near and after fledging) of the season, we found feather spreads accompanying decapitated, de-winged carcasses of adult and fledgling Common Terns and pellets with tern feathers, bones, and feet. During an early-season night stint, we also observed terns abandoning the colony at dawn and dusk, returning to incubate through the night. The ultimate cause of this sign and behavior is unknown: though the signs are relatively typical of owl predation, we observed 1-2 Peregrine Falcons visiting the colony around dusk as well as removing feathers, heads, and wings when eating terns. Later in the season, we also observed terns leaving the colony for 10-45 minutes immediately following dusk peregrine visits, mirroring the early-season dusk and dawn abandonment.

Peregrine Falcon - Consistent Peregrine Falcon visits made up the vast majority of predation on the island. Peregrines visited the colony on 34 days, occasionally multiple times per day, for a total of 71 visits over the course of the season. On 2 occasions, two peregrines visited the colony at the same time. We observed peregrines taking 12 terns over the course of the season, typically adults and fledglings. More prey was likely taken but not observed, and it is possible that falcons took smaller chicks that were not as visible in their talons. On each visit, falcon(s) were chased off the island. Later in the season, the falcon(s) would perch on Junk of Pork Island, ¼ mile east of Outer Green, after being chased off the island.

Other Predation/Predator Visits: Gulls, Spotted Sandpiper, and Black-Crowned Night Heron - We found fewer than 10 gull-predated tern eggs and 1 gull-predated Black Guillemot egg over the course of the season. Though gulls often loafed on Junk of Pork, gulls were minimally present on Outer Green (only observed perching once) until the end of the season (after approximately 25 July), when most terns were gone from the island. At this point, Herring and Great Black-Backed Gulls loafed in the intertidal and occasionally perched on the island. We did not conduct any lethal gull control operations, though on 4 occasions we actively flushed perching gulls from the island.

Though we did not find many gull-predated tern eggs, we found approximately 25-30 tern eggs with small holes poked in them. Later observations revealed a Spotted Sandpiper poking tern eggs, creating small holes in the eggs. Though this behavior was only explicitly observed on one occasion, this is the most likely explanation for the eggs with small pokes given (1) the size of the poked holes and (2) the location of poked eggs in areas near SPSA foraging and/or nesting locations.

Finally, we had one evening Black-Crowned Night Heron visit on 20 July. The heron was flying low and seemingly looking for prey, so we fired a screamer siren and successfully deterred the heron from landing. On 26 July, a juvenile Black-crowned Night Heron flew over the island multiple times, landing once, but this heron was chased off by the terns and did not take prey.

Black Guillemots

We monitored 18 active Black Guillemot burrows (8 new, 10 previously marked). 15 of 30 monitored eggs hatched (hatch success = 0.5) and 9 chicks were considered fledged (fledge success = 0.6).

American Oystercatchers

A pair of American Oystercatchers nested on Outer Green for the fourth consecutive year; this year, they nested on cliffs on the east side of OGI, contrasting from previous years where they nested on the southwest side of the island. The pair successfully fledged 3 young that were continually observed through island closing on 5 August.

Jenny Island, Maine

Curtis Mahon, Island Supervisor – National Audubon Society Seabird Institute

Tern Census

The annual Gulf of Maine Seabird Working Group (GOMSWG) census was conducted on 3 June. A total of 1,584 Common Tern nests were counted, with clutches ranging between 1 and 5 eggs. A Lincoln index mark/recapture correction of 1.033 was applied to the uncorrected count. The addition of 38 productivity nests and 22 marked feeding study nests, and 30 geolocator nests, brought the total to 1,726 nests. This count is the fourth highest ever recorded on Jenny. Twenty-two Roseate Tern nests were also active during the GOMSWG census window. One additional B-wave nest was laid after the census window.

Table 1. GOMSWG census results on Jenny Island, 2020-2024.

Year	COTE	ROST
2020	1,433	21
2021	2,044	17
2022	1,899	17
2023	1,857	22
2024	**1,726**	**22**

Tern Hatch and Fledging

Common Tern nests were already widespread across the island when staff arrived for the 2024 season on 20 May. The first nest was found during a pre-season trip to the island on 12 May. The first Common Tern chick hatched on 5 June, 2 days earlier than in 2023 (7 June) which was already 3 days earlier than 2022 (10 June). The first Common Tern chick fledged on 29 June, 3 days earlier than in 2023.

Tern Productivity

For Common Terns, four productivity plots containing 37 nests, and three feeding study plots with 17 nests were monitored to determine productivity. 23 Roseate Tern nests were monitored for productivity. Common Tern productivity was 1.13 chicks fledged per nest, which was a sharp increase from 2023's productivity rate of 0.35 chicks per nest, but still below 2022's rate (1.25 chicks per nest; Table 2). Roseate Tern productivity was calculated at 1.27 chicks fledged per nest.

Table 2. Tern productivity on Jenny Island, 2021-2024.

Species	Year	Mean clutch size	Mean hatch	Productivity	Nests monitored
COTE	2021	2.43	2.13	0.55	99
	2022	2.20	1.90	1.25	88
	2023	2.04	1.54	0.35	69
	2024	**2.50**	**2.31**	**1.13**	**54**
ROST	2021	1.94	1.71	1.27	17
	2022	2.00	1.82	1.10	17
	2023	1.76	1.52	1.14	21
	2024	**1.83**	**1.61**	**1.27**	**23**

Tern Provisioning

Common Tern chick provisioning was monitored at three feeding study plots with 17 nests. A total of 1,116 feedings were observed, across 798.66 nest-hours of observation, with an average of 1.40 feedings per nest per hour. Atlantic herring constituted the highest percentage of observed feedings (31.7%). Hake (including white hake and four-bearded rockling) made up another 20.8% of the feedings. This year, shrimp (8.3%), larval lobster (8.1%) and

smelt (4.5%) all saw significant increases in percent of feedings compared to last year (1.4%, 0% and 0% respectively).

Table 3. Principal prey items in COTE chick diet on Jenny Island in 2024.

Prey item	Number of Items	% of Diet
Herring	354	31.7
Hake	232	20.8
Shrimp	93	8.3
Larval Lobster	90	8.1
Smelt	50	4.5

One feeding study plot with 4 Roseate Tern nests was monitored. A total of 190 feedings were observed over the course of 132 hours, with an average of 1.54 feeds per nest per hour. Sandlance constituted the highest percentage of observed feedings at 44.7%. Hake (including white hake and four-bearded rockling) followed in second at 22.1% with herring in third at 20.0%. Typically herring makes up the highest percentage of Roseate Tern diet on Jenny Island followed by hake.

Table 4. Principal prey items in ROST chick diet on Jenny Island in 2024.

Prey item	Number of Items	% of Diet
Sandlance	85	44.7
Hake	42	22.1
Herring	16	20.0

Predator Activities and Control Efforts

Large gulls were not a significant problem in the 2024 field season. While one Great Black-backed Gull attempted to nest (and was controlled), no gulls were observed preying on tern chicks. Great Black-backed Gulls occasionally circled above the Common Eider flock, but none were observed predating chicks.

Great Horned Owl predation was more intense in 2024 than during the previous season. In total, 11 partially-eaten kills were observed in early June, on 3 separate days across the intertidal on the northern and eastern sides of the island. Traps were set on subsequent nights when weather allowed, however no owls were ever caught, and no further evidence of owl predation was observed.

Peregrine Falcon predation was less intense during the 2024 season than during 2023. A single peregrine was observed the whole season, and was not observed predating any terns.

Avian Flu

No birds were seen exhibiting symptoms of avian flu during the 2024 season.

Pond Island National Wildlife Refuge

Samantha Smith, Island Supervisor and Morgan Sherwood, Research Assistant – National Audubon Society Seabird Institute

Tern Census

Tern census was conducted on 10 June. The unadjusted count for Common Terns was 1,650 nests. An additional 95 study nests were being followed at the time of census and the Lincoln Index was 1.011. The adjusted count of 1,763 nests, which includes study nests, is the highest number of nests recorded on Pond Island since the restoration project began and is 122 more nests than last year (Table 1).

At the time of census, there were 2 active Arctic Tern nests and 11 active Roseate Tern nests. One additional B-wave Roseate Ten nest was found post-census, bringing the total number of nests for the season to 12. It is suspected that the predation events from the 2023 season could account for the lowest number of Arctic Tern nests since 2021.

Table 1. Number of tern nests on Pond Island NWR from 2019-2024.

Year	COTE	ROST	ARTE
2019	1159	0	7
2020	1453	2	3
2021	706	0	0
2022	1580	5	5
2023	1641	9	4
2024	**1763**	**12**	**2**

Productivity

Common Tern productivity was determined by following 95 nests in fenced and unfenced study plots. These nests were followed from egg stage until fledging (fledging determined at 15 days, unless later found deceased). Mean clutch size was 2.52 with a meanhatch of 2.36 and 1.40 fledged per nest (Table 2). Two Arctic Tern nests were monitored. Arctic Tern mean clutch size was 2.0, with a mean hatch of 2.0, and productivity of 1.5 chick fledged per nest. Twelve Roseate Tern nests were monitored throughout the season, followed from egg stage until fledging. Roseate Tern mean clutch size was 1.33, and mean hatch was 1.33. ROST averaged 1.0 fledged per nest.

Table 2. Tern reproductive success on Pond Island, 2020-2024.

Species	Year	Clutch size	Hatched per nest	Fledged per nest	Nests monitored
COTE	2020	2.03	1.71	0.79	62
	2021	1.76	0.85	0.27	62
	2022	2.24	1.94	1.56	68
	2023	2.18	1.89	0.77	83
	2024	**2.52**	**2.36**	**1.40**	**95**
ARTE	2020	1.56	0.56	0.45	9
	2021	1.00	0.33	0.33	3
	2022	2.00	1.80	1.00	5
	2023	2.00	0.5	0.25	4
	2024	**2.00**	**2.00**	**1.50**	**2**
ROST	2020	2.00	0.75	1.00	2
	2021	-	-	-	-
	2022	1.33	1.00	0.83	6
	2023	1.67	0.56	0.11	9
	2024	**1.33**	**1.33**	**1.00**	**12**

Tern Chick Provisioning

Chick provisioning studies for Common Terns were conducted by observing 18 nests from hatching through fledging or failure. There were 1,427 total prey items observed being fed during 902.43 nest-hours of observation,

resulting in a feeding rate of 1.58 feedings per nest-hour. The principal prey species this season were herring (23.2%), sandlance (22.9%), hake (20.5%), and smelt (8.1%) (Table 3).

Table 3. Principal prey items in Common Tern chick diet on Pond Island in 2024.

Prey item	Number of Items	% of diet
Herring	331	23.2
Sandlance	326	22.9
Hake	293	20.5
Smelt	116	8.1

Chick provisioning studies for Roseate Terns were conducted by observing 5 nests from hatching through fledging or failure. There were 677 total prey items observed being fed during 242.2 nest-hours of observation, resulting in a feeding rate of 2.80 feedings per nest-hour. The principal prey species delivered was sandlance (75.9%). The next two highest represented prey types were hake (7.5%) and herring (1.9%) (Table 4).

Table 4. Principal prey items in Roseate Tern chick diet on Pond Island in 2024.

Prey item	Number of Items	% of diet
Sandlance	514	75.9
Hake	51	7.5
Herring	13	1.9

Predator Activities and Control Efforts

Peregrine Falcons were observed hunting on the island throughout the season. Twenty-five kills (4 adults, 2 chicks, 19 fledglings) were confirmed, with possibly higher numbers. Early in the season, bird bangers, screamers, and shouting were effective deterrents, but one falcon became resistant later on. The terns themselves successfully chased off some falcons.

Predation from two Great Black-backed Gulls (18 fledglings) was noted, and harassment by both Great Black-backed and Herring Gulls increased in July. Laughing Gulls loafed in the intertidal around the landing, frequently chasing adult terns for fish, but without causing mortality.

Eagles perched on Wood Island and hunted on Pond. Early in the season, two adult terns and at least two eider ducklings were taken by eagles, but bird bangers, screamers, and the terns themselves were effective deterrents. By season's end, two adults and a juvenile eagle attempted to predate the tern colony, although unsuccessful.

Between 21 and 25 July, 16 terns were found predated and one body had an owl pellet among the remains, so from 22-27 July, up to 4 leghold traps were set nightly, but nothing was captured.

On 16 June, an eider duck took a Common Tern chick from its nest and drowned it in the ocean. On the same day, two Roseate Terns killed a Common Tern chick - one picked it up and dropped it on a rock and the other pecked it to death. These appeared to be novel occurrences, in densely packed areas of the colony where space was limited.

Highly Pathogenic Avian Influenza (HPAI)

Pond Island National Wildlife Refuge did not have confirmed cases of HPAI in the breeding colony during the 2024 season. HPAI was suspected as a possible cause of mortality in the case of a dead adult COTE found on 30 May which had been found as it was dying and appeared to have no control over its limbs and head was twitching. Throughout the entire 2024 season we found soft shelled eggs in the colony; specifically in the dunes and on the beach. From 25 July to August 1, 4 fledglings appeared to lose control of their body movements and died shortly after, with HPAI suspected as a possible cause. During this timeframe, 1 adult and 3 fledglings were found deceased with very green fecal matter.

Eastern Egg Rock, Maine

Theresa Rizza, Island Supervisor – National Audubon Society Seabird Institute

Census

The GOMSWG tern census was conducted from 5-8 June, and Laughing Gulls were counted from 5-24 June. The early census date was chosen to accommodate the early first lay date of 15 May for Common Terns. The raw count of Common Tern nests was 1,218, which was adjusted with a Lincoln Index of 1.017. Including the addition of 58 nests in study plots, the final Common Tern nest count was 1,298 (Table 1). 79 Roseate Tern nests and 48 Arctic Tern nests were identified. 2,457 Laughing Gull nests were counted during census, a significant increase from 2023 and a new record count for the island.

Table 1. Number of tern and Laughing Gull nests found on Eastern Egg Rock from 2019-2024.

Year	COTE	ROST	ARTE	LAGU
2019	1067	76	70	333-862
2020	1156	80	77	1174
2021	1359	85	74	251
2022	1358	78	84	1194
2023	1552	70	55	1635
2024	1298	79	48	2457

Tern Productivity

Productivity was higher for Common and Roseate Terns than last year and both species had the second highest rate they have had in the last five years (Table 2). Clutch size was very similar to recent years. Mean hatch was very good for all three species, with Common Terns having their highest rate in the last five years and Roseate and Arctic Terns their second highest. Common Terns in two areas, along the eastern and southwest sides of the island experienced heavy predation by Herring Gulls as did a subcolony of Arctic Terns breeding at the south end of the island.

Table 2. Reproductive Success for Common, Arctic, and Roseate Terns on Eastern Egg Rock from 2020-2024.

Species	Year	Clutch size	Mean Hatch	Productivity	Nests monitored
COTE	2020	2.28	1.81	0.27-0.56	79
	2021	2.30	2.00	0.51	78
	2022	2.47	2.24	1.26	68
	2023	2.40	1.81	0.44	73
	2024	**2.43**	**2.25**	**0.95**	**59**
ARTE	2020	1.67	0.60	-	42
	2021	1.84	1.08	-	73
	2022	2.00	1.51	-	53
	2023	1.84	0.82	-	45
	2024	**1.87**	**1.37**	**-**	**47**
ROST	2020	1.83	1.68	1.60	72
	2021	1.65	1.38	1.06	78
	2022	1.99	1.54	1.09	78
	2023	2.00	1.54	1.01	63
	2024	**1.83**	**1.67**	**1.22**	**78**

Tern Provisioning

Prey item selection was varied among species this year, with Common Terns split nearly evenly between amphipods and hake, Arctic Terns feeding amphipods as a majority of their diet, and Roseate Terns feeding primarily hake (Table 3). The highest percentage of fish consumed by all three species of tern was hake. Roughly 27% of feedings by each tern species were not identified to species. The Egg Rock crew spent 92.45 hours monitoring 12 Common Tern nests, 41.75 hours monitoring 10 Roseate Tern nests, and 51.25 hours monitoring 10 Arctic Tern nests.

Table 3. Principal prey items (percentage) in tern chick diet on Eastern Egg Rock in 2024.

COTE		ROST		ARTE	
Prey item	**Percentage**	**Prey item**	**Percentage**	**Prey item**	**Percentage**
Amphipod	30.6	Hake	59.8	Amphipod	38.4
Hake	29.9	Sandlance	3.5	Hake	27.9
Herring	4.1	Herring	2.9	Euphausiid	1.9

Predator Activities and Control Efforts

Laughing Gull deterrence began in early May and consisted of shooting gull-deterrence flares, clapping, and screaming. This approach was successful at first, but a combination of decreasing efficacy in deterrence methods as the gulls became desensitized to our efforts and a sudden increase in the apparent disturbance to the alcids led to discontinuation of deterrence efforts in early June. Eggs in all Laughing Gull nests were oiled during census, with 2,457 nests destroyed.

Herring Gull predation on tern chicks and fledglings was significant. Eight Herring Gulls were shot and the carcasses used as effigies to dissuade further predation, which was largely successful. Peregrine Falcons were observed hunting terns on a few occasions in early and mid season, although were observed taking a tern only once. On two occasions, Herring Gulls were observed predating Laughing Gulls, and Laughing Gull carcasses were found near *Larus* gull loafing spots on a regular basis.

Atlantic Puffin

We observed our first Atlantic Puffin with fish on 2 June. Due to disturbance of the perimeter boulder field by winter storms, many historic burrows were no longer active, or their nest markers no longer corresponded with viable burrow locations. This complicated the process of identifying active burrows and a census estimate was not generated this year, although at least 87 burrows were deemed active. We trapped and banded 11 adult Atlantic Puffins, and grubbed and banded 6 pufflings.

Other Notes

While conducting the tern and Laughing Gull census, we counted 20 Common Eider nests. Ducklings were regularly observed in July and August.

Three Razorbills were present on Eastern Egg Rock regularly in May and June, and were often seen loafing and quickly hopping down into crevices, although not spending more than a minute out of view. There was no indication that they bred on the island this year.

A pair of Common Murres was seen regularly until mid July, and was easily identified as one member of the pair was bridled. The pair was observed on island on one occasion, and a single non-bridled individual was seen loafing near a blind among the Atlantic Puffins on a single occasion.

Metinic Island, Maine Coastal Islands NWR

Hannah Glass, Island Supervisor - USFWS

Tern Census

On June 13, we counted 1,135 tern nests during the Gulf of Maine Seabird Working Group (GOMSWG) census. After applying a Lincoln Index Correction Factor of 1.011 to the raw count and adding 78 productivity plot nests, we estimated a corrected total of 1,226 pairs of terns nested on Metinic in 2024. The size of the colony remained stable compared to 2023 (1,231 pairs). We identified the species at 47% of the nests (n=581) and calculated a species ratio of 71% common terns (868 pairs) and 29% Arctic terns (358 pairs).

Table 1. Estimated number of tern pairs counted during the GOMSWG census at Metinic Island, 2020-2024.

Year	COTE	ARTE
2020	630	389
2021	690	421
2022	689	537
2023	858	373
2024	868	358

Productivity

Productivity rates for both ARTE and COTE were slightly below the Refuge target of 1.0 chicks / pair. Linear growth rates for both species were lower than observed in recent years (ARTE 4.3 gr/day and COTE 3.98 gr/day).

Table 2. Tern reproductive success at Metinic Island, 2020-2024.

	2020	2021	2022	2023	2024
Common Tern					
# of Nests	45	44	55	59	53
Mean Clutch Size	1.96	2.20	2.31	2.37	2.24
Mean Hatch Success	81.8%	89.7%	89.0%	95.0%	91%
Mean Fledge Success	50.0%	19.6%	60.6%	47.4%	45%
Chicks fledged/pair	0.80	0.43	1.40	1.07	0.92
Arctic Tern					
# of Nests	24	28	30	26	34
Mean Clutch Size	1.63	1.82	1.87	1.42	1.82
Mean Hatch Success	92.3%	88.2%	91.1%	81.1%	87%
Mean Fledge Success	63.9%	35.3%	62.5%	73.3%	61%
Chicks fledged/pair	0.96	0.64	1.17	0.85	0.97

Tern Provisioning

During chick provisioning observations, we watched seven common tern nests for 282 hours and recorded 331feedings (1.17 feedings/hour/per nest). We observed 10 Arctic tern nests for 366 hours and recorded 623 feedings (1.70 feedings/hour/per nest). Hake was the most common prey item delivered to Arctic tern (25.8%) and common tern (31.4%) nests. Unfortunately, 46% of Arctic tern and 35% of common tern diet was classified as unknown or unknown fish, making it difficult to evaluate actual diet composition for these species.

Table 3. Principal prey items of tern chick diets on Metinic Island in 2024.

Prey Item	COTE	ARTE
Herring	13.3%	8.0%
Hake	31.4%	25.8%
Hake/herring	3.9%	1.0%
Invert	4.8%	7.9%
Sand Lance	--	1.4%
Pollock	0.9%	0.2%
Unknown Fish	22%	26.1%
Unknown	13%	20.1%

Predator Activities and Control Efforts

We determined that none of the 100 tern nests we marked for our predation study had been predated prior to the GOMSWG census. This was much lower than prior years. Herring and great black-backed gulls are allowed to nest on Metinic, away from the tern colony. We conducted a gull census on June 1 and counted 74 herring and five great black-backed gull nests. We coated all the gull eggs with vegetable oil to reduce hatching rates. Herring and great black-backed gulls were observed on several occasions preying upon tern chicks, and on two occasions, we observed both species grabbing and/or eating a tern chick.

Merlin have previously bred in the forest on Metinic, but we do not believe they nested this season as we did not observe any merlins this season. Additionally, we observed peregrine falcons within the tern colony on two occasions. The peregrines were most common later in the season as tern chicks began to fledge. They were unsuccessful in capturing any terns. However, one unidentified raptor was spotted later in the season carrying off a small tern chick.

We caught 103 garter snakes this season, and all snakes were removed from the island. No snakes were observed eating any tern chicks or eggs this season.

Black Guillemots

We located 41 active guillemot burrows on USFWS property and as of July 21 had confirmed a hatch rate of 48.0%. The first guillemot chicks were observed June 23 and as of the last burrow check, 56% (n=18) of chicks had fledged or were at least 15 days old. Guillemot chicks gained an average of 9.92 g/day. We believe that several eggs were predated by corvids or gulls and that other burrows were abandoned for unknown reasons. Our hatching success (48%) was 60% lower than the 10-year average for this colony. We captured eight adult guillemots (3 recaps and 5 unbanded) and banded 20 chicks.

Leach's Storm-Petrels

We located 106 active petrel burrows on the northern half of the island using audio callback or grubbing. We only confirmed eggs in 21 burrows as we were not able to see inside or reach the nest chamber in most burrows. As of the last burrow check on July 21, 52% of eggs had hatched (i.e. 11 chicks) with another 10 eggs still being incubated.

Sheep

Sheep graze freely across Metinic from September through May but are restricted to the southern half of the island during the seabird breeding season. With the help of Refuge staff, an electric fence was set up across the middle of the island and sheep were herded to the south side of the fence mid-May. A small group of sheep evaded round up efforts, and by the end of July, eight sheep remained on FWS property. Throughout the season, these sheep repeatedly tried to enter the tern colony, but were not confirmed to have damaged any tern nests.

Research

In collaboration with National Audubon Society and Gettysburg College, the Refuge deployed 17 GPS tags on nesting terns (9 COTE and 8 ARTE) this season. The tags downloaded data to a base station placed in the tern colony. This project is helping MCINWR document foraging habitat, as well as identifying important staging areas. We also collected fecal samples from terns as part of the ongoing effort with Cornell University to document tern diet.

Matinicus Rock

Tracey Faber, Island Supervisor – National Audubon Society Seabird Institute

Tern and Laughing Gull Census

The GOMSWG census was conducted on 13-14 June. We estimated a total of 726 Arctic Tern nests after adjusting the raw count with a Lincoln Index correction factor. We directly counted 380 Common Tern nests, or 34.4% of the total colony. Common Tern nests increased from 290 in 2023, close to the 2021 historic high count. Arctic Tern nests increased by 40 from 2023, but the count was still 139 nests fewer than in 2022.

Laughing Gull nesting was decreased and delayed by hazing efforts such that only 7 nests were found during the census. 17 nests were found overall, with two hatching for 5 chicks total, some of which likely fledged.

Table 1. GOMSWG census results on Matinicus Rock, 2019-2024

Year	ARTE	COTE	LAGU
2019	790	327	4
2020	No census	No census	No census
2021	854	395	121
2022	865	278	135
2023	686	290	4
2024	726	380	7

Tern Productivity

Tern productivity was monitored in both fenced productivity plots and unfenced feeding study plots. Arctic Terns fledged 1.04 young per nest with a mean clutch of 1.77 for 53 nests. Common Terns fledged 1.14 young per nest and mean clutch was 1.73 for 37 nests.

Table 2. Tern productivity on Matinicus Rock 2021-2024

Species	Year	Mean clutch size	Hatch Success	Productivity	Nests monitored
ARTE	2021	1.71	0.88	0.25	48
	2022	1.92	0.84	1.22	49
	2023	1.47	0.77	0.81	47
	2024	**1.77**	**0.77**	**1.04**	**53**
COTE	2021	1.88	0.88	0.28	32
	2022	2.15	0.91	1.41	27
	2023	1.65	0.72	0.83	48
	2024	**1.73**	**0.88**	**1.14**	**37**

Tern Chick Provisioning

Common and Arctic terns, during chick provisioning, relied heavily on invertebrates, euphausiids in particular. The most common prey item for Common Terns was euphausiids, at 47% of items, while hake comprised 26% of prey. Arctic Tern chick diet also included hake (44%) and euphausiids (44%).

Predator Activities and Control Efforts

Peregrine Falcons and Merlins were observed throughout the season. Peregrines took adult or fledgling terns on at least 4 occasions. Herring Gulls predated young chicks and fledglings occasionally from late June through August, and 3 were shot. One bedraggled young Great Black-backed Gull that was walking through the tern colony was also shot. Bangers and screamers were used to haze Laughing Gulls daily between 14 May and 3 July, and 10 breeding adults were shot between 20 and 25 June when numbers increased to around 50 loafing in the northern meadows. Incidents of kleptoparasitism decreased significantly due to these efforts. While Common Ravens did not nest on the island in 2024, there was still significant alcid predation, though some was likely by large gulls or Peregrines.

Atlantic Puffins

Preliminary estimated productivity of Atlantic Puffins is 0.67 (n=69), with a hatch success of 0.79 (n=66) and fledge success of 0.88. This would be the highest puffin productivity since 2019. Puffin diet was mostly haddock (36%), followed by redfish (21%), hake (19%), and euphausiids (11%). Consistently available prey items throughout the chick rearing period resulted in consistent growth rates and high fledgling weights through the end of July.

Razorbills

Razorbill hatch success was 0.76, and productivity was 0.59 chicks fledged per nest, with a fledge success of 0.79 (n=51). Razorbill diet consisted primarily of hake (66%), herring (13%), and sandlance (7%). As is typical, growth rates were higher for earlier hatched chicks, and lower for later-hatched chicks.

Black Guillemots

Preliminary estimated productivity of Black Guillemots is 0.56 (n=43), with a hatch success of 0.56 (n=68) and fledge success of 0.63. Mean clutch size was 1.63 eggs per pair. This would be the lowest guillemot productivity since 2014, with a high percentage of failed and/or predated eggs.

Common Murres
We recorded a high count of 67 Common Murres on 22 May. At minimum 18 eggs were laid, and 17 chicks hatched, with 16 likely fledging in late June through late July. This was the 7th consecutive year that Common Murres have bred on Matinicus Rock, and the highest count of chicks observed. Incidental diet observations showed murres delivering of herring, black-bellied rosefish, and butterfish to chicks.

Leach's Storm Petrels
The occupancy rate across three productivity plots was 0.75. Productivity checks are ongoing.

Manx Shearwaters
We used a combination of call playbacks, burrow latticing, and grubbing to assess Manx Shearwater activity throughout the season. Three burrows seemed active in 2024, with at least 2 chicks by the first week of August.

Other Breeding Birds
In 2024, we confirmed breeding of Common Eiders, Savannah Sparrows, Song Sparrows, and Herring Gulls, in addition to the above-mentioned species. For the first year since 2021, Common Ravens did not lay eggs, and only attempted one nest-start. The one hatched Herring Gull chick that was found was later predated.

Seal Island National Wildlife Refuge

Coco Faber, Island Supervisor – National Audubon Society Seabird Institute

Tern Census
The 2024 Gulf of Maine Seabird Working Group (GOMSWG) tern census was conducted on June 10, the earliest the census has ever been conducted. As not all areas of the tern colony are cleared to walk through, a partial direct count of the colony was conducted across 14 grid squares within Area 1. A Lincoln Index of 1.021 was applied to the direct count, and an extrapolated total was derived from this number. We calculated a combined total of 1,245 Arctic and Common Tern nests. This is a decrease of 414 nests 2023, and the lowest combined census count since 1995. A species ratio was determined by identifying a sub-sample of nests to species, then used to calculate an estimated count of 765 Common and 480 Arctic Tern nests. The number of Common Tern nests decreased significantly from 2023, accounting for the majority of the overall decrease in nests. The number of Arctic Tern nests also decreased (Table 1).

Table 1. Adjusted number of tern nests found on Seal Island NWR from 2019-2024.

Year	COTE	ARTE
2019	1,293	776
2020	No Census	No Census
2021	1,422	659
2022	1,064	721
2023	1,109	550
2024	**765**	**480**

Tern Productivity
Tern productivity was monitored in both fenced productivity plots and unfenced feeding study plots (Table 2). Hatch success was down for Common Terns and up for Arctic Terns, compared to 2023. Overall productivity was higher for both species than 2023. Both species were affected by gull predation in the fog, as well as a rainstorm towards the end of June, which hit Common Tern chicks particularly hard.

Table 2. Tern productivity on Seal Island NWR, 2021-2024.

Species	Year	Mean clutch size	Hatch Success	Productivity	Nests monitored
COTE	2021	1.74	0.72	0.32	69
	2022	2.21	0.86	1.32	57
	2023	1.95	0.85	0.51	57
	2024	**1.83**	**0.71**	**0.67**	**46**
ARTE	2021	1.71	0.62	0.22	49
	2022	1.78	0.83	0.83	36
	2023	1.48	0.71	0.61	33
	2024	**1.63**	**0.81**	**0.84**	**38**

Tern Provisioning

Arctic Tern nests were observed for 565.5 cumulative nest-hours, with an average feeding rate of 4.77 feedings per nest per hour. Common Tern nests were observed for 639 cumulative nest-hours, with an average feeding rate of 5.60 feedings per nest per hour. Arctic Tern diet was 47.9% euphausiids, 22.5% hake, and 10.6% amphipods, while Common Tern diet was 66.9% euphausiids, 11.5% hake, and 1.5% herring (Table 3).

Table 4. Principal prey items (percent of diet by prey item) in tern chick diet on Seal Island NWR in 2024. Total number of prey items observed n= 2,698 for ARTE and n=3,575 for COTE.

Prey item	ARTE %	Prey item	COTE %
Euphausiid	**47.9**	Euphausiid	**66.9**
Hake	**22.5**	Hake	**11.5**
Amphipod	**10.6**	Herring	**1.5**

Predator Activities and Gull Control Efforts

Gull predation was observed regularly, often at the fringes of the colony and occasionally in the center of the tern colony. During a period of fog at the end of June, a number of eggs and chicks went missing from productivity plots, likely a result of predation by multiple Herring Gulls. Two Herring Gulls were shot shortly thereafter, and predation decreased. Towards the end of July, multiple Herring Gulls were observed predating fledgling terns at the edges of the colony, and two more were shot.

Gull control efforts included poking eggs in all gull nests found during a gull census conducted at the end of May and mid-June, as well as the culling of individual predatory gulls (Table 4). Low numbers of Laughing Gulls were observed daily, and 4 nests were found and destroyed at the end of June.

Table 4. Gull control measures by species at Seal Island NWR in 2024.

Species	# Nests destroyed	# Killed
Herring Gull	242	4
Great Black-backed Gull	26	1
Laughing Gull	4	0

Peregrine Falcons were observed sporadically, with multiple individuals predating the tern colony throughout the season.

Atlantic Puffins

An Atlantic Puffin census was conducted for the first time since 2019. The breeding population was estimated using a stratified extrapolation method, by determining the activity of a subset of burrows in the main colony and all burrows in expansion areas. We estimated a total of 672 active Atlantic Puffin burrows this season.

Atlantic Puffin productivity is being monitored at 63 burrows. Hatch success was 0.83 chicks hatched per egg. Productivity monitoring is ongoing, but the projected number of chicks fledged per pair is 0.79, an increase from 2023 (Table 5).

Table 5. Atlantic Puffin hatch success and productivity at Seal Island NWR from 2019-2024.

	# Burrows monitored	Hatch Success	Productivity
2019	71	0.89	0.85
2020	73	0.88	0.76
2021	77	0.79	0.53
2022	78	0.94	0.81
2023	65	0.77	0.59
2024	**63**	**0.83**	**0.79**

A total of 2,989 prey items were observed delivered to puffin chicks, comprising 16 identified species. Haddock made up the majority of diet, at 61.6%, with hake, euphausiids, and redfish comprising another 10.8%, 9.6%, and 8.8%, respectively. Haddock was present in bill-loads consistently over the course of the season, with hake and euphausiids seen in small numbers early on, and redfish appearing later in the season.

Black Guillemots

Black Guillemot productivity is being monitored at 41 burrows. Average clutch size was 1.73 eggs laid per pair and average hatch success was 0.68 chicks hatched per egg. Productivity monitoring is ongoing, but the projected productivity is 0.83 chicks fledged per pair.

Razorbills

A total of 101 active burrows were confirmed in 2023, an increase of 6 burrows from 2023. A subset of 43 burrows were monitored for productivity. Productivity this season was 0.54 chicks fledged per pair and hatch success was 0.79 chicks hatched per egg.

Cormorants

A minimum of 57 Great Cormorant and 33 Double-crested Cormorant nests were counted from photos taken on May 24. Great Cormorant nests increased again after a drop in 2023, while Double-crested Cormorants held steady, with one fewer nest than 2023. Counts of chicks of both species are still being conducted to estimate productivity.

Ship Island

Bridget Schmidt, Island Supervisor and Sarah Regan, Island Intern - USFWS

Tern Census

We conducted the 2024 GOMSWG census on Ship Island on June 14th. The unadjusted count of common tern nests was 1292, with a Lincoln Index of 1.020 and productivity plots, we calculated a total of 1,387 nests.

Table 1. Number of tern nests on Ship Island from 2020-2024

Year	COTE
2020	355
2021	426
2022	936
2023	1,392
2024	1,387

Tern Productivity

We monitored 69 nests in ten productivity plots. Average clutch size was 2.07 eggs per pair, hatch success was 76%, fledge success was 50%, and productivity was 0.78 chicks per pair. We found 54 dead chicks in our plots. Most chick deaths occurred from 6/27-7/7 during periods of heavy rain and fog.

Table 2. Reproductive success for common terns on Ship Island from 2020-2023.

Year	Nests monitored	Clutch size	Hatching success	Productivity
2020	33	2.27	78.8%	0.97
2021	45	1.61	66.2%	0.94
2022	60	2.52	79.3%	1.80
2023	64	2.63	86.3%	1.50
2024	69	2.07	76.0%	0.78

Tern Provisioning

We included 12 nests in our provisioning study and observed the nests for 294 hours. We observed 330 feedings with a rate of 1.12 average feeds/nest/hour. Most of the tern chick diet was comprised of Atlantic herring (78.2%) followed by invertebrates (9.1%). We only observed four butterfish being delivered to chicks and all four chicks were able to swallow the butterfish.

Table 3. Principal prey items (percent) in tern chick diet on Ship Island in 2024 (n=330).

Prey item	COTE
Herring	78.2%
Hake	1.8%
Sand Lance	1.2%
Butterfish	1.2%
Pollock	0.3%
Invertebrates	9.1%

Predator Activities and Control Efforts

No gulls were removed from the island this year. A few herring and great black-backed gulls predated common tern chicks throughout the month of July. We continued to harass gulls throughout the season and displayed multiple dead gulls along the beach. The terns aggressively mobbed any predator that entered the colony. We observed peregrine falcons 28 times this season, and they predated at least six adult terns. Northern harriers attempted to predate adults on two occasions.

We observed bald eagles flying over Ship Island, with three landings on the island. The eagles primarily preyed on gulls nesting on Trumpet Island and cormorants on West Barge. We did not observe any mammalian predators or owl visitation this year.

Other Species

We observed 51 species of birds on or around Ship Island in 2024. In addition to common terns, breeding was confirmed for three species of passerines, one species of waterfowl, and two shorebirds. We estimated 2-3song sparrow, 10-12 savannah sparrow, 4-5 mallard, 1 yellow warbler, and 8 spotted sandpiper pairs nested on Ship Island this year. This was the first year that a pair of American oystercatcher nested on Ship Island and they fledged one chick.

Common eiders were frequently observed on Trumpet Island, East Barge, and the waters surrounding Ship Island. We observed our first eider crèche on June 9th and the last crèche was observed on August 1st. We observed ducklings in age classes 1a, 1b, 1c, 11a. We did not observe any successful predation attempts on eiders, but gulls did attempt to predate ducklings.

Other Notes

Refuge staff partially mowed the vegetation on Ship Island to reduce the abundance and distribution of invasive species, and to encourage terns to nest in the interior of the island. Refuge staff and island technicians also spent significant time hand pulling invasive plants (i.e. wild radish, nightshade, garlic mustard, tall mustard, and hedge mustard) this season. Vegetation growth proved to be a significant management issue this season causing nest abandonment.

In collaboration with National Audubon Society and Gettysburg College, the Refuge deployed 10 GPS tags on common terns to monitor spatial movements relative to chick provisioning. Data was transmitted to a base station and uploaded from Jun 14th through September.

We collected 80 fecal samples from common terns to identify the diet of chicks and adults: 20 adults during incubation, 20 adults during chick rearing, and 40 chicks. The Refuge is working with Cornell University to conduct the DNA analysis of fecal samples to determine diet composition.

Petit Manan Island

Amanda McFarland: Island Supervisor – Maine Coastal Islands NWR, USFWS
Dr. Natasha Gownaris- Researcher from Gettysburg College
Devin Leal, Jocelyn Little, Logan Becker, Leah Nath - Island Technicians

Tern Census

During the Gulf of Maine Seabird Working Group (GOMSWG) census on June 13, 2024, a total of 939 active tern nests were counted. We applied a Lincoln Index correction factor of 1.042 to this value and added our 62 productivity plot nests for an estimated total of 1,040 pairs of terns on Petit Manan Island (PMI). This is an 8.2% increase from 2023 (961 pairs). During peak incubation prior to the census, 214 individual nests were identified to species to calculate species ratios of interior habitats, noting that common tern (COTE) dominated shorelines and mixed Arctic tern (ARTE/COTE) interior habitats were each uniquely calculated. We estimated 318 ARTE pairs and 722 COTE pairs nested on PMI, with a colony-wide ratio of 30.5% ARTE and 69.5% COTE. Additionally, seven common eider (COEI) and six laughing gull (LAGU) nests were documented during the census. The historic nesting area for LAGU was not surveyed as the LAGUs were successfully deterred from nesting on the island in large numbers before the census. This resulted in an incomplete count for the number of both COEI and LAGU nests on the island.

Table 1. Number of nests found on Petit Manan Island during the GOMSWG census window from 2020-2024.

Species	2020	2021	2022	2023	2024
COTE	949	872	752	518	722
ARTE	353	461	447	275	318
LAGU	589	820	3	2	6
COEI	36	36	24	7	7

Tern Productivity

We documented the first eggs for both species of terns on the 21st of May. This was four days earlier than the decade average. Average clutch size for both species were the highest seen for the past five years (Table 2). Within productivity plots, hatch success for COTE was 74.5% and 75.0% for ARTE. Both species had the highest productivity for the past five years (Table 2). Two weather events during the first week of July accounted for the death of 53% of COTE and 58% of ARTE chicks.

Table 2. Tern productivity summary for Petit Manan Island from 2020-2024.

YEAR	2020	2021	2022	2023	2024	AVG
COTE						
# of Nests	23	42	36	36	25	32
Mean Clutch Size	1.96	1.79	1.86	1.89	2.04	1.91
Hatch Success (%)	84.4	50.7	71.6	64.1	74.5	69.1
Fledge Success (%)	47.4	13.2	60.4	45.4	55	44.3
Productivity	0.78	0.12	0.81	0.56	0.84	0.62
ARTE						
# of Nests	36	43	60	56	37	46
Clutch Size	1.67	1.72	1.65	1.48	1.73	1.65

Hatch Success (%)	71.7	74.3	61.6	36.1	75.0	63.7
Fledge Success (%)	55.8	12.7	54.1	63.3	70.8	51.3
Productivity	0.67	0.16	0.55	0.34	0.92	0.53

Tern Provisioning

Provisioning observations were conducted on 13 ARTE and 13 COTE nests for a total of 861 observation hours (396 ARTE/ 465 COTE) with 1,700 prey deliveries (833 ARTE/ 867 COTE). Dominant prey items for both species were hake, invertebrates, and Atlantic herring (Table 3). This was the highest percent of invertebrates observed in COTE and ARTE diet in the past five years. Notably 93.2% of invertebrate diet in COTE was Euphausiids. Butterfish were observed throughout the chick rearing period with 15.2% being rejected by ARTE and 39.4% rejected by COTE. Feed rate and food composition was consistent throughout the study period. On average, ARTE adults delivered 2.10 prey items per nest per hour while COTE delivered 1.86 items per nest per hour. This is the highest ARTE feed rate observed in the past five years.

Table 3. Principal prey items (%) in tern chick diets on Petit Manan Island in 2024.

Species	ARTE	COTE
Atlantic Herring	9.6	19.4
Sandlance	1.1	1.0
Invertebrates	28.7	29.0
Hake	35.1	21.3
Unknown Fish	6.6	7.7
Larval Fish	2.8	2.2
Unknown	5.5	4.0
Butterfish	4.0	7.8
Hake or Herring	3.0	2.0
Pollock	0.6	0.2
Stickleback	0.8	2.7

Alcids

Our individual high counts for alcids were: 256 Atlantic puffins (June 29), 323 black guillemots (May 18), 34 razorbills (May 23), and 19 common murre (May 29).

We located 60 active Atlantic puffin (ATPU) burrows. We confirmed the fate for 48 of those burrows and considered 16 chicks to have fledged. Winter storms in January caused large amounts of habitat loss along the East and West shorelines. Notably, 82% of sod burrows were destroyed. Refuge staff deployed 30 artificial burrows prior to the nesting season to recreate nesting habitat. A delayed incubation period was observed due to competition for burrows. Hatch rate was tied with the second lowest observed in the past decade. More than half of ATPU diet was Atlantic herring (26%) and hake (32%). This was the highest percentage of herring observed in puffin diet for the past decade. Diet composition was consistent throughout the season. Linear Growth in ATPU was 6.8 g/day. We located six active razorbill (RAZO) burrows. Productivity for RAZO was 0.17 chicks/pair.

We located 57 black guillemot (BLGU) burrows. We monitored 22 nests around the perimeter of the island and along the wooden boardwalk. Productivity for BLGU was 1.3 chicks/pair. We observed a higher number of chick death associated with aggression than past years. Common murre were regularly observed on the rocky point beneath the lighthouse and on occasion we observed prospecting and courtship behavior. However, there was no evidence of any known breeding attempts in 2024. Linear Growth in BLGU was 9.3 g/day.

Table 4. Active alcid nests and reproductive success at PMI, 2024.

Species	Burrows Monitored	Hatch Success	Productivity
ATPU	48	69 %	0.33
RAZO	6	33%	0.17
BLGU	22	89%	1.3

Storm-petrels

We located and flagged Leach's storm-petrel (LHSP) burrows early in the season while vegetation was short. We returned to the burrows in late June and used burrow-scope cameras and an audio-playback to determine occupancy of incubating adults. We monitored a subset of 40 burrows that were easily grubbed or scoped. These burrows were permanently marked with metal tags for future monitoring. We determined that 31 burrows had eggs, and we later found 29 chicks for an estimated hatching rate of 93.5%.

Predator Control

Avian predators were discouraged from roosting or perching on the island throughout the season by using pyrotechnics, bird spikes, an Agri-laser, and human presence. Peregrine falcons (PEFA) were the most frequent avian predator observed. PEFA were first observed on May 2nd, and we observed a minimum of 74 predation attempts. We directly observed the predation of 16 terns. We also observed six additional tern feather piles. In addition to terns, PEFA predated two adult ATPU. Herring gull (HERG) predation events were observed throughout July. We observed six successful predation events and were not able to remove the gull that seemed to specialize in preying on the terns.

We continued the LAGU control from the previous season to prevent reestablishment. We lethally removed two LAGU which attempted to nest. We discovered six nests after the GOMSWG census. In addition, one herring and two great black-backed gulls were lethally removed, two of which were injury related.

Other Research

Fecal Sampling: In partnership with researchers at Cornell University and Gettysburg College, fecal samples were collected for diet composition analysis. A total of 64 samples were collected from COTE, ARTE, and ATPU to be used to compare diets of chicks to adults and among species.

Stable Isotope/Blood Sampling: In partnership with Dr. Natasha Gownaris (Gettysburg College), blood samples were collected from chicks for stable isotope analysis (Table 5). A second sample was collected opportunistically from several of these chicks. We also collected 25 dropped fish samples throughout the season. We also collected 45 eggshell samples from ARTE, COTE, ATPU, BLGU, RAZO, and LHSP for further analysis.

Table 5. Total blood sampling effort at PMI, 2024

Species	ATPU	BLGU	ARTE	COTE
Individuals sampled	10	10	13	13
Total Samples	11	10	20	19

Tern GPS Tagging: In partnership with Natasha Gownaris (Gettysburg College) and Keenan Yakola (Oregon State University), 35 GPS tags were deployed on COTE, ARTE, ATPU, and LHSP. Leg loop harnesses were used for tern species, while suturing was used to attach tags for ATPU and LHSP. Both tern species had lower productivity than the colony average (Table 6). ATPU had comparable productivity, but one nest failed after the tag was deployed. We were able to retrieve 11 of 13 GPS tags deployed on LHSP tags. The remaining two nests abandoned after tags were deployed.

Table 6. Tagging effort and productivity at PMI, 2024

Species	# nest	Hatch Success	Fledge Success	Productivity
COTE	10	87 %	35 %	0.70
ARTE	8	76 %	46 %	0.75
ATPU	4	-	75%	0.75
LHSP	13	76.9%	-	-

2024 Maine State Synopsis of Nesting Least Terns

From June 12 - 14 a statewide coordinated walking nest census count documented a minimum of 191 nesting pairs of Least Terns in Maine. This was four more pairs than last year's 187 pairs and was the third lowest pair count in the past ten years. During the census window, 15 nests were on Wells, 15 nests on Laudholm, 11 nests on Crescent Surf, three nests on Parsons, 30 nests on Western, 106 nests on Stratton Island, 10 nests on Seawall, and one nest at Reid State Park. Multiple sites had higher nest counts outside of the census window, but those numbers are not reflected in the state totals. The Least Terns on Wells Beach fledged a minimum of 28 chicks, Laudholm fledged a minimum of three chicks, Parsons fledged 19 chicks, Western fledged 45 chicks, Stratton Island fledged 30 chicks. Crescent Surf, Seawall, and Reid State Park did not fledge any chicks which left the state with a minimum total of 125 fledglings and an estimated productivity of 0.65 fledglings per pair. This was the second highest productivity and the third highest number of fledglings in the past ten years.

Estimate of Least Tern Pairs

	WELLS BEACH	LAUDHOLM FARM	CRESCENT SURF	PARSONS BEACH	GOOSE ROCKS	WESTERN BEACH	STRATTON ISLAND	HIGGINS	RAM ISLAND	SEAWALL	POPHAM	REID STATE PARK	TOTAL
2003	0	20 (0)	57 (8)	0	8 (0)	0	-	38 (53)	0	0	0	33(5)	156 (66)
2004	15(10)	1 (0)	[50] (3)	0	0	0	-	45 (54)	0	0	0	50(2)	146 (69)
2005	0	4 (1)	[52] (7)	0	0	[40](3)	18 (9)	[22] (0)	0	[17] (0)	0	0	114 (20)
2006	[1] (0)	0	30 (10)	0	[25] (1)	0	103 (15)		0	0	0	[1](0)	134 (26)
2007	1 (1)	0	[37] (1)	0	[45] (2)	0	113(10)8	0	0	0	0	0	150*(112)
2008	0	0	92 (52)	0	2 (0)	[2]	72 (33)	0	0	0	0	0	166* (89)
2009	0	0	102**(62)	0	[6]**(0)	0	72 (16)	[16] (0)	0	0	0	0	170 (78)
2010	0	[1]**	136**(45)	0	[18]**	0	76** (5)	0	0	0	0	0	211* (50)
2011	0	0	123* (73)	0	23* (12)	0	59* (28)	0	0	0	0	0	205*(113)
2012	0	0	99* (78)	0	0	0	86-92* (72)	0	5 (1)	0	2	0	185-191* (155)
2013	0	0	129* (93)	0	0	0	92* (79)	0	0	0	3* (0)	0	224*(172)
2014	0	4** (4)	164* (29)	0	0	0	79* (36)	4* (0)	0	0	2* (?)	0	249* (72)
2015	0	6** (0)	138*(144)	0	0	0	69* (0)	25* (6)	0	0	14* (3)	0	233*(153)
2016	0	2**(0)	169*(15)	0	10**(7)	4(0)**	69*(14)	0	0	1(0)**	22(0)**	0	238*(36)
2017	0	1*(0)	115*(13)	0	4*(0)	48*(5)	87*(1)	0	0	0	0	0	255*(19)
2018	0	21*(0)	43*(19)	0	2**(0)	4**(0)	122*(50)	10**	0	0	0	0	186*(69)
2019	0	0	156*(31)	0	0	35*0)	84*(14)	21*+(16)	0	0	0	0	296*(61)
2020	0	0	130*(65)	0	0	0	0	128*(50)	0	7(1)	0	0	258*(116)
2021	0	18*(41) ***	116*(40) ***	0	[10]**(0)	0	[63]*(0)	71*(17)	0	13*(39)	0	0	281*(137)
2022	0	23*(18)	102*(0)	0	5**(1)	0	91*(14)	51*(5)	0	10*(2)	0	0	277* (40)
2023	0	9*(1)	77*(8)	0	8*(0)	0	76*(4)	20*(0)	0	3*(0)	0	0	187*(13)
2024	15*(28)	15*(3)	11*(0)	3*(19)	0	30*(45)	106*(30)	0	0	10*(0)	0	1*(0)	191*(125)

( ) number of fledglings

[ ] colony deserted

***** simultaneous count at all occupied nesting sites during window count, not a site specific high nest count, only these numbers used in total. In 2017, after window count, colonies moved around substantially due to predation issues, in 2018 a synchronized count was not possible as the CS colony was disrupted and colonies never really synched up.

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

*** Productivity at Crescent Surf and Laudholm Farm should be calculated by combining number of nests and fledglings from the two beaches and be considered one "Little River colony" as LETE were moving back and forth between beaches after fledging making it impossible to know which birds fledged from which beach.

Wells Beach, Wells

Laura Zitske and Laura Williams - Maine Audubon

Population Estimate: A total of 15 nests were counted during the nest census, although more were laid throughout the season. Due to winter storms, the dunes were washed over and created an even, sandy area north of Public Way 15. The Least Terns started staking their territory in late May and competing for space with two Piping Plover pairs that were scraping in that area. In early July at the peak, 60 adults and 30 nests were estimated for the Wells Beach colony, potentially because the Least Terns had not nested on Wells Beach for the last 17 years. Beachgoers walking through the stake and twine area continuously posed a threat and caused disturbance to the birds.

Comparison: Least Terns arrived on Wells for the first time since 2007, and at that time there was one pair and one successful fledge. In 2004, Wells was home to 15 Least Tern pairs and fledged 10 chicks. Prior to then, the last time Least Terns nested and successfully fledged chicks there was in 1979.

Predation Management: None

Laudholm Farm Beach, Wells

Helen Manning and Will Jackson - Rachel Carson NWR

Population Estimate: 15 Least Tern pairs were nesting during the walking nest count census conducted on June 14. The high count for the season outside of the census window was 18 nests recorded on July 3. One fledgling count was conducted on July 23 where no fledglings were recorded but chicks were present. A second fledgling count was conducted on August 7 but all terns had left the beach. Outside of the counts, one fledgling was seen on July 22 and two were seen on August 1 which provided a minimum total of three fledglings. The causes of nest and chick loss are largely unknown though crow, coyote, fox, and Cooper's Hawk sign were recorded throughout the season. There were also multiple days with temperatures in the upper 80s and 90s that could have contributed to exposure related issues.

Comparison: 21 pairs nested at Laudholm in 2018 but all nests were predated by a fox after the electric net fence failed. There were no pairs nesting at Laudholm in 2019 or 2020. In 2021 there were 18 pairs nesting which combined with Crescent Surf's 116 pairs produced at least 81 fledglings. In 2022, 23 pairs produced 18 fledglings and in 2023, nine pairs fledged one chick.

Predation Management: An electric net fence was set up around the colony and anti-perching bird spikes were placed on top of the symbolic fencing posts.

Crescent Surf Beach, Kennebunk

Helen Manning and Will Jackson- Rachel Carson NWR

Population Estimate: 11 Least Tern pairs were nesting during the walking nest count census conducted on June 14. The high count for the season outside of the census window was 45 nests recorded on May 31. One fledgling count was conducted on July 23 where no fledglings were recorded. All terns had left the beach by the time a second fledgling count would have been conducted. Coyote predation is suspected to be the main source of Least Tern nest and chick loss at Crescent Surf. Throughout the season, crow, fox, and Cooper's Hawk sign were also recorded. The

beach never really rebuilt after the winter storms eroded away much of the nesting habitat, so Least Terns were limited in suitable nesting habitat this year.

Comparison: Crescent Surf Beach saw its most successful years in 2015, 2013, and 2012 with productivity of 1.04, 0.76, and 0.79 respectively. 2021, 2020, 2011, 2009, and 2008 were decent years with productivities between 0.5-0.6. Productivity was poor in 2017, 2016, and 2014, and was also poor from 2003-2007. In 2022, 102 pairs nested and did not fledge any chicks and in 2023, 77 pairs fledged eight chicks.

Predation Management: Anti-perching bird spikes were placed on top of symbolic fencing posts. This was the first year since 2007 predation management was not conducted.

Parsons Beach, Kennebunk
Helen Manning and Will Jackson – Rachel Carson NWR

Population Estimate: Three Least Tern pairs were nesting during the walking nest count census conducted on June 14. A high count of seven nests was recorded on July 1 outside of the census window, though it is suspected more nests were present during the season. Two fledgling counts were conducted where seven fledglings were recorded on July 23 and 12 were recorded on August 7 which results in a minimum of 19 fledglings total. Crow, fox, and gull sign were recorded throughout the season as well as human and domestic dog within the nesting area.

Comparison: This was the first time Least Terns attempted nesting at Parsons Beach since monitoring began in 1977.

Predation Management: None.

Goose Rocks Beach, Kennebunkport
Laura Zitske and Laura Williams - Maine Audubon

Population Estimate: Least Terns did not attempt to nest on Goose Rocks Beach in 2024.

Comparison: In 2022, five nest attempts hatched two chicks and fledged one. A small colony of Least Terns attempted to nest in 2021. There were ten nesting attempts but no chicks survived until fledging and the colony abandoned in late July. No nesting attempts were made in 2020 or 2019, although courtship was observed. Two nesting attempts were made in 2018 but no chicks hatched. At least seven pairs attempted to nest in 2017 but all were unsuccessful. Ten pairs of Least Terns made nest attempts on Goose Rocks in 2016 fledging at least seven chicks. No nesting attempts were made at Goose Rocks between 2012-2015. In 2011 a season high of 46 birds were documented and produced a minimum of 12 fledglings. In 2010, a small colony set up after failures at Crescent Surf and Stratton Island, however no chicks survived.

Predation Management: None.

Stratton Island
National Audubon Society

Population Estimate: 106 nests and 36 chicks were counted during the nest census conducted on June 14 and a total of 129 nest attempts were recorded throughout the season. Stratton Island had the largest Least Tern colony in the state this year. Some nests were lost to tidal wash over in June, and in early July, Black-crowned Night Herons predated the majority of the island's chicks, and the colony was slow to recover. A minimum of 30 fledglings were produced this year with a high count of 17 on July 11, and 13 fledglings seen two weeks later.

Comparison: In 2022, at least 14 fledglings were produced from 91 pairs. Black-crowned Night Heron predation was the biggest struggle in 2022. In 2021 at least 63 pairs nested on the island but abandoned after two nights of Black-crowned Night-Heron predation and tropical storm Elsa, no chicks fledged. In 2020 Least Terns did not

attempt to nest on the island. 84 pairs produced 14 fledglings in 2019 and 122 pairs produced 50 fledglings in 2018. In 2017 only one chick fledged from 87 nesting pairs. Stratton Island has historically hosted the second largest least tern colony in the state.

Predation Management: Predation management was conducted on Stratton Island. Specialist predators targeting the colony were removed.

Western Beach, Scarborough
Laura Zitske and Laura Williams - Maine Audubon

Population Estimate: Least Terns had a record-breaking season at Western beach. A total of 30 nests were counted during the census, although it is suspected many more were laid after the census window. The site, located in the middle of the beach, held up to 80 adults at one time, but consistently held around 40 since the end of May. A fox jumped the electric fence mid-season and predated all the nests inside. A second wave of nesting occurred after the predation event, with most nests being laid outside the electric fencing. A minimum of 45 chicks fledged.

Comparison: In 2019, 35 Least Tern nests were observed on Western, but after a predation event, no nests or chicks remained. There were a minimum of five Least Tern nests in 2018 that fledged no chicks. There were 48 Least Tern nest attempts on Western in 2017, fledging five birds. In 2016, there were at least four nest attempts on Western, with no fledglings produced. Before this, terns had not nested on Western Beach since 2008, and the site had not fledged chicks since 2005, when there were a total of 40 active nests. Prior to 2005, Least Terns had not nested at the site since 1981.

Predation Management: USDA Wildlife Services removed specialist predators from Western Beach throughout the breeding season. An electric net fence was set up surrounding most of the colony.

Higgins Beach, Scarborough
Laura Zitske and Laura Williams - Maine Audubon

Population Estimate: Around 45 Least Terns were observed touching down and courting on Higgins Beach in mid-May. Least Terns never nested and by June 1 abandoned the area. It is suspected there was a disturbance event that caused the colony to choose another area.

Comparison: In 2023, 20 Least Tern nests were counted but no chicks fledged. A colony with at least 51 nesting pairs fledged a minimum of five chicks in 2022. In 2021, at least 71 pairs nested and fledged a minimum of 17 chicks. A colony of 128 nesting pairs of Least Terns on Higgins Beach fledged at least 50 chicks in 2020. A smaller colony of 55 pairs fledged 16 chicks in 2019. A small colony was unsuccessful in 2018 and no terns nested in 2017. In 2016, a colony had begun to form at the end of May, but a storm tide in early June washed over the area, and no nests were laid. In 2015 and 2014 small colonies formed at Higgins Beach, fledging 13 chicks in 2015 and none in 2014. No Least Terns nested on Higgins between 2010-2013.

Predation Management: USDA Wildlife Services removed specialist predators from Higgins Beach throughout the breeding season.

Seawall Beach, Phippsburg
Laura Zitske and Laura Williams - Maine Audubon

Population Estimate: Least Terns touched down on the Morse River side of Seawall Beach with consistent numbers of around 40 adults starting in late May. On June 4, a high count of 16 nests were observed. Before the census window count, a large portion of the colony was predated by foxes and skunks; 10 nests were counted for the census. A high tide event flooded these remaining nests. Pairs began to nest again and as the colony continued to lay eggs, the eggs were predated by fox. The only chick observed was on July 3, with only around a dozen adults flying

around the area, and five incubating nests. On subsequent visits, the chick and all nests had been predated. By July 18, the colony was abandoned.

Comparison: Last year, predators were just as prevalent of an issue as they were this year, if not more. There was a high count of 11 nests at one time, with 50 adults, and no chicks hatched or fledged. However, in 2021, 39 chicks fledged from a colony of 60 adults. Prior to 2020, Least Terns did not nest on Seawall since 2005, where the colony was predated, resulting in no chicks hatching.

Predation Management: None.

Reid State Park, Georgetown
Laura Zitske and Laura Williams - Maine Audubon

Population Estimate: Between late May and early July, an average of seven Least Terns were regularly spotted at Half Mile Beach. One nest was counted during the census window. Three hatched chicks were observed on July 5 but not seen in following visits. Predation and tidal over wash were consistent issues for the colony, which eventually abandoned by late July.

Comparison: Least Terns had not nested at Reid State Park since 2006, prior to 2023, with only one chick hatching but not fledging. Even in 2006, no chicks fledged.

Predation Management: None.

New Hampshire

Isles of Shoals

Liz Craig, Director of Seabird Research, Shoals Marine Laboratory (SML)
Joe Brosseau & Hope Caliendo, Seabird Technicians, SML
Additional collaborators and summer interns listed below

White and Seavey islands

Tern Census
Common Terns

- COTE census was conducted over 4 days within June 3rd to 12th, 2024
- Unadjusted census:
    - 629 nests on White Island
    - 2,339 nests on Seavey Island
    - Lincoln Indices were calculated for White Island and Seavey Island (divided into sections with indices ranging from 1.03 to 1.10 on White and 1.00 to 1.20 on Seavey)
- Adjusted census:
    - 671 nests on White Island
    - 2398 nests on Seavey Island
    - **Total estimated population was 3,069.** Similar to last year's census count (3,165).

Roseate Terns

- **133 ROST nests were established on Seavey Island within the census window** (before 14 June 2024; down from historic high of 151 in 2023).
- B-wave ROST nests brought the season total to 153 (down from historic high of 172 in 2023).

Arctic Terns

- 0 ARTE nests were established in 2024, with 2023 being the first year to not establish any.

Table 1. Number of tern nests found on White and Seavey islands from 2016-2024

Year	COTE	ROST	ARTE
2020	3,280	96	1
2021	3,412	112	1
2022	3,066	124	1
2023	3,165	151	0
2024	3,069	133	0

Productivity

Common Terns

- 8 fenced plots (~10x12 ft) containing 84 nests
- Nests were monitored until chicks reached "fledge" age (15 days)
- Productivity was high for COTEs (0.92 chicks per nest) in comparison to recent years. Contributing factors to this high COTE productivity may have included a variety of good fish (diet was heavy in herring and hake early in the season, with low amounts of butterfish seen) and a lack of storms during hatching and chick rearing. The colony also experienced below average predation pressure in 2024.

Roseate terns

- ROST nests were monitored individually until chicks reached "fledge" age (5 days for ROST)
- Productivity was average for ROSTs (0.80 chicks per nest) in comparison to recent years.

Table 2. Breeding parameters for Common, Arctic, and Roseate terns on White and Seavey islands from 2020-2024. Only nests with known outcomes were used for ROST & ARTE calculations.

Species	Year	Clutch size	Hatching success	Fledging success	Nests monitored
COTE	2020	2.19	1.86	0.57	70
	2021	2.16	1.01	0.33	116
	2022	1.99	1.46	0.96	72
	2023	1.71	1.15	0.39	77
	2024	2.02	1.69	0.92	84
ROST	2020	1.64	1.43	0.91	94
	2021	1.77	1.05	0.62	73
	2022	1.81	1.61	1.31	88
	2023	1.44	1.02	0.87	120
	2024	1.61	1.11	0.80	111
ARTE	2020	1.00	0.00	0.00	1
	2021	1.00	0.00	0.00	1
	2022	1.00	1.00	1.00	1
	2023	-	-	-	0
	2024	-	-	-	0

Tern Provisioning

- COTE and ROST nests were monitored for diet.

- Remote observation cameras were used to record video of each COTE and ROST nest every 1-2 days starting 18 June 2024. COTE and ROST observations concluded 29 July 2024. Complementary provisioning data were collected by observers in blinds to compare to camera observations. Data from camera recordings will be collected in fall 2024.
- Diet items included herring, hake, butterfish, pollock/haddock, mackerel, butterfish, cunner, sand lance, redfish, pufferfish, pipefish, lumpfish, banded rudderfish, cephalopod, lobster, euphausiid, shrimp grasshopper, cicada, moth, and chum.
- Partnering with Dr. Gemma Clucas at Cornell Lab of O to conduct DNA metabarcoding of feces to determine diet to species level.

Predator Activities and Control Efforts

Gulls:
- Used human presence, as well as pyrotechnics and lasers to dissuade gulls from lingering and predating.
- Managed predation with pyrotechnics and lasers: 9 pyrotechnics were used between 12th of May and 28th of July (down from 20 in 2023).
- Lethal control: No lethal control was used.

PEFA:
- Was present on island during first arrival, and flushed with pyrotechnics once in late May. No predation events observed.

Other Avian:
- RUTU were first seen in mid June, and seen regularly through the end of July.

Muskrats:
- Due to predation issues in previous years, muskrats were trapped at their den on White using conibear traps. 2 muskrats were trapped (up from 1 in 2023). One neighborhood of Roseate Terns was found to have significant egg predation, with teeth marks indicating likely muskrat predation.

Other Mammalian:
- No other mammalian predators were observed on White or Seavey islands in 2024.

Other Species
- Common Eider: at least 38 nests (1 on White and 37 on Seavey; similar to 2023)
- Spotted Sandpipers: at least 6 nests (2 on White and 4 on Seavey; down from 15 total in 2023)
- A Bridled Tern was observed on the colony intermittently from 9 July to 4 August (date of this report) 2024
- Used eBird for daily bird list to share bird diversity data from White and Seavey.

Other Isles of Shoals islands

Alcids

This was the third year of concerted monitoring efforts for Black Guillemots on the Isles of Shoals with one dedicated 2024 intern, Kati Leitner. As of 4 August 2024 there were 48 total known nests on the Isles of Shoals. 21 known BLGU nests were observed across 4 neighborhoods on Appledore Island and another 27 nests across 4 neighborhoods on Smuttynose Island. This constituted a slight increase from nests observed in 2023 (41 total). Nest cavities were labeled with epoxy markers to facilitate continued monitoring into the future.

Long-legged wading birds

A mixed-species colony of long-legged wading birds has re-established on Appledore Island as of 2020. 2024 nest counts will be conducted at the end of the breeding season once chicks fledge. A combination of nest ID and adult counts are used to estimate breeding colony size and relative species abundance. Species included Snowy Egret, Great Egret, Glossy Ibis, and Black-crowned Night-Heron.

American Oystercatchers

The SML team identified 1 AMOY nest on Appledore Island and 2 on Lunging Island in 2024.

Gulls

Gulls continue to be monitored on Appledore Island by the Gulls of Appledore team led by Sarah Courchesne and Mary Elizabeth Everett. Both Great Black-backed Gulls and Herring Gulls continued to breed on Duck Island, Appledore Island, Smuttynose Island, Star Island, Lunging Island, and Square Rock.

Double-crested Cormorants

Double-crested Cormorants continued to breed on Duck Island, Lunging Island, and Square Rock.

Research:

- Collected HPAI samples from gulls and terns in collaborations with Wendy Puryear at Tufts
- Collected GPS locations for all censused tern nests. Evaluating spatial distribution of birds and nest site selection wrt habitat characteristics and management.
- Continued application and evaluation of salt for habitat management for terns at the neighborhood/ mesohabitat scale.
- Tern fecal collection (for DNA metabarcoding) and visual diet observations conducted to determine diet with Gemma Clucas.
- Passive bioacoustic monitoring of terns with UNH students Valerie Eddington, Joe Brosseau, and Dan Zogby (PI Laura Kloepper). Joe Brosseau's manuscript on bioacoustic response to investigator disturbance accepted for publication in summer 2024 (JASA).
- Exploration of historic tern diet data and reproductive success/growth wrt fisheries data.
- Deployed 20 GPS tags on Common Terns and 5 GPS tags on Roseate Terns to pair provisioning data with foraging.
- Investigation of tag effects in Roseate Terns (with SML/Cornell undergraduate intern Grace Guo) and Common Terns (with UNH undergraduate student Elizabeth Kupferberg)
- Camera monitoring of ROST diet
- BLGU diet/reproductive success/interactions with gulls by SML intern Kati Leitner (UC Santa Cruz)
- Drone-based exploration of tern distribution and abundance (thermal and optical) with UNH collaborators Mike Palace and Frankie Sullivan
- Body burden of Hg in comparison to foraging behavior (stable isotopes) in breeding seabirds by former SML intern Lenny Laird – published summer 2024: https://doi.org/10.1016/j.scitotenv.2024.174438

Research/Project Updates

- Gemma Clucas *Update on Fecal DNA Work* (Virtual)
- Logan Becker *Gettysburg College/FWS Research Collaborations* (Virtual)
- Kay Garlick-Ott *Mapping aggression: research updates 2024*
- Aliya Caldwell *High-resolution satellite telemetry data reveal full Gulf of Maine-breeding Common Tern (Sterna hirundo) migration cycle* (Virtual)
- Jill Tengeres *Tracking movements of Common Terns that use New England staging sites, MA*
- Sarah Guitart *Cameras and Tern Diet Monitoring* (Virtual)
- Keenan Yakola *Seabird Tracking in the Gulf of Maine 2024*

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