

From Puffins to Petrels

Text and photographs by Stephen W. Kress

Seabird colony restoration techniques developed off the Maine coast may offer new hope for threatened species

This coming July I'll be scanning the rugged shore of Seal Island in outer Penobscot Bay, Maine, with the hope of glimpsing an Atlantic puffin slipping into the boulders with a beak-load of herring. The sighting would mark the end to a nearly century-long absence of the species from Seal Island—once the puffin's stronghold on the Maine coast. It would also highlight another success for the National Audubon Society's "Project Puffin," an 18-year effort to reintroduce these seabirds to the area. Though puffins are not an endangered species, the techniques for reestablishing their colonies are directly applicable to other colony-nesting species, some of which are nearing extinction.

My interest in Maine seabirds dates back to 1969 when I became an ornithology instructor at the Audubon Camp on Hog Island in Muscongus Bay. While reviewing the literature on the birds of the area, I discovered the accounts of Arthur Norton, ornithologist and former curator of the Portland Society of Natural History. Norton told of the seabird colonies that once flourished in Muscongus Bay—an area where many northern species, such as Arctic tern, black guillemot, and Leach's storm-petrel, reached the southern limits of their ranges. His descriptions of the puffin colonies on nearby Eastern and Western Egg Rock both intrigued and saddened me. The birds had not nested on either island for nearly a century.

Norton explained that people took puffin eggs, and also trapped the birds for meat and to pro-

vide feathers for hats. Local fishermen would spread herring nets over the rocks after the puffins had retreated to their nest burrows for the night. As the birds emerged the next morning, they would become tangled in the nets, easy prey for the fishermen. Most of the breeding birds were trapped, which led to the puffin's extirpation from both islands by about 1880. Hunting and trapping also eliminated puffins from three other Maine coast islands (including Seal Island) by 1887.

Norton also mentioned the great flocks of Arctic and common terns that once nested on the Egg Rocks. These graceful birds were slaughtered for their feathers from 1886 to 1900. Norton's accounts of puffin and tern colonies on the Muscongus Bay islands contrasted sharply with the bird communities that I was showing to Audubon campers at these same islands in the late 1960s. Instead of puffins and terns, a trip aboard the the camp's boat, *Puffin III*, produced only great black-backed gulls, herring gulls, double-crested cormorants, and common eiders. But my imagination brought the puffins back to life at Egg Rock. In my mind I could see them darting in from the sea on quick wings, beaks loaded with fish for their young hidden under the boulders.

The island seemed impoverished by the loss of its original birdlife. I began wondering how I might go about restoring the puffins and terns. I researched the life history of the puffins, and the more I read, the more I became convinced that these "sea parrots" could be restored to their





Puffins nesting on the tiny islands of Muscongus Bay, Maine, were killed by the thousands for their meat and feathers. By the turn of the century, the birds' once-massive breeding colonies had vanished.

original breeding place at Egg Rock. The fact that puffin chicks usually returned to nest at the same island where they hatched was already well established, but no one knew for certain whether the chicks' homing skills were innate or learned.

I developed a plan to take puffin chicks from a thriving colony in Canada and attempt to reintroduce them to Muscongus Bay. The chicks would be moved when about eight days old, and hand-reared until they reached fledging age at about 42 days. The young would then be released at Eastern Egg Rock. I hoped that they would accept the tiny island as their new home and return there several years later as breeders to found a new colony.

The plan seemed simple enough, and gaining support from within the Audubon Society was relatively easy. To make the project a success, however, I would have to convince others. No one had restored a seabird colony before, and many saw such work as intrusive, high-risk, and of doubtful value, since puffins still numbered in the millions elsewhere.

I argued that my plan was more than just an effort to restore puffins to one of their historic breeding places or to create a popular teaching resource for the Audubon Camp. I believed that if the puffin project were successful it would become a valuable model for other seabird restoration efforts—especially species that faced imminent extinction from excessive hunting, pollution, or predation by exotic mammals.

I worked with David Nettleship of the Canadian Wildlife Service, and together we developed a plan to collect puffin chicks on Great Island, Newfoundland, where approximately 160,000 puffin pairs nest, and move them to Egg Rock. The Newfoundland colonies in Witless Bay contained ample pairs to spare nestlings for the reintroduction effort.

The project started small, with only six puffin chicks transplanted from Great Island to Muscongus Bay in 1973. But from 1974 through 1981, when we stopped bringing puffin chicks to Eastern Egg Rock, 774 puffins were moved there. Ninety-five percent fledged successfully, thanks largely to the remarkable dedication of the research assistants who lived on the island and shared my dream of restoring seabird colonies.

Between 1974 and 1977 we experimented with several different burrow designs for rearing the chicks. At first, we tried building the burrows with ceramic chimney tiles, but found that they would overheat and also stain the birds' breasts with accumulated excrement. We then hand-excavated 100 two-foot-deep soil burrows, only to find that they would fill with water during heavy rains and almost drown the chicks. So we filled the holes and started using sod blocks to build above-ground

burrows. This has been the most successful design.

The transplanted puffins were due to begin returning to Egg Rock in 1977, but I was concerned that even if they did return, they would not come ashore. Typically, puffins spend their first two or three years at sea. When they do come ashore in midsummer, they usually land on the loafing ledges of existing colonies where they socialize and begin looking for future nesting places. But Egg Rock had no puffin colony to lure them in. To solve that problem, we carved and hand-painted some larger-than-life puffin decoys and set them out on prominent rock outcrops where returning puffins would be sure to see them.

Our first returning puffin showed up at Egg Rock on June 12, 1977. The bird landed in the water near the island, but soon came ashore to inspect the decoys on the highest rock ledge. It was easily identified by its two leg bands, one metal, the other colored plastic, which we had placed on all the released puffins. We eventually identified 147 of them. Many were sighted at Matinicus Rock, and some had traveled all the way to Machias Seal Island, about 135 miles east of Egg Rock.

Although we visited Great Island, Newfoundland, several times to see if any of the transplanted puffins had returned to their birthplace, we never found any there. We concluded that the transplanted birds were cruising Maine's outer islands between the ages of two to four, and then settling down to breed by the time they were five. Once they reach breeding age, puffins seldom venture to other colonies.

Transplanted puffins were often seen at Egg Rock between 1977 and 1980, but the next important landmark for the project eluded us until 1981, when Evie Weinstein spotted a puffin with fish circling Egg Rock. We both watched breathlessly as it scrambled into the boulders with its catch. A food delivery could mean only one thing—puffins were breeding again on Egg Rock after a 100-year absence!

Five puffin pairs bred at Egg Rock in 1981, including one unbanded pair. Ten years later, in 1991, 16 pairs nested there. While the colony has not shown a dramatic increase, the numbers remain remarkably stable from year to year, and our studies show that most pairs rear their young successfully. In 1991, 24 of the 32 breeding birds were wearing bands identifying them as transplanted puffins from Newfoundland. The eight unbanded breeders demonstrated that the colony is also gaining recruits from other colonies or from young produced at Egg Rock.

While waiting for the puffins to return to Egg

Rock, I also launched a program in 1978 to restore an Arctic tern colony, which had disappeared from the rock in 1936, displaced by growing numbers of herring and great black-backed gulls. To assist both the puffin and tern restoration efforts, the U.S. Fish and Wildlife Service (USFWS) had eliminated most breeding gulls from Egg Rock by 1975, but as late as 1978, terns had not recolonized the island. To encourage them, I asked Donal O'Brien, a noted bird carver and conservationist, to create a tern model that we could replicate to attract other terns. In the spring of 1978 we set out 33 decoys and watched excitedly as terns immediately settled among them.

We set out the models again in 1979 and 1980, and played nonstop recordings of tern courtship calls. In 1980 our efforts were rewarded when 80 pairs of common and Arctic terns nested among the decoys and tape speakers. The colony has grown dramatically since then, with nearly 1,000 pairs of common and Arctic terns nesting there in 1991, alongside 50 pairs of endangered roseate terns and at least 156 pairs of laughing gulls, which are uncommon in Maine.

Eastern Egg Rock is owned by the Maine Department of Inland Fisheries and Wildlife and managed by the National Audubon Society as the Allan D. Cruickshank Wildlife Sanctuary. The island demonstrates how active seabird management can revive an historic assemblage of seabirds. But since our primary goal was to develop techniques with broad application, I was eager to see if we could replicate our Egg Rock successes on other islands.

With this in mind, I set out in 1984 to apply some of our techniques at Seal Island, a 100-acre National Wildlife Refuge in outer Penobscot Bay. According to Norton, Seal Island once held the largest breeding colony of Atlantic puffins on the mid-coast of Maine, and also one of the principal Arctic tern colonies. But puffins had disappeared from the island in 1887 and Arctic terns had not bred there since about 1950.

Because the U.S. Navy used Seal Island as a bombing target in the 1950s, and unexploded ord-



nance still remains in the ground, it took us three years to obtain permission to set up a field camp. We were finally ready in July 1984 to resume the transplant program, bringing puffins from Great Island, Newfoundland, to Seal Island. The Canadian Wildlife Service continued its cosponsorship of the project. David Nettleship helped us to collect puffin chicks on the slopes of Great Island, while the USFWS gave us permission to conduct research at Seal Island and assisted us again with gull control.

Between 1984 and 1989, we successfully fledged 912 transplanted puffin chicks using the rearing techniques developed at Eastern Egg Rock. At first the results of this ambitious effort were disappointing, but the project took a positive shift in 1990 with a strong return of the 1988 puffin group. By 1991 we had sighted 113 of the translocated Seal Island puffins—72 from the 1988 release and 29 from 1989.

During the spring of 1991, as many as 30 puffins were seen at one time on Seal Island, and many were exploring rock crevices, a behavior that often precedes breeding.

While working to reintroduce puffins on Seal Island, we also tested our tern restoration techniques. For six

Project Puffin director Stephen Kress (above) places a puffin chick in one of the artificial nest burrows at Egg Rock. Young puffins typically spend their first two or three years at sea before returning to the place where they fledged. Below, a puffin Kress released at the same site years earlier perches next to some carved wooden decoys.





The restored puffin colonies teach the vital lesson that habitats are more complete, interesting, and viable when they contain their fullest complement of wildlife.



Puffin chicks were collected on Great Island, Newfoundland (above), where the birds are abundant, and moved to Maine. Kress also tried his reintroduction techniques with Arctic terns (above right), but instead of transporting chicks from other colonies, he set out decoys and played tape recordings of active colonies to lure in potential nesters.



years we controlled gull populations, set out decoys, and played tape recordings of tern colonies. Finally, in 1989, we were rewarded when 16 pairs of Arctic terns and one pair of common terns nested among the decoys. The colony increased to 115 pairs of Arctic and 15 pairs of common terns by 1990, then increased dramatically the following year to 281 pairs of Arctic, 369 pairs of common, and four pairs of roseate terns.

The potential nesting space for terns on 100-acre Seal Island is truly impressive. Equally important, our studies of tern feeding habits showed that the island has abundant food for the birds. In the 1991 breeding season we found that nearly every tern egg produced a fledgling—an impressive success ratio.

Since the earliest days of the puffin project, we had hoped to apply the techniques learned in Maine to help some of the 30 endangered seabird species. With the help of a Rolex Award for Enterprise grant in 1987, we finally had our chance. The following year we launched a program in the Galápagos Islands. The Galápagos National Park and the Charles Darwin Research Station invited Richard Podolsky and me to test our seabird attraction techniques to help the endangered dark-rumped petrel in the highlands of Santa Cruz Island.

Dark-rumped petrels are crow-sized seabirds that share many behaviors with puffins. They usually breed for the first time when they are five years old and lay one egg in an excavated burrow. Both parents take turns incubating the egg and feeding the chick. Unfortunately, humans have introduced many predators to the Galápagos

Islands, either accidentally or deliberately—Norway and black rats, dogs, cats, pigs—and these are devastating the petrel breeding colonies. Petrels are vulnerable to predators during their entire 50-day incubation period as well as their 110-day chick-rearing period. In some years all the young petrels on the island are destroyed by predators.

To reduce the petrel predation, we tried to encourage the birds to nest in areas without predators, or in areas where the predators could be controlled more easily. Assisted by the Library of Natural Sounds at the Cornell Laboratory of Ornithology, we produced a set of experimental tapes of petrel vocalizations. We tested them in the field to see which ones would be most effective for attracting petrels. A tape recording of petrel colony sounds re-recorded over itself proved to be the most seductive, perhaps because it sounded like a large, thriving colony. During 1988 and 1989 we hand dug 160 burrows within an extinct volcano in the Santa Cruz highlands, where a few petrels were making a last stand against the exotic mammals. The new burrows attracted petrels immediately. By the fourth year of the study, six pairs successfully nested in the new burrows and many other pairs showed promise of nesting there in the future.

Our study suggests that wildlife managers can minimize predator damage by influencing where the birds nest. The attraction techniques we are developing could someday be used to encourage dark-rumped petrels to nest on an island that is completely free of exotic predators, making intensive, long-term predator control unnecessary.

Seabirds are often reluctant to pioneer new





Kress took the seabird colony restoration techniques developed in Maine to the Galápagos Islands (above), where he tried to encourage endangered dark-rumped petrels (left) to nest in protected areas. Above right, researchers adjust a tape player used to lure petrels to new nest sites.



nesting areas, but our studies demonstrate that by attracting the birds with decoys and tape recorders we can overcome their natural reticence and encourage them to establish new colonies. Such signals give birds the impression that the habitat is safe for breeding. Even highly colonial birds such as terns and puffins will take a chance on breeding in a new area if they think that large numbers of their species are already committed to the site. And once a bird is committed, it may breed at the site for the rest of its life, which may be more than 20 years.

Wildlife managers can use these techniques to encourage seabirds to recolonize former breeding sites, though the outcome of these efforts cannot be assured. Survival of transplanted birds varies greatly from year to year (as does survival of wild birds) and large numbers of young birds must be moved to the new area to have any hope for even a modest success. Establishing a seabird colony may take a decade or more, whether a project uses translocation of young or attraction of adults. The first years of any reintroduction project will test the endurance of researchers and supporters, but the Egg Rock puffins demonstrate that a puffin colony can be restored through a committed effort over a long period.

The future for puffins and terns on the Maine coast is brighter today than it was a decade ago. The additional colonies, on islands separated by miles of open water, minimize the chance that all the breeding seabirds in the area could be devastated by disasters such as disease, predation, and pollution. New colonies also broaden the opportunities for public viewing. Like whales, porpoises, and other charismatic sea life, puffins

capture the enthusiasm of thousands of people who venture out on special seabird-watching tours each year. The restored puffin colonies teach the vital lesson that habitats are more complete, interesting, and viable when they contain their fullest complement of wildlife.

Ten years after the first reintroduced puffins returned to breed, the Egg Rock colony has grown and appears stable. And the same techniques that were successful there are working at Seal Island. Today when puffins whip past a crowd of Audubon campers aboard the *Puffin III*, and thousands of terns lift from the island in a unified movement, I am convinced that this small corner of the ocean is more secure and interesting thanks to our efforts. ■

Stephen W. Kress is a biologist with the National Audubon Society and an associate of the Cornell Laboratory of Ornithology. In addition, he is director of the Puffin Project, which he started in 1973.

Adopt a Puffin

Project Puffin is supported entirely by private contributions to the National Audubon Society's Fratercula Fund. Individuals or groups can help the project by "adopting" one of the Eastern Egg Rock puffins. For each \$100 donation, the Project Puffin staff will select a puffin to sponsor. Participants receive a certificate with a color photo of their puffin and a subscription to the group's annual newsletter, Egg Rock Update. Contributions to the project are tax deductible.

For more information, write to: Project Puffin, National Audubon Society, 159 Sapsucker Woods Road, Ithaca, New York 14850.