



Egg Rock Update

Newsletter of the Seabird Restoration Program
of the National Audubon Society

2007

PUFFINS, TERNS, AND GLOBAL WARMING

Puffins at Maine coast islands continue to thrive, as demonstrated by increasing populations and high nesting success. But researchers elsewhere are finding troubled times for puffins, terns, and other seabirds. While there are many subtle effects that a rapid shift in climate can have on seabirds, rising ocean levels and changes in food supplies are two immediate threats.

Rising Ocean Levels

Water from melting ice in Greenland, the Arctic, and Antarctica are contributing to rising ocean levels. Recent estimates from the Intergovernmental Panel on Climate Change predicts in its 4th assessment (2007) an increase in sea level of between seven and 24 inches by 2100.¹ These effects will vary greatly along the Atlantic Coast with the most severe effects in the Mid-Atlantic and Southeastern states due to the gentle slope of the land.² Since the year 1800, sea levels in the Gulf of Maine have risen about one foot, and most of this has happened in the 20th century—a rate unprecedented in the previous 1,000 years, and consistent with warming of the northern hemisphere.³ To assess the impact of rising sea levels on Maine, the Natural Resources Council of Maine in collaboration with the Geographic Information Systems Department at Colby College and University of Maine's Climate Change Institute determined that with a three-foot rise in water, 242 key coastal wildlife habitats in Maine would be flooded. The report also identified 20 high-risk cities and towns that would lose 20 to 30% of their land.⁴

A sea level rise of three feet would result in disaster for Maine seabirds, as most nest on low-lying islands. Eastern Egg Rock, for example, is only 17 feet above the average high tide. The most immediate threat from rising

Only 17 feet above sea level, Eastern Egg Rock is typical of most Maine seabird nesting islands that are vulnerable to storm-driven floods and sea-level rise.



SCOTT HALL; INSET ROBERT F. BUKATY

Common Terns thrived at Eastern Egg Rock this year in the wake of an extreme April storm and high tide that washed over the island, depositing heaps of dead vegetation and marine debris. Marine storms can create or destroy seabird nesting habitat—depending on the time of the year.

ocean levels is the compounded effect of high tides and storm surges, which will become more common with warming seas.⁵ For example, on April 16, 2007, storm waves measuring 31.5 feet were recorded on the Maine Coast. Combined with a high tide of over 13 feet, it is no surprise that the storm washed over most of Eastern Egg Rock. If the storm had occurred a month later, it would have flooded most puffin-nesting burrows. Ironically, the timing of the storm actually improved tern nesting habitat, by eroding accumulating invasive grasses and exposing the underlying beds of gravel—ideal tern-nest-



F. CHARLES GOVERNALI

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ROBERT BUKATY (2)



Mission: Developing techniques for restoring seabirds to historic ranges and encouraging the protection and appreciation of seabirds worldwide.

ing habitat. Some terns even nested atop heaps of dead vegetation dumped by the storm into the interior of the island.

Changes in Fish Stocks

Even small increases in water temperature are significant as they diminish plankton populations, which in turn affect entire marine ecosystems. Melting arctic ice will likely balance some of the global warming effect on Maine coastal waters, but data from NOAA's Climate Diagnostic Center reveals that Gulf of Maine water temperature has increased by 1.1°F.⁶ Likewise, changes in ocean currents and salinity can negatively affect the plankton and fish species available to foraging seabirds. These changes can also affect the size and timing of the arrival of fish that are fed to seabird chicks. Puffins and terns are especially sensitive to these changes and researchers worldwide are beginning to see troubling effects.

Some of the changes brought about by climate change are complex and difficult to predict. Surprisingly, some may have at least short-term benefit for seabirds. For example, Atlantic saury (*Scomberesox saurus*) is a new fish that has recently been identified in the diet of Maine puffins and terns. Typically found in the warmer waters south of Cape Cod, its presence in the Gulf of Maine indicates warmer waters. Its appearance the last two years in southern and Mid-coast Maine has helped supplement the meals of puffins and terns. However, climate change often brings trouble to seabird food supplies. When combined with overfishing and marine pollution, climate change can contribute to disastrous effects on the growth and survival of seabird chicks.



Atlantic saury, a fish usually found further south, became an excellent food source for Maine's puffins and terns last summer.

Measuring the Effects on Maine Seabirds

To measure the effects of global warming on seabirds, interns from Audubon's Seabird Restoration Program measure sea surface temperatures three times daily at each of our seven island field stations. These measurements, along with studies of the diets and growth of puffins and terns, are providing long-term measures of the health of the Gulf of Maine. Puffins and other seabirds are sensitive indicators of problems in the marine food chain.



Spencer Galen collects sea water at Seal Island NWR to measure sea surface temperature.

Seeking Higher Ground

The same methods developed to restore seabirds to new nesting islands can also help seabirds move to higher ground as ocean levels rise. This may mean selecting islands with higher elevations for future restoration sites, or encouraging seabirds to move away from the edges of islands to higher ground. The creation of suitable nesting habitat combined with social attraction—the use of seabird decoys and sound recordings to lure birds to safe sites—has great promise for this purpose. Several projects are already underway to move tern nesting colonies away from the dangers of flooding shorelines. ❖

MAKING A DIFFERENCE

Climates have changed in the past, but never as fast as now. Our success at slowing global warming will depend on meaningful action by governments *and* our personal choices. This is not just about the quality of life for seabirds and our grandchildren—it is about our own future. Electing caring legislators and making more sustainable energy conservation choices at home and work are excellent places to start.

Here are some links to specific things that you can do to make a difference:

- **Elect leaders that care** about global warming: www.stepitup2007.org
- Conduct a **home energy audit**: www.hes.lbl.gov
- **Buy or rent cleaner cars**: www.evrental.com
- **Measure your carbon footprint** at the Center for Alternative Technology: www.cat.org.uk
- **Inform teachers** about available energy education materials: www.eia.doe.gov/kids
- **Learn more about global warming and find solutions**
www.audubon.org/globalWarming/index.php
www.climatecrisis.net
www.earthday.net
www.npr.org/climateconnections
- **Stay informed** by reading *Audubon* magazine.

Footnotes

- 1 www.ipcc-wg1/Report/AR4WG1_Print_SPM.pdf
- 2 www.pubs.usgs.gov/fs/fs76-00/fs076-00.pdf
- 3 W. Roland Gehrels, Daniel F. Belknap, Stuart Black, and Rewi M. Newnham. Rapid sea-level rise in the Gulf of Maine, USA, since AD 1800. *The Holocene*, May 2002; 12: 383–389.
www.hol.sagepub.com/cgi/content/abstract/12/4/383
www.cleanair-coolplanet.org/information/pdf/Indicators_poster.pdf
- 4 www.nrcm.org/sea_level_rise.asp
- 5 www.ucusa.org/global_warming/science/hurricanes-and-climate-change.html
- 6 www.cleanair-coolplanet.org/information/pdf/Indicators_poster.pdf

An expanded version of this article that includes present-day examples of changes that are affecting seabird colonies beyond the Gulf of Maine is posted on our website <www.projectpuffin.org>.

SEABIRD RESTORATION PROJECT UPDATES

The techniques that brought puffins and other seabirds back to Maine are now helping rare and endangered seabirds worldwide.

Short-tailed Albatross • Torishima Island, Japan

Short-tailed Albatross were thought to be extinct in 1949 following the slaughter of more than five million for the Japanese feather trade. But a few pairs returned to Torishima Island the following year. These survivors have flourished with the aid of Dr. Hiroshi Hasegawa and his colleagues from the Japanese Ministry of the Environment and the Yamashina Institute for Ornithology.

Nearly all Short-tailed Albatross nest at Torishima Island and here the population has increased to 341 pairs in 2007. However, most of these birds continue to nest on steep slopes where they are vulnerable to landslides and a possible volcanic eruption. Starting in 1992, Dr. Hasegawa began using decoys and sound recordings to start a new colony on a landslide-free part of the island. As of April 2007, this subcolony had increased to 24 pairs—a 60% increase from the 15 pairs nesting among the decoys there last year.

To create another colony on a non-volcanic island, preparations began this year to move some of the chicks to a historic albatross site—Mukojima Island in the Bonin Islands of Japan. A pilot project this year successfully fledged hand-reared Black-footed Albatross chicks. This success has encouraged researchers to begin moving Short-tailed Albatross chicks to the island in February 2008. ❖



HIROSHI HASEGAWA

Albatross chicks will be translocated from Torishima Island to the Bonin Islands next year with hopes of starting a new Short-tailed Albatross colony on a non-volcanic island.

Information provided by Hiroshi Hasegawa, Toho University



JEREMY MADEIROS

A fledgling Cahow at Nonesuch Island will soon head to sea. Hopefully, it will return to pioneer a new colony.

Cahow • Castle Harbor, Bermuda

Although Cahows (the national bird of Bermuda) once nested in vast numbers throughout Bermuda, habitat loss, exploitation by European colonists, and predation from introduced mammals such as pigs, rats, and cats has decimated the population. Presumed extinct for over 300 years, a few pairs were rediscovered in 1951. Today, about 80 pairs survive on four tiny islands in Castle Harbor. These sites, however, are vulnerable to rising ocean levels, and increasingly powerful hurricanes are accelerating erosion of the loose sandstone, destroying the remaining nesting habitat.

Jeremy Madeiros and staff from the Bermuda Conservation Department have installed a solar-powered, sound playback system on the highest ground of one of the nesting islets to attract Cahows to nest there. In 2007, six pairs chose to nest in burrows on this safer location. Over the past four years, Madeiros and his team have also moved 79 chicks from the vulnerable islets to higher ground on nearby Nonsuch Island. These chicks were hand-fed a diet of whole squid and anchovies until they reached fledging age. Some of the translocated chicks will be old enough to return in November 2008. ❖

Information provided by Jeremy Madeiros, Bermuda Conservation Department. For more information on Cahows, read: "Seeking Higher Ground" by Rachel Dickinson, Audubon, September–October 2007.



THE 2007 MAINE RESEARCH TEAM

Foreground: Ayla Liss; **First Row (left to right):** Steve Kress; Michelle Fournier; Maggie Lee Post; María Félix Lizárraga (Josephine D. Herz International Scholar); Alison Kocek; Maria Cunha; Jennifer Malley; Emily Golson.

Second Row (left to right): Lisa Quirk; Matthew Martinkovic; Sarah Pierce; Spencer Galen; Jennifer Knight; Delaney Burke; Ryan Kingsbery; Matt Klostermann; Katherine Fourhman; Lawrence Schwamb; Lisa Mazzarelli; Katie Kaufman.

Third Row (left to right): Rosalie Borzik; Sue Schubel; Scott Hall; Christina Donehower; Pete Salmansohn; Jeff Kimmons; Juliet Lamb; Gabriel Johnson; Malcolm Grant.

Absent from photo: Robin Abbey-Lee; Deirdre Anderson; Sara Brown; Melissa Campbell; Felicia Chen; John Drury; Peggy Friar; Peter Gawne; Kirk Gentalen; F. Charles Governali; Mary Roman Gunther; Nicki Hall; Anthony Hill; Susan Inman; Martin Junco; Katie La Creta; Robby Lambert; Mandy Lightcap; Anthony Liss; Susan Meadows; Terry Mingle; Kristin Pennock; Alex Perez; Ellen Peterson; Madeleine Pott; Sam Radcliffe; Nicholas Record; Ryan Rice; Luke Seitz; Sam Slater; Cara Templeton; Chris Tupper; Cricket Tupper; Emily Tupper; Stella Walsh; Marsha Whitney; Debbie Wood; Mary Wooden.



SEAL ISLAND NATIONAL WILDLIFE REFUGE

The season started off with a startling observation: more than 2,000 clutches of tern eggs were destroyed! The mystery of the cracked and smashed eggs was solved when a flock of about 20 Herring and Great Black-backed gulls was seen flying up from the tern colony at dawn. The gulls made early-morning raids during several days of stormy weather that prevented the island staff from protecting the terns. Once protection efforts resumed, about 1,800 pairs re-nested. At least 322 pairs of puffins nested; these produced about 280 fledglings. The high count of the summer—701 puffins in view at once—indicates that the colony is rapidly increasing.

Record numbers of puffins were observed crowded on to a favorite loafing ledge. They were readily visible via the "Puffin Cam," sponsored by Barbara's Bakery, Inc., which streamed real-time video to the Internet.



HEIDI WALKER

Common Tern

Seal Island NWR	981	
Matinicus Rock	664	
Eastern Egg Rock	1,139	
Pond Island NWR	315	
Jenny Island	680	
Outer Green Island	937	
Stratton Island	752	
Total	5,468	

Above: Number of pairs of nesting terns at Audubon's managed sanctuaries. Yellow boxes indicate numbers that increased from 2006.

▼ MATINICUS ROCK

The abandonment of the Machias Seal Island tern colony, combined with predation of tern nests in early June on Seal Island NWR, led to a dramatic influx of 800 additional pairs at Matinicus Rock (the latter two islands are just nine miles apart).

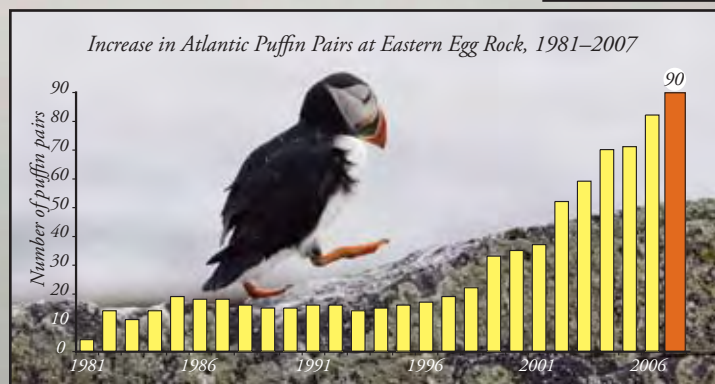


STEVE KRESS

This brought the Arctic Tern colony up to 1,790 pairs, while Common Terns increased from 292 pairs to 664 pairs. However, chronic predation from Herring and Laughing gulls combined with heavy rain in July resulted in a disappointing season overall. The huge colony produced just 621 Arctic Tern fledglings and 234 Common Tern fledglings. The Razorbill colony increased by 7% to 312 pairs—a new record high number. Puffins had an excellent year, fledging 0.89 chicks/burrow.

▼ EASTERN EGG ROCK

Puffin nesting pairs increased from 82 in 2006 to 90 pairs in 2007—including nine first-time breeding pairs. Fledging success was 0.93 chicks/pair and nearly all pairs successfully fledged a chick. A huge storm on April 16th flooded much of Egg Rock, eroding vegetation and heaping mounds of it onto the island's interior. This improved nesting habitat and prompted an influx of Common Terns. A total of 1,139 pairs nested, representing a 500-pair increase over the 2006 total and the highest number since 2001. These terns successfully fledged 1,059 chicks. Roseate Terns numbers remained stable at 118 pairs—representing more than half of Maine's population. These federally endangered birds also had an excellent nesting season, fledging 117 chicks. At least 1,700 pairs of Laughing Gulls nested this year—another all time high.



ROBERT F. BURKATY

▼ JENNY ISLAND

In early May, four plots covered with landscape fabric, straw, and woodchips were placed on over-washed habitat on the island's south end. These plots varied in length from 25 to 40 feet and provided nesting habitat for 63 pairs of Common Terns on this two-acre island—the smallest of Audubon's managed sanctuaries. The number of Common Tern nesting pairs increased to 680 this summer—the largest number since 2000—and 1,137 young Common Terns successfully fledged. Seventeen pairs of Roseate Terns (the largest number ever recorded at the island) fledged 29 young.



Landscape fabric covered with straw proved an excellent way to create new tern-nesting habitat on Jenny Island.

STEVE KRESS

OUTER GREEN ISLAND

Several habitat management projects were implemented on Outer Green Island. Black plastic spread over potentially eroding areas, and landscape fabric covered with dead grass and twigs to improve habitat by baking weed seeds. The Common Tern colony increased to 937 pairs. Roseate Tern pairs also increased to 1,600, reaching fledging age.



Arctic Tern	Roseate Tern	Least Tern
786	0	0
1,790	0	0
101	118	0
3	0	0
0	17	0
0	7	0
9	80	113
2,689	222	113

GULF OF MAINE SEABIRD WORKING GROUP DATA

Audubon sanctuaries as of the June 2007 census. Gray boxes show declines from 2006; gray boxes show declines.



COURTESY OF DURYEYA AND PEGGY MORTON

▼ DURYEYA AND PEGGY MORTON SEABIRD INTERNSHIP

The Seabird Restoration Program is proud to announce the establishment of the Duryea and Peggy Morton Seabird Internship. This Endowed Fund will provide, in perpetuity, for the hiring of one summer intern to help protect Maine seabird nesting islands. The internship recognizes the Morton's generosity and encouragement since the beginning of the project. Duryea Morton was Director of the Audubon Camp in Maine and Vice President of Education for National Audubon when the Puffin Project began in 1973. He hired Stephen Kress, Project Puffin founder, as Bird Life Instructor at the Maine Camp.

OND ISLAND NATIONAL WILDLIFE REFUGE

Pond Island season got off to a troubling start when island staff flushed a Great Horned Owl on their first visit to the island. On their first night of setting live-catch traps, interns Emily Tupper and Ryan Rice amazed to discover that they had trapped two Great Horned Owls on the same night! With the removal of two Great Horned owls, and abundant food in the Kennebec River, the 315 pairs of Common Terns enjoyed the most successful nesting season since the inception of this project in 1996. Fledging 632 young (an average of two per nest), the colony achieved the highest productivity in the Gulf of Maine.



and NWR Supervisor Emily Tupper (right) and Ryan Rice weigh and measure tern chicks to assess their health and fledging condition.

▼ STRATTON ISLAND

For the past three years, Maine's beleaguered Least Tern population has discovered the safety of island nesting, distancing themselves from mainland beaches where eggs and young too often fall prey to fox, skunk, crow, mink, and human disturbance. This year, 113 pairs nested on the island and nearly all raised a chick! The Common Tern colony increased to 752 pairs, and fledged nearly 1,000 chicks. Roseate Terns were well-represented with 80 pairs—a total second only to Eastern Egg Rock. Similar to last year, nesting waterbirds numbered: 121 pairs of Glossy Ibis, 123 pairs of Snowy Egrets, 25 pairs of Black-crowned Night-Herons and two pairs of Little Blue Herons. Despite high hatching success, most eider ducklings were again eaten by Great Black-backed Gulls—an on-going threat here and throughout the Gulf of Maine.



BILL SCHULTZ

Maine's Least Terns nested successfully this year at Stratton Island.

EDUCATION AND OUTREACH

PROJECT PUFFIN VISITOR CENTER

Located at 311 Main Street in Rockland, Maine, Project Puffin-Visitor Center opened this year on June 1. Since then, more than 10,000 people have visited. This represents an increase of 15% over last year's attendance during the same period. The award-winning, 20-minute documentary film, *Project Puffin*, produced by Ganglion Films was shown more than 500 times. In addition to the crawl-in



JOHN SNYDER

Children learn to use binoculars and make observations from a bird blind similar to those used by Audubon biologists.



STEVE KRESS

Lisa Quirk, Education Intern, demonstrates principles of "puffin grubbing" during the annual seabird celebration at Project Puffin Visitor Center.

puffin burrow and the bird blind activity, visitors of all ages enjoyed extraordinary views of puffin life both above and below ground via three robotic cameras on Seal Island NWR. The underground camera was especially exciting as it revealed family life in one puffin nesting burrow, including remarkable views of parents tending their chick from hatching to fledging. Project Puffin Visitor Center is a joint project of National Audubon Society and Maine Audubon. ❖

See Puffins in Maine!

Join Audubon interpretive guides aboard puffin-watching boat tours to Eastern Egg Rock. A portion of each ticket price is donated to Audubon for the management of Eastern Egg Rock.



To Eastern Egg Rock from New Harbor
Hardy Boat Cruises
(800) 2-PUFFIN or (207) 677-2026
email <cruiases@hardyboat.com>
www.hardyboat.com

To Eastern Egg Rock from Boothbay Harbor
R.N. Fish and Son, Inc.
(800) 633-3244 or (207) 633-2626
http://puffins.capnfishs.com

BILL SCHOLTZ

SEABIRD ADVENTURES

Project Puffin's school outreach program, *Seabird Adventures*, completed an exceptional 12th year. "Seabird Sue" Schubel presented programs to 45 classes in 15 schools, returning to some classes for six sessions. Sue's classes are designed to meet Maine's learning standards, which makes them especially popular. For the first time, several home school groups participated by bringing their students to Project Puffin Visitor Center in Rockland. Sue also visited several island schools, notably those on Isle au Haut and Monhegan Island, where many children are from fishing families. For a complete list of the 11 *Seabird Adventures* programs visit <www.projectpuffin.org/education.html>. ❖

ACKNOWLEDGEMENTS

We dedicate this issue of *Egg Rock Update* to the memory of two dear friends of Project Puffin: **Mary Johansen**, formerly of Bremen, Maine, caretaker of the Todd Wildlife Sanctuary and friend, who opened her home and provided emotional support and shelter to all Puffineers; and **Albert Bunker** of Matinicus Island, Maine, and Audubon Warden of Ten Pound Island, who safely transported staff to Matinicus Rock and transplanted puffin chicks and staff to Seal Island NWR. Both are greatly missed.

The Seabird Restoration Program is a department of the Science Division of the National Audubon Society. We acknowledge Tess Present, Kathy Dale, Peg Olsen, and Don Ekstrom for their solid support and encouragement. We also thank Seth Benz and Maine Audubon Society for providing use of the Hog Island and mainland Audubon Camp facilities and Anthony Liss and Susan Schubel for their invaluable logistic support. We also thank John Fitzpatrick and the Cornell Laboratory of Ornithology staff for continued cooperation.

In addition, we thank Brad Allen and the Maine Department of Inland Fisheries and Wildlife for permission and logistic support for our work on Eastern Egg Rock, Jenny Island and Outer Green Island. We also thank Charles Blair, Brian Benedict and the staff of Maine Coastal Islands National Wildlife Refuge for their continued cooperation for our studies on Seal Island NWR, Pond Island NWR and Matinicus Rock, which are administered by the Refuge. We also thank the Prout's Neck Audubon Society for their loyal support for our work on Stratton Island.

It is a special pleasure to acknowledge the following people for their generous assistance and gifts:

- | | | | |
|---------------------------------------|-----------------------------------|--|------------------------------|
| Robert, Pauline, and Dierdre Anderson | Holy Martyrs Church, Falmouth, ME | John McPhedran | Godfrey Rockefeller |
| Avian Haven | Robert Houston and the | Richie Patrick | Bill Scholtz |
| Robert Bateman | USFWS Gulf of Maine Program | Joe Payne, Casco Bay Keeper | Clark Smith & Rosita Hartley |
| Robert & Amy Campbell | Margi Huber & Maine Audubon | Chris Pennock | Helen & Chris Tupper |
| Susannah Corona | Bittersweet Removal Volunteers | Randy & Jean Peterson | Gerald Urquhart |
| John Drury and Lucy McCarthy | Suzi King | David Petrucelli & Prout's Neck Yacht Club Staff | Stella Walsh |
| Ann & Walter Gamble | Mark LaBarr | Herb & Pat Pratt | Kyle Westhaver |
| Gunnar Gunderson & | Lucy LaCasse | Prout's Neck Women's Auxiliary | Colin & Elizabeth White |
| Lincoln County Rifle Club | Robby Lambert | Joe & Tina Pyne | George & Kelly Wood |
| Lee Ann & Carl Hoffner | Charles & Sally Lee | | |

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Island Foundation, Inc.
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\$25,000-\$49,999

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Saul & Beth Ann Segal
U.S. Fish & Wildlife Service grants

\$15,000-\$24,999

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Barbara's Bakery, Inc.
Jingo Foundation
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SeaWorld & Busch Gardens
Conservation Fund
United Natural Foods, Inc.
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National Aquarium in Baltimore

Edward K. & Jo Carpenter

Donald F. Chandler
DownEast Energy
Mary Fellows
Russell Galen
Thomas B. Judge
Warren & Kathy Lammert
Donald Leeber, MD
Dr. & Nelson & Louisa S. Levy
State of Maine grants
Phyllis Meek
Mid-Coast Audubon Society
The Norcross Wildlife Foundation
Samuel & Wendy S. Plimpton
Roy & Barbara Pollock
Steven C. & Barbara Rockefeller
Patrick & Lynette
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