



Egg Rock Update

Newsletter of the Seabird Restoration Program
of the National Audubon Society

2016

IS THE ACADIAN REDFISH HELPING PUFFINS ADAPT TO CLIMATE CHANGE?

Once-Endangered Fish Population Increasing Near Some Puffin Colonies

It was a big surprise when Project Puffin researchers on Matinicus Rock and Eastern Egg Rock discovered plump puffin chicks deep under granite boulders this past summer. With 2016 sea surface temperatures hitting near-record highs, island biologists feared a dismal nesting season, similar to 2013 when only about 10% of puffins fledged young. But the discovery that 75% of puffin pairs on Matinicus Rock fledged chicks was surprising because just nine miles away on Seal Island NWR, only 57% of pairs fledged young. In contrast to the healthy puffin chicks at Matinicus Rock, most Seal Island chicks were underweight, and many were starving. Even worse, at Machias Seal Island on the U.S./Canadian border, researchers reported the worst-ever nesting season—only 12% of the 5,000 puffin pairs fledged a chick, and most of these were so underweight they were likely to perish at sea.

White hake and Atlantic herring are usually the principal forage fish for puffins in the Gulf of Maine, but warmer-than-usual sea surface temperatures made it difficult for puffins to find sufficient supplies of these cold-water fish.

In 2016, white hake remained important in puffin chick diets at all islands, but Atlantic herring was almost completely absent. At Seal Island NWR, white hake made up more than 75% of the puffin chick diet, but the supply was still insufficient for many chicks to thrive. In contrast, Acadian redfish dominated the puffin chick diet at Matinicus Rock and Eastern Egg Rock, making up 43% and 50% respectively of all fish delivered. At both islands, beak loads of white hake and haddock supplemented the redfish-dominated diet.

A fisheries success story

Named for the crimson color of mature adults, Acadian redfish were first detected in puffin chick diets in Maine in 2011 and have been a regular and significant part of their diets in recent years. This is notable because redfish were once persecuted so severely throughout their New England and Canadian Maritimes range that they nearly vanished. In 1996, the fish was classified as endangered by the International Union for Conservation of Nature. Acadian redfish are vul-

nerable to excessive fishing because they are long-lived fish with relatively low reproduction rates. Known widely as “ocean perch,” redfish is hailed as a fisheries success story, demonstrating how proper management under the Magnuson-Stevens Fishery Conservation Act made it possible for them to recover. Puffins feed their young the pelagic juvenile stage of redfish, as these small fish migrate from deep water to relatively shallower water near the mainland where they feed on zooplankton.



JEAN HALL

Acadian redfish helped to save the day for puffin chicks at Eastern Egg Rock and Matinicus Rock; elsewhere in the Gulf of Maine many puffin chicks starved.

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

Cool facts about Acadian redfish



- Redfish are also called “ocean perch.”
- Unregulated fishing that began in the 1930s caused their extirpation, and by 1996 they were listed as endangered.
- Their lifespan is 50 years or more.
- Breeding redfish frequent waters up to 2,000 feet deep at the edge of the continental shelf.
- They give birth to up to 20,000 **live** young.

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The 2016 Maine Research Team

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Learn how you can sponsor a Project Puffin research assistant. Contact us at: puffin@audubon.org



SHAWN P. CAREY

Like Acadian redfish, haddock is recovering from once overfished populations and becoming more abundant in puffin chick diets.

Climate, plankton and puffins

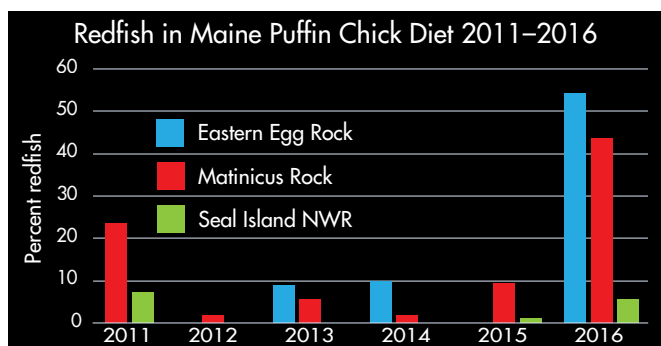
Blooms of tiny green phytoplankton (aquatic plants that contain chlorophyll) are a normal spring phenomenon in the Gulf of Maine. Phytoplankton are typically consumed by zooplankton, the dominant form being the copepod *Calanus finmarchicus*. Recent research by NOAA biologists has shown a pattern of phytoplankton blooms with increasing magnitude in the western region of the Gulf of Maine.¹ Because phytoplankton fuel the food chain that produces the forage fish eaten by puffin chicks, we may have an explanation for why puffin colonies in the western region of the Maine coast are more successful than those in the eastern region. Small forage fish such as Acadian redfish and white hake likely benefit from more abundant and healthier condition zooplankton prey near the westernmost puffin colonies such as Matinicus Rock and Eastern Egg Rock. In contrast, there has been diminished nesting success for puffins and other seabirds in eastern Maine. Since about 2004, sea surface temperature has warmed and this has affected the early spring phytoplankton bloom and consequently the forage fish available to the eastern colonies.

Seabird eggs in many 'baskets' builds climate resilience

Rare seabirds benefit from the restoration and protection of multiple sites because some sites will prove successful while others may fail. Providing Maine seabirds with many nesting islands offers more resiliency to a changing climate because some colonies may thrive while others may suffer because of differences in plankton, forage fish or other local conditions.

Read an expanded version of this article at <http://bit.ly/PuffinsRedfish>.

¹Spring bloom dynamics and zooplankton biomass response on the US Northeast Continental Shelf. Kevin D. Friedland, Robert T. Leaf, Joe Kane, Desiree Tommasi, Rebecca G. Asch, Nathan Rebuck, Rubao Ui, Scott I. Large, Charles Stock, Vincent S. Saba. *Continental Shelf Research* 102(2015)47–61.



Prior to 2011, Acadian redfish were not part of the Maine puffin diet. In 2016, the availability of redfish made it possible for most puffins to breed successfully at Matinicus Rock and Eastern Egg Rock.

WINTER HAVEN

New Marine National Monument offers winter habitat for puffins and breeding white hake

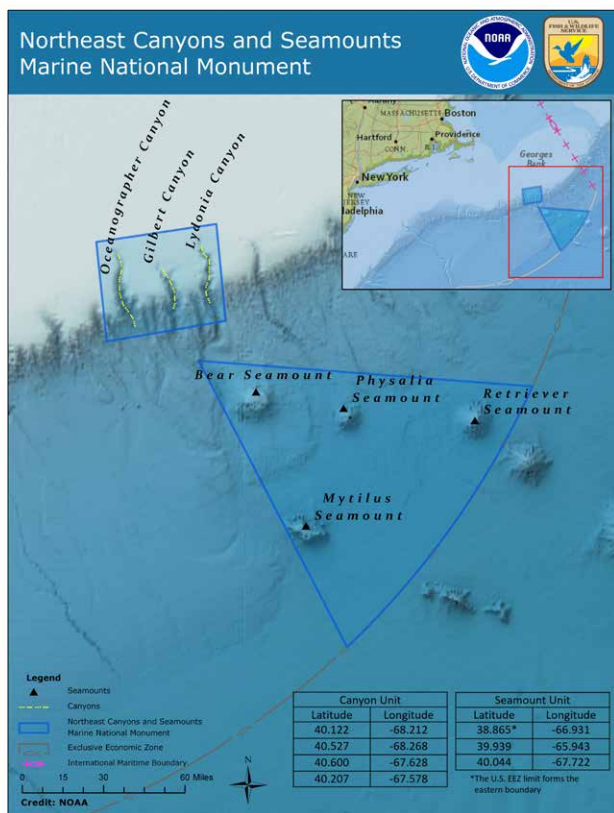
More than 21,000 seabird enthusiasts responded to the Audubon call to write letters to President Obama, urging him to establish the Northeast Canyons and Seamounts Marine National Monument.

The movement to create this first marine sanctuary along the Atlantic Coast of the United States was already underway before Project Puffin announced our discovery a year ago that the area was frequented by Maine coast puffins in winter. This discovery capped decades of mystery about the winter home of Maine puffins and was timely news for those already committed to saving the area, which is famed for pristine corals, whales and sea turtles that frequent a unique marine habitat that is home to more than 1,000 marine species.

Charismatic animals usually get most of the attention when conservation challenges arise, but another denizen of the deep canyons also deserves attention. The new Marine National Monument is also a refuge for breeding white hake that can reach nearly five feet in length, each laying millions of eggs. This area is one of the sources of the puffins' most reliable forage fish.

Tiny white hake (measuring less than ½ inch) hatch in coastal canyons such as the new marine national monument, and soon begin a remarkable, epic migration of more than 150 miles from the continental shelf to Maine's coastal waters. Their journey takes them near Maine seabird islands where puffins, terns and other seabirds intercept them to feed their chicks.

Today, white hake breed only in the deep canyons of the continental shelf. Thanks to President Obama, 4,913 square miles of pristine marine habitat—an area about the size of Connecticut—is now protected from commercial fishing, mining and other threats.



INTRODUCING TIFFANY HUENEFELDT

The Seabird Restoration Program is pleased to introduce its newest staff member—Managing Director Tiffany Huenefeldt. With a science background in chemistry and biology and a lifelong passion for birds, she comes to Audubon after residing for 18 years in Germany and Spain. Tiffany has held a variety of positions in the business sector, most recently as Corporate Development Manager for KD Pharma, one of the largest producers of Omega-3 concentrates, a position that gives her a unique perspective of the global economics associated with sustainable fisheries.



STEPHEN W. KRESS

Reflections on my first week!

Admittedly, the seabird section of every field guide I own had been, until recently, virtually unused and uncreased. So how, you might ask, is it possible that I became the new Managing Director of the Seabird Restoration Program? A vacation in Maine, my love of all things "bird," and a growing desire after 18 years abroad to return to my country, its people, and the amazing wildlife here started me on this incredible journey.

I first came into contact with Project Puffin on a spontaneous trip to Maine. Armed with binoculars and camera equipment, my local friends took my daughter and me on a Boothbay Harbor puffin-watching cruise. I was hooked. I just couldn't believe it when, shortly thereafter, I saw the vacancy announcement speaking to both my business and biology background. It seemed to be written just for me. Since then, I have had the honor of meeting and now working for Dr. Steve Kress, the father and captain of this remarkable program.

The full-time team is a small, tightly knit group of amazingly dedicated people working hard to further our knowledge of the seabird breeding colonies on seven coastal islands in Maine, sharing what is learned, and ensuring that our donors know they are appreciated. Talented interns and passionate volunteers bring the daily muscle to the summer field and camp season. It is their constant presence on the islands that allows the fragile bird populations to remain robust as we watch over invasive species, predators and the availability of forage fish.

As the unused pages of my field guide demonstrate, marine birds are often unseen and forgotten. Your interest and support ensures that this amazing program continues as we safeguard the puffins and seabirds in our constantly changing marine environment. Thank you. I'm honored to now be working with you.

Tiffany Huenefeldt

Tiffany Huenefeldt
Managing Director, Seabird Restoration Program

2016 Maine Island Highlights

LAUGHING GULL BY
BOB BUTAKY



ISLAND WEATHER

Following a very warm winter, May temperatures were cool but soon gave way to average or above average summer temperatures. Rain was a rare event in 2016; drought conditions in southern Maine led to the Stratton Island pond drying to nothing more than a mud puddle by September. One major weather event with a high-tide storm surge led to a high loss of tern nests on low-lying beaches at Stratton Island.

FOOD

The chick-rearing season started with plenty of fish to go around, but a drop in food availability was noted at all islands after the first week in July. A lack of herring was notable at most islands, with only Casco Bay's Outer Green and Jenny Islands reporting typical herring amounts in chick diets. Sand lance dominated tern diets on Stratton and Pond Islands, and hake, as usual, was dominant on Egg Rock, Matinicus Rock, and Seal Island NWR. Redfish made up a significant portion of puffin chick diets, especially at Matinicus Rock and Egg Rock.

PRODUCTIVITY

Productivity was near average for most species across all islands. Despite the drop in food availability in July, the relatively dry weather allowed tern chicks to survive, although fledging at below average weights. Puffin productivity was near average at Matinicus Rock, though later-hatched chicks did not fare as well as earlier-hatched chicks. Puffin productivity at Seal Island fell below average, reflecting the north-south gradient in the Gulf of Maine in 2016, with average productivity at southern colonies and dismal productivity at the most northern colonies.



ROSEATE TERN CHICK BY JEAN HALL

EASTERN EGG ROCK

- 852 Common, 78 Roseate, and 76 Arctic Tern pairs nested.
- 150 Atlantic Puffin nests were determined to be active.
- A recently dead beaver was discovered on the island in mid-June; how it arrived is still a mystery.
- White hake was the primary food item fed to tern chicks, while red-fish was the most abundant fish fed to puffin chicks.

JENNY ISLAND

- Twenty-one pairs of Roseate Terns, and 1,122 pairs of Common Terns nested, as well as one pair of Arctic Terns.
- Two mink disrupted the colony in early June; both were quickly trapped, limiting negative effects on productivity.
- Common Tern chicks were fed primarily herring, while Roseate Tern chicks primarily received sand lance.



JENNY ISLAND LANDING BOAT AND OBSERVATION BLIND (LEFT); AND COMMON TERN CHICKS (RIGHT). PHOTOS BY STEPHEN KRESS

STRATTON ISLAND

- An early June storm wiped out hundreds of low-lying nests, leaving 825 nests to be counted during the Gulf of Maine Seabird Working Group census.
- Common Terns fledged an average of 1 chick per nest (two to three chicks per nest is average), despite predation by Black-crowned Night-Herons.
- Maine's largest Roseate Tern colony, with 86 pairs nesting, fledged an average of 1 chick per pair.



COMMON TERN IN FLIGHT AT STRATTON ISLAND. PHOTO BY STEPHEN KRESS



SEAL ISLAND NWR CABIN BETWEEN THE POND AND THE SEA. PHOTO BY STEPHEN KRESS.

SEAL ISLAND NWR

- Tern populations held steady, with 1,309 Common Tern and 939 Arctic Tern nests.
- An estimated 510 puffin nests were active.
- Puffin productivity was below average, with 0.57 chicks fledged per pair.
- 23 Great Cormorant nests produced 37 chicks.
- Rare birds spotted at Seal Island NWR included an Ancient Murrelet and a Great Knot—both first records for Maine.



SEAL ISLAND NWR Co-SUPERVISOR, KEENAN YAKOLA, WITH PUFFIN CHICK (LEFT) AND "GRUBBING" FOR CHICKS (RIGHT). PHOTOS BY STEPHEN KRESS.



OUTER GREEN ISLAND

- A record 1,367 Common Tern pairs nested, fledging an average 1.26 chicks per nest.
- One Roseate Tern pair nested, the first since 2010.
- Sixteen pairs of Black Guillemots nested, including one pair with a 3-egg clutch.

OUTER GREEN ISLAND SUPERVISOR, SJ KWIATKOWSK, WITH ROSEATE TERN CHICK. PHOTO BY STEPHEN KRESS.



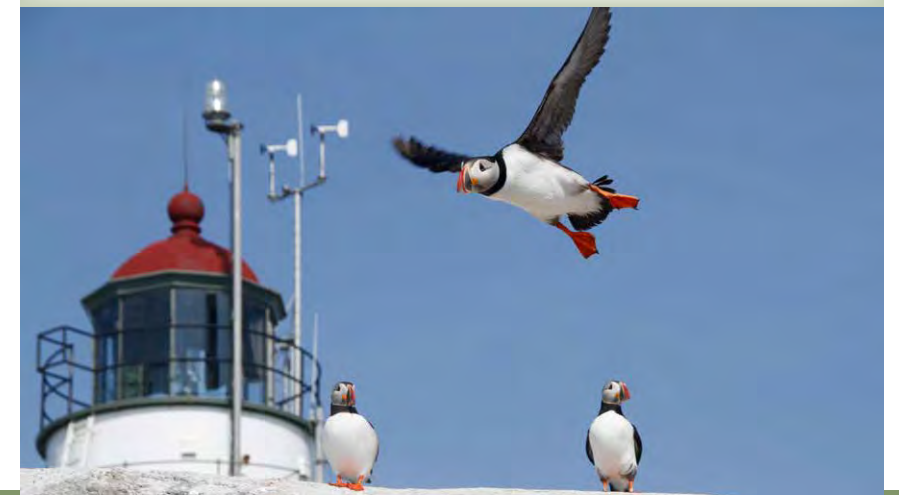
POND ISLAND NWR SUPERVISOR, RAVIN THOMASSON, WITH COMMON TERN CHICK. PHOTO BY STEPHEN KRESS.

POND ISLAND NWR

- For the first time since 1998, no Great-horned Owl predation was detected.
- A record 773 Common Tern pairs nested, fledging an average of 1.5 chicks per nest.
- Three pairs of Roseate Terns nested, although no eggs hatched.
- Six pairs of Arctic Terns nested, fledging eight chicks.

MATINICUS ROCK

- 621 Arctic Tern pairs nested, fledging 0.67 chicks per pair.
- 167 Common Tern pairs nested, fledging 1.03 chicks per pair.
- Two Common Murre eggs were found amongst the nests in the Razorbill colony; both eggs failed to hatch.
- Puffin productivity was the highest in the Gulf of Maine, with about 75% of pairs fledging chicks.
- Three Manx Shearwater nests were confirmed with chicks.



THE MATINICUS ROCK LIGHTHOUSE TOWER OVERLOOKING THE ATLANTIC PUFFIN NESTING COLONY. PHOTO BY STEPHEN KRESS.

EDUCATION AND OUTREACH

WE'VE GONE ALTERNATIVE!

Alternative energy, that is, with the installation of photovoltaic cells on the Hog Island Camp's Fish House and Bridge buildings. Friends of Hog Island contributed over \$27,000 and volunteer labor to the solar project. Solar panels, microinverters, engineering and design services to help the Seabird Restoration Program team prepare the roofs and install the cells were donated by SunPower Corporation and Northeast Smart Energy, LLC. Valued at nearly \$150,000, the project will provide 75–90% of the energy needs of both the Hog Island Camp and SRP's mainland base camp.



JONATHAN ROUSSEAU

The team of 29 Friends of Hog Island volunteers was coordinated by (left to right): Dwayne Escala, Benjamin Wong and Facilities Manager Eric Snyder.

AUDUBON BIRD CAMS

Project Puffin started its fifth year of explore.org collaboration with the installation of a new camera on Seal Island National Wildlife Refuge in the Great and Double-crested cormorant colony. It provided an up-close view of the often overlooked, emerald-eyed beauty of these birds. Unfortunately, the same waves that can shift granite slab puffin burrows took their toll on the camera. The camera could not be repaired until after the nesting season, but it will be back on the island in 2017. The other cams continued to provide an avenue for citizen scientists to collect data on diet and behavior. We watched as the Hog Island Osprey pair, Rachel and Steve, successfully raised three chicks to near-fledging stage before a much-publicized eagle raid on the nest. We certainly felt the loss of the chick "Spirit," but the successful fledging of "Eric" and "Little B," who both survived the attack, was all the sweeter.



HOG ISLAND OSPREY CAM PHOTO

Seal Island NWR seabird cams and Hog Island Osprey cam (above) are sponsored by explore.org, a direct charitable activity of the Annenberg Foundation.

PUFFIN BOAT TOURS

Summer 2016 saw the busiest year for our seabird program's tour boat outreach efforts since 1988 when Project Puffin-led tours to Eastern Egg Rock began. Project Puffin interns helped lead the tours, which reached nearly 9,000 passengers aboard tour boats from New Harbor and Boothbay Harbor to Eastern Egg Rock. This was approximately 110 boat tours over a 2 ½ -month period!



STEPHEN KRESS

Education intern Sammi Ocher (right) imitates the wing-drying pose of a cormorant during a puffin-watching tour to Eastern Egg Rock.

INTERNATIONAL FELLOWSHIPS

Project Puffin welcomed three international fellows to Maine in 2016. With support from the Josephine Daneman Herz International Fellowship and Audubon's International Alliances Program, the three seabird biologists brought years of experience to Project Puffin's program in Maine and learned methods for seabird conservation that will be helpful in their home countries. Miguel Corrales and Fernando Solís are biologists with Grupo De Ecología y Conservación de Islas (GECI) based in Ensenada, Mexico. They are part of the collaborative program between GECI, Audubon's Seabird Restoration Program and the Cornell Lab of Ornithology that is working to restore seabirds to seven Baja California islands. Jonathas dos Santos came to Maine this summer from the Coastal Marine Birds Program in Northeast Brazil. He is a veterinarian with an interest in the health of migratory terns and other marine animals in coastal Brazil.

HOG ISLAND AUDUBON CAMP

This year's lineup of Hog Island sessions continued to emphasize puffin and other seabird conservation with courses such as Maine Seabird Biology & Conservation, Hands-on Bird Science, Joy of Birding, and for young birders, Coastal Maine Bird Studies for Teens. Some of the country's best-known birders and ornithologists such as Scott Weidensaul, Pete Dunn and Kevin McGowan led these courses with participants in the conservation program getting first-hand experience conducting a seabird census and restoring puffin habitat.

PUFFIN SOCIETY TRIP

Fifteen members of the newly formed Puffin Society joined our first event last

July. Dr. Steve Kress presented a program update at our Project Puffin Visitor's Center in Rockland, Maine, that was followed by a private dinner reception overlooking Penobscot Bay. Early the next morning, Steve narrated a boat trip to Egg Rock. Upon landing, the group was met by the research interns and island supervisor Kelsey Navarre, who led society members to the island bird blinds for close-up views of nesting puffins and terns.



**Join the Puffin Society
(annual gift of \$1,000 or
more) and receive an
invitation to visit Eastern
Egg Rock in July 2017.**

2015–2016 CONTRIBUTORS

Contributions listed were received from October 1, 2015 through September 30, 2016. Space restrictions prevent us from listing our 1,310 Supporter-level friends. Every donor is important to us and we sincerely regret any omissions. Your continuing participation makes our work possible.

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