



Egg Rock Update

Newsletter of the Seabird Restoration Program
of the National Audubon Society

2013

CLIMATE CHANGE AND CHANCE

Recovering fish stocks may help puffins adapt to warming waters

During the past two seasons, Project Puffin documented lower nesting success of Atlantic Puffins in the Gulf of Maine. At Matinicus Rock (MR) and Seal Island National Wildlife Refuge (SINWR), where puffin nesting burrows are shallow enough to check for eggs, Project Puffin staff discovered that in 2013, there were only two-thirds as many nests as in 2012. At these islands, puffin eggs hatched about two weeks later than usual, and many abandoned their eggs. Only about 10 percent succeeded in rearing a chick.

Similar nesting failure occurred at Machias Seal Island, on the U.S.-Canadian border, where only 15 percent of the 6,500 puffin pairs produced a fledgling in 2013. These events suggest that

Puffin decoys helped to encourage the first translocated puffins to land on Egg Rock in 1977. Today, decoys encourage puffins to land where researchers can see the fish that are intended for their chick.

puffins were in poor condition following the stressful winter of 2012–2013; many either took a year off from breeding or died at sea over the winter. Because puffins may live for more than 30 years, taking an occasional nesting season off is their way of protecting themselves.

A surprising twist to the disappointing 2013 nesting season occurred at Eastern Egg Rock (EER), Maine's southernmost puffin colony, where there were seven more pairs nesting (104 pairs in 2012 compared to 111 in 2013). Most pairs fledged chicks.

Where are the fish?

A new scientific study is helping to solve this mystery. White hake and Atlantic herring are among several species that frequent the Northeast Continental Shelf (which includes the Gulf of Maine) that are shifting their ranges. Seventeen important fish populations (stocks) are moving north at the surprising speed of 1 to 8 km per year, another seventeen are moving to deeper, cooler water and eight stocks are moving both north and into deeper water.

The fact that white hake and Atlantic herring are among the species affected by warming water has huge implications for the future of puffins and other fish-eating seabirds in Maine. These two fish make up the bulk of the summer diet for puffins and terns, but white hake are moving north and into deeper, cooler



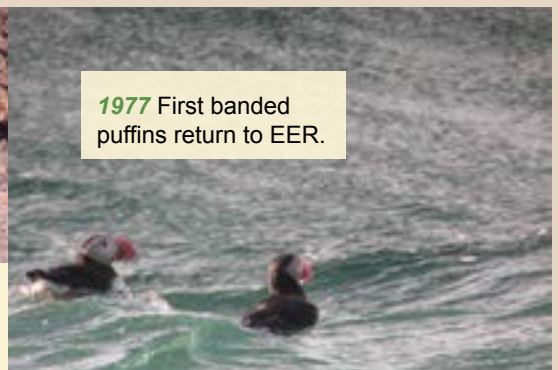
Deborah Z. Jackson

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

PROJECT PUFFIN: 40 YEARS OF PROTECTING AND RESTORING SEABIRDS



1973 First six of 954 puffin chicks brought from Newfoundland to reestablish the former colony on Eastern Egg Rock (EER).



1977 First banded puffins return to EER.



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water. Atlantic Herring are not moving farther north, but they are also affected by warmer water and they are changing the areas where they occur.

Fish can shift their range to find more suitable water temperatures, but seabirds have fixed limits as to how far they can travel from nesting islands. Longer fishing trips require the birds to burn more energy to find sufficient food for themselves and their young.

Why were Egg Rock puffins successful?

Multiple colonies reduce the risk of predators wiping out all of the species in a region. This conservation strategy can also help birds adapt to climate change, because each puffin nesting island has its own distinct “signature” of forage fish. For example, at SINWR and MR (just nine miles apart) parent puffins bring back similar types of food. In contrast at EER, located 35 miles southwest of MR, puffins probably frequent different fishing holes where they encounter a somewhat different mix of forage fish. Comparison studies show that Egg Rock puffins have found ample quantity of the same kinds of fish over the past nine years, but since 2010, MR puffins have brought more varied meals to their chicks.

Can Maine puffins adapt?

While puffin parents are quick to capture any small fish or marine crustacean to feed their chicks, some foods are nutritionally much better for the chicks than others. The importance of a prey item depends upon the calories it provides, its size and shape, and even upon the number of prickly spines that makes it hard to swallow.

Whether Maine puffins can adapt to climate-linked changes in fish populations depends in part upon changes in white hake and herring populations, and how fast changes occur. It also depends on chance factors, such as which fish species will reoccupy the vacated habitat near nesting islands. And, it depends upon our ability to wisely manage fish stocks—existing and future stocks that will likely shift into Maine coast water from the south. Some of these southern species could become increasingly important to seabirds.

What is changing in the puffins' world?

During the spring and summer of 2013, fertility of the Gulf of Maine was also lower than usual, perhaps due to a very weak, undetectable spring phytoplankton bloom that lead to a dearth of

the nutritious copepod *Calanus finmarchicus* in most areas. This cold water species is the primary food that fattens puffin prey such as herring and hake.

“Chance events” may help puffins adapt

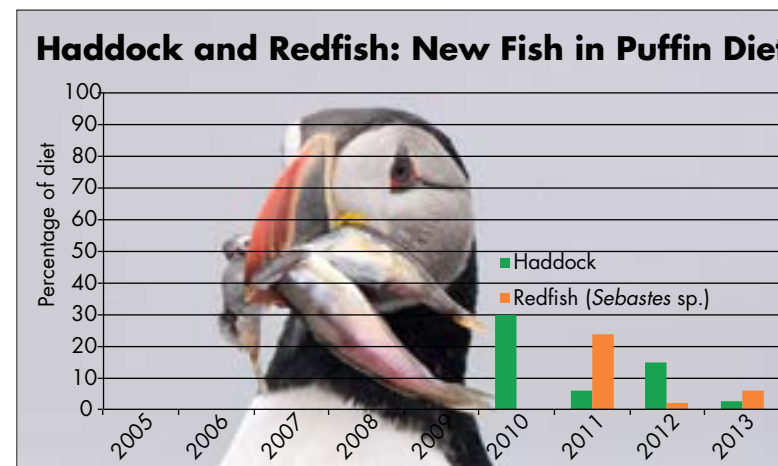
Two new kinds of fish are showing up in puffin chick diets—redfish, or “ocean perch” (*Sebastes* spp.) and haddock, both greatly overfished in previous decades. Now, effective fishery management regulations are giving them a chance to rebuild their numbers and populations in the Gulf of Maine are increasing. Fortunately, neither species appears to be shifting northward or into deeper water. This timely recovery of haddock and redfish stocks may prove to be good news for puffins.

If white hake moves out of reach of the nesting islands, perhaps a well-managed herring population can make up for the loss. New fish from warmer waters will also enter the puffins’ domain. These unknowns point to the huge role of chance events associated with climate change. For example, this summer, another wide-bodied southern fish, the Atlantic moonfish (*Selene setapinnis*), showed up in Maine tern nests for the first time. However, moonfish proved of little

value as the tern chicks could not swallow them.

A recent world review recommended leaving 33 percent of maximum fish biomass in the oceans to sustain seabird populations. This would help puffins and other fish-eating birds adapt to chance changing conditions in the Gulf of Maine.

Read more at <http://projectpuffin.audubon.org/climate-change-and-chance>
 Acknowledgments: Kevin Friedland, NOAA for review of the ecological content of this article and Christopher O’Neal for statistical tests.



PROJECT PUFFIN OUTREACH HIGHLIGHTS

- More than 4 million views of the Audubon/Explore.org high-definition cams focused on puffins, terns and ospreys.
- More than 9,000 visitors viewed the live cams, seabird art exhibits and lectures at Project Puffin Visitor Center in Rockland.
- 7,025 puffin watchers on the “Hardy Boat” from New



- Harbor and “Cap’n Fish” from Boothbay Harbor learned about puffins and other seabirds on day trips led by Project Puffin narrators.
- Seabird Adventures, our school outreach program, provided hands-on activities about seabirds and coastal conservation to 1,361 children in 19 Maine schools with many children receiving multiple visits from outreach teacher “Seabird Sue” during the 2012–2013 school year.
- Ten sessions at the Hog Island Audubon Camp were filled with 355 participants who attended the popular six-day programs for adults, teens, and families.

PROJECT PUFFIN: 40 YEARS OF PROTECTING AND RESTORING SEABIRDS (Continued)

<p>1980 First use of social attraction results in Common and Arctic terns nesting at EER after a 44-year absence.</p>	<p>1981 Four pairs of puffins nest on EER after a 96-year absence.</p>	<p>1982</p>	<p>1984 Restoration of puffins begins on Seal Island NWR.</p>	<p>1984 Matinicus Rock light-house becomes Project Puffin station.</p>	<p>1985</p>	<p>1986 Stratton Island field station opens (Prout’s Neck, Maine).</p>	<p>1987</p>	<p>1988 First international seabird restoration project begins in the Galapagos Islands to help endangered Dark-rumped Petrels.</p>	<p>1989 Arctic and Common terns recolonize Seal Island NWR after a 25-year absence.</p>	<p>1990</p>	<p>1991 Jenny Island field station opens near Cundy’s Harbor, Maine.</p>	<p>1992 Seven pairs of puffins nest on Seal Island after a 105-year absence.</p>	<p>1993</p>	<p>1994</p>
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Photo by Darreck Z. Jackson



Maine Island Updates



2013 ISLAND HIGHLIGHTS

Whe summer **WEATHER** was typically wet and foggy. Tropical Storm Andrea soaked Maine's tern colonies on June 7th and later storms caused further havoc for tern chicks. The rain also favored the rampant growth of bindweed over puffin and tern habitat.

PREDATORS affected productivity on Jenny Island where two minks and a Black-crowned Night-Heron raided the tern colony. Peregrine Falcons visited several islands regularly, causing colony disruptions and taking adult puffins and terns.

FOOD was relatively abundant for terns on all islands this summer, but not for puffins or black guillemots on Matinicus Rock and Seal Island. In contrast, Egg Rock puffins found ample food. White hake and herring dominated puffin chick diet, especially in early summer. Butterfish was scarcer than in 2012, but the even more difficult-to-swallow Atlantic moonfish showed up for the first time in tern nests on all seven islands.

Hog Island Audubon Camp

40 participants from Road Scholar helped to remove invasive plants and clean up marine debris such as lobster trap buoys at Eastern Egg Rock and Stratton Island.



Eastern Egg Rock

Roseate Terns increased 17% in number since 2012, to 83 nesting pairs with 77 fledglings. Puffins increased to 111 nesting pairs.



ATLANTIC PUFFIN BY ROBERT BRINAY

Jenny Island

A total of 829 Common Tern pairs nested and fledged an average of 1.09 chicks per pair this summer. Seven pairs of Roseate Terns nested, producing five fledglings.



Outer Green Island

The Common Tern colony reached a record high of 1,143 pairs, which produced 1.15 chicks per pair (1,314 chicks). Ten percent of the colony (112 pairs) nested on the outdoor carpet placed down as a weed barrier.



Pond Island N.W.R.

The Common Tern colony reached a record high of 692 pairs—a 16% increase from 2012. They fledged an average of 1.25 chicks per nest (865 fledglings)—the result of a diet dominated by sand lance and herring.



Matinicus Rock

Arctic Terns benefitted from abundant hake and herring early in the season attaining the colony's highest nesting success since 2003; they fledged an average of 0.85 chicks per pair.



Stratton Island

110 Least Tern pairs nested, fledging at least 79 chicks—the highest in recent years.



Seal Island N.W.R.

Half of the 21 Razorbill pairs fledged a chick—a record high number of pairs with the best nesting success yet. In contrast, Black Guillemots fledged just 0.20 chicks per pair; food for chicks was scarce and many died of starvation.



Read about more island updates at <http://projectpuffin.audubon.org/island-highlights>

PROJECT PUFFIN: 40 YEARS OF PROTECTING AND RESTORING SEABIRDS (Continued)

1996 Pond Island NWR field station opens near the mouth of the Kennebec River, ME.



1996 Devil's Slide Rock project for Common Murres begins in Half Moon Bay, CA.



2002 Outer Green Island tern restoration begins near Portland, Maine; Common Terns nest.

PHOTO BY ALISON KOEHLER



2006 Project Puffin Visitor Center opens in Rockland, Maine.



PHOTO BY CAROLINE POUL

2009 Common Murres nest and first Manx Shearwater chick at Matinicus Rock.

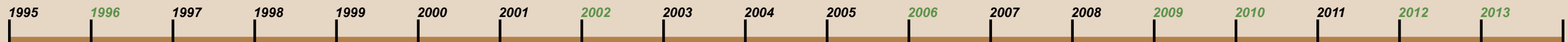
2010 Hog Island Audubon Camp reopens.



2012 Audubon and Explore.org launch HD cams to view osprey, puffins, and terns.

2012 Baja Seabird Restoration Program begins in Mexico.

2013 Plans start for Audubon Seabird Institute.



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