



Newsletter of the Fratercula Fund of the National Audubon Society

## SEAL ISLAND PUFFINS HAVE RETURNED!

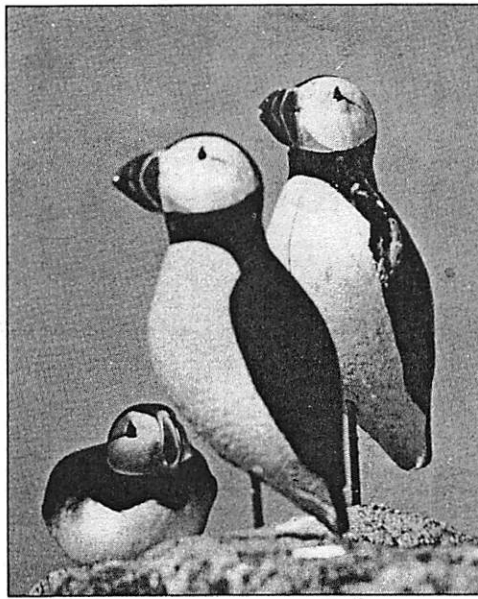
*The effort to restore Atlantic Puffins to Seal Island took a positive turn this summer with the return of 52 transplanted puffins.*

**D**uring the days of excessive hunting for food and feathers, puffin numbers dropped substantially on the Maine coast. By 1887, Puffins were extirpated from Seal Island, and by 1901, only one pair remained on Matinicus Rock (located six miles west of Seal Island). The National Audubon Society's Puffin Project was started in 1973 to learn how to restore puffins to their former nesting islands.

Between 1984 and 1989, the Puffin Project transplanted 912 Atlantic Puffins from Great Island, Newfoundland to Seal Island National Wildlife Refuge in outer Penobscot Bay, Maine. The birds were hand-reared in sod burrows by student interns, and then banded and released with the hope that they would return to Seal Island in later years to start a new colony.

Although the puffin restoration project had proved successful at Eastern Egg Rock, before the summer of 1990 the results from Seal Island had been disappointing: in previous years only 6 of the 534 puffins transplanted between 1984 and 1987 had returned. Apparently chick survival at sea varies greatly from year to year due to uncontrollable factors such as weather, food abundance, or pollution.

However, several years' efforts of transplanting puffins paid off this summer with the return of one-quarter of the 1988 transplant group. In early June, Puffin Project observers noticed a dramatic increase in two-year-old puffins (puffins spend their first two to three years at sea without returning to land). Many of the young birds sighted at Seal Island and nearby Matinicus Rock were wearing yellow plastic bands with engraved black numerals that clearly identified them as returning transplanted Seal Island puffins. A total of 52 Seal Island transplants were sighted this summer. Forty-seven of these birds were two-year-olds that were transplanted from Newfoundland to Seal Island in 1988. These represent 25% of the 190 puffins transplanted that year. The other five birds



were puffins transplanted to Seal Island in 1987. Of the 52 puffins sighted this summer, 32 were observed at Matinicus Rock, 21 were observed at Seal Island, and 10 were observed at both islands. In addition to banded birds, many unbanded puffins were seen. These were probably young produced on Machias Seal Island or Matinicus Rock.

Some of the transplanted puffins were also seen at other Gulf of Maine islands: 24 were sighted at Petit Manan Island, about 50 miles east of Seal Island, and 10 were sighted at the large puffin colony on Machias Seal Island, 84 miles east of Seal Island.

On Seal Island, the returning puffins spent most of their time sitting among decoys that were set in place atop large rock formations. Some of the

birds also explored rock crevices, a behavior that suggests they are beginning to prospect for nesting burrows. Puffins were observed on land each day from June through mid-August, a three-fold increase in frequency over 1989. As many as 12 puffins were seen at the same time!

The 1991 field season at Seal Island promises to be full of more surprises. It is likely that even more puffins will return to the Maine coast from the 1988 transplant cohort, since many young do not return until they are three years old. Hopefully, we will also see many birds returning from the 190 fledglings transplanted in 1989.

Atlantic Puffins usually breed for the first time when they are four or five years old, so nesting will probably not occur at Seal Island before 1992. Still, the events of this summer give us optimism that within a few more years puffins will soon reclaim this once important bird island.

*The Puffin Project is co-sponsored by the National Audubon Society and the Canadian Wildlife Service, in cooperation with the U.S. Fish and Wildlife Service which maintains Seal Island as a National Wildlife Refuge. ■*

## EGG ROCK PUFFINS

The Eastern Egg Rock puffin season got off to an exciting start on June 3rd. Within minutes of placing a pair of wooden decoys in their usual position atop a massive granite dome, three two-year-old puffins promptly began inspecting the decoys.

Young puffins were conspicuously absent at Egg Rock for the past several summers, so the sudden appearance of the three birds on the first day of the season was a great kick-off for this remarkable field season. Although none of the yellow-banded Seal Island puffins

(see page 1) were observed at Eastern Egg Rock, this small colony had its own share of exciting puffin moments. Young unbanded puffins (possibly some native young) were conspicuous at the island most of the summer. They sat with adults on favorite loafing rocks and were frequently seen prospecting for new burrows.

Fifteen pairs of puffins nested at Eastern Egg Rock this summer, an increase of one pair over the 1989 total. Strong mate and burrow fidelity are the rule for most of the pairs. For example, three pairs have kept the same mate and shared the same burrows for seven consecutive years. In total, 13 of the 15 pairs have had the same mate for at least the past two years, and they have spent an average of 4.7 years together.

The loss of a mate is the main reason for the formation of new pairs, but there are more than a few examples of pairs breaking up and recombining even when both members of the pair are alive and return to the colony.

For example, Y22, a 13-year-old female has had three mates so far: Y94, Bi76 and Bi70. Y94 was her first mate and



Stephen Kress

they nested successfully in burrow #5 from 1982 through 1985. Y94 did not return in 1986, and Y22 promptly moved into burrow #23 with Bi76, a male one year younger than herself, whose mate was still alive but shifted to an adjacent burrow. Y22 bred with Bi76 for the next three years, but shifted burrows again in 1989 when Bi76 paired with a new female, Bi45, who also had two previous mates (one presumed dead and one still living). Y22 nested with Bi70 (whose mate of five years disappeared in 1988) in 1989, and they bred together again in 1990.

Two other burrows have interesting stories: Black 56 had nested in burrow #8 for the past eight years. In 1989 she was 14 years old. As the last survivor of the 1976 transplant at Egg Rock, she was the oldest puffin at the island. Late in the summer of 1989 she appeared to have a patch of oil on her crown. Oiled seabirds rarely survive, and, in fact, Black 56 did not return in 1990. Her mate, a 10-year-old named EN+96, returned to burrow #8 and remated with an unbanded puffin in 1990.

En25 is currently a bachelor. He has consistently bred in burrow #21 with a procession of females. His first mate, EN+83, disappeared after the 1985 breeding season. He then remated with EN+92 in 1986, a female one year younger than himself. They nested together again in 1987, but she disappeared in 1988. He then remated with Bi45 in 1988, but she left him in 1989 (to nest with Bi76). He continued to frequent burrow #21 in 1989 and 1990, but did not attract a mate.

These complex pairings are beginning to show some trends. For example, the Egg Rock puffins usually find a new mate the year after their mate dies. It also seems that males are more likely to occupy the same burrow year after year and that females, like Y22 and Bi45, are more likely to reneest in different burrows.

The presence of unbanded puffins in the Egg Rock colony has become important. As the case histories above show, when one member of a pair dies the replacement is often an unbanded bird. In 1990, six of the fifteen nesting puffin pairs on Egg Rock Island included one unbanded bird. The origins of the unbanded birds are unknown, but it is likely that they are native young produced at either Eastern Egg Rock or nearby Matinicus Rock. ■

### PUFFIN BOAT TOURS

If you would like to see Maine puffins, terns, gull-mots, eiders and other seabirds consider taking a National Audubon Society-sponsored cruise to either Eastern Egg Rock, or to Matinicus Rock and Seal Island. These tours are narrated by Audubon biologists, provide excellent opportunities to view seabirds up close, and also help fund our research because a part of each fare is donated to National Audubon Society's Puffin Project

*For details about Eastern Egg Rock trips:*

- R.N. Fish, Inc., P.O. Box 660, 65 Atlantic Avenue, Boothbay Harbor, Maine 04538
- Hardy Boat Cruises, R.R. 1, Box 53, Shore Road, North Edgcomb, Maine 04556

*For details about Matinicus Rock and Seal Island trips:*

- Maine Whale Watch, Northeast Harbor, Maine 04662

### ADOPT-A-PUFFIN

Help support Project Puffin by "adopting" one of the Eastern Egg Rock Puffins. An adopted puffin makes a unique birthday or holiday gift! Or, adopt a puffin as a school project to learn about conservation and wildlife.

For each \$100 gift, we will select one of the Egg Rock Puffins for you to sponsor. You will receive a certificate, a photo, and a biography of your puffin.

*Write: Fratercula Fund, National Audubon Society, 159 Sapsucker Woods Road, Ithaca, New York 14850 USA.*

## GALAPAGOS UPDATE

*Four pairs of Dark-rumped Petrels breed in artificial burrows, but rats take a heavy toll.*

The program to assist the endangered Dark-rumped Petrel achieved a major success this summer when four pairs of these rare seabirds nested in artificial burrows on the Galapagos Islands.

Dark-rumped Petrels, distant relatives of the albatross, nest in underground burrows at the higher elevations of four Galapagos Islands, 600 miles east of mainland Ecuador. Their only other nesting colonies are on the Hawaiian Islands. Dark-rumped Petrels have a long breeding cycle that brings them to land for about six months each year. The incubation period is 52 days and an additional 110 days is required to rear their

single chick. This slow development is necessary for birds that feed far from islands and often leave the chick untended for several days between feedings. This breeding strategy, however, makes the petrel chicks extremely vulnerable to exotic mammals such as black and Norway rats that are now well-established on many of the Galapagos Islands. On Santa Cruz Island, nearly all petrel chicks are killed annually by rats and some biologists believe the colony is declining at the rate of 30% each year.

In 1988, National Audubon Society, The Galapagos National Park, and The Charles Darwin Research Station joined forces to test a novel plan to help the Dark-rumped Petrels on Santa Cruz Island. That year 80 artificial burrows were constructed in Mirador crater, an extinct cinder-cone volcano in the Santa Cruz highlands, and 80 additional burrows were constructed in 1989. To advertise the new homes, a tape recording of a large petrel colony was played from eight speakers from dusk to dawn, mid May to mid August.

Dark-rumped Petrels began exploring the artificial burrows immediately and five days after the start of the project a petrel was found spending the night in one of the burrows (see *Egg Rock Update*, 1988). Early in the 1989 season fragments of a petrel egg were discovered in burrow D-17—evidence that an egg was laid sometime late in the first breeding season (see *Egg Rock Update*, 1989).

During the three-year study, petrels dramatically increased their use of the burrows, especially the frequency with which they spent nights in the burrows (overnights). In 1988, only 14 overnights were recorded. This number more than doubled in

1989 to 39 overnights, and sailed off the charts in 1990 at 257 overnights. The increase in activity over the past three years occurred because petrels usually spend at least a year or two searching for a burrow before they eventually breed. On July 9 this summer, we discovered our first egg in burrow B-19, and we celebrated the hatching of this chick 52 days later. Petrels also bred in three other artificial burrows this year. In each case, the pair spent many nights in the burrow in 1989, but waited until 1990 to breed.

One seldom sees rats in the Santa Cruz highlands because the vegetation is lush and the rats are largely nocturnal. Al-



Susan Schubel, Intern, prepares to return a Dark-rumped Petrel chick to its artificial burrow in the Galapagos Islands.

Stephen Kress

though the Galapagos National Park conducted a rat control program at Mirador Crater in late August, at least one rat began raiding petrel burrows. Only a trail of gray plumes marked the site where a rat apparently pulled the chick from burrow B-19. Although there was no direct evidence for predation, we also suspect rats for the disappearance of chicks from burrows D-17 and G-13. And rats may also be linked to the death of a hatching chick in burrow F-11.

Although the loss of these first chicks is sobering, Dark-rumped Petrels live for 20 years or more and are well-known for their tendency to nest in the same burrow year after year. It is therefore likely that these pairs will reuse their burrows in 1991. Hopefully, they will be joined by four or five additional petrel pairs: this year we observed repeated overnight activity in many previously inactive burrows. To give the petrel chicks a better chance against the rats, the Galapagos National Park is committed to intensifying its efforts to reduce the rat population in the vicinity of Mirador.

Despite the loss of these chicks, we view the season as a dramatic success because the nestings demonstrate that managers can influence where the petrels nest. The use of tape recordings and artificial burrows will have their greatest benefit when the attractants encourage the birds to nest on truly predator-free islands.

*Recordings of Dark-rumped Petrels were provided by the Library of Natural Sounds at the Cornell Laboratory of Ornithology. ■*

## TERN POPULATIONS REACH RECORD-HIGH NUMBERS AT AUDUBON MAINE COAST SANCTUARIES

Tern numbers increased this summer at all of National Audubon's Maine Coast sanctuaries (fig. 1 and 2). Management efforts have helped to boost the size of the tern colonies at Eastern Egg Rock and Matinicus Rock to more than 1200 pairs, making the colonies on these islands respectively the largest Common and Arctic Tern colonies in Maine. The tern colony at Seal Island expanded from 17 pairs in 1989 to 270 pairs in 1990. On Stratton Island, tern numbers increased from 5 pairs in 1987 to 219 pairs this summer. These increases also included impressive gains in Roseate Tern numbers—38 pairs at Eastern Egg Rock and 18 pairs at Stratton Island. These islands now rank as the second and third largest Roseate colonies in Maine. The largest Roseate Tern colony, 50 pairs of birds, is on Petit Manan Island.

Although the number of nesting terns has increased at Audubon Sanctuaries in recent years, these gains offset declining tern colonies elsewhere in Maine. So, despite active management at key nesting islands, Maine's tern population has remained static within recent years (fig. 3). Without restoration and gull control programs at Audubon sanctuaries, it is certain that Maine tern populations would have suffered a serious decline.

In 1885, terns nested on about 75 Maine coast islands. Today, pressure from predatory gulls, owls, and night-herons

greatly restricts the islands on which the terns can nest. As of 1990, 88% of Common Terns, 95% of Arctic Terns, and 98% of Roseate Terns nested on just six islands managed by the National Audubon Society and other agencies. Certainly, without managed sanctuaries terns would have disappeared from their once vast haunts along the Maine coast. The future for Maine terns now rests on the effectiveness and continuity of management efforts. ■

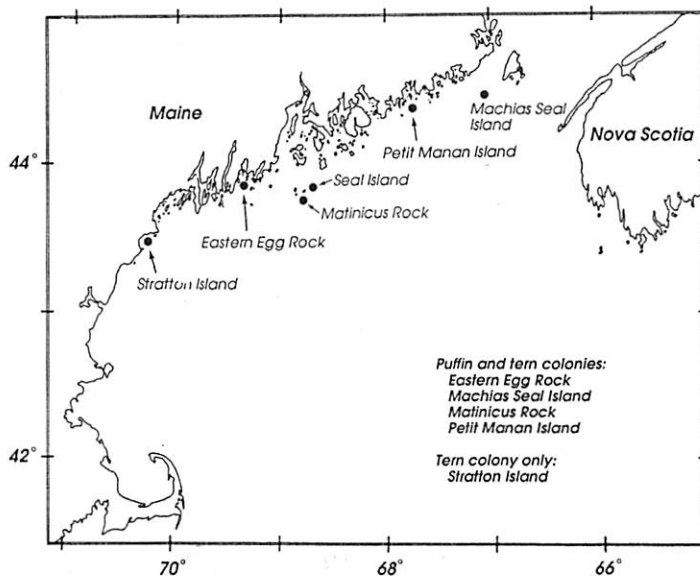


Figure 1. Puffin colonies and major tern sanctuaries on the Maine coast.

James D. Lowe

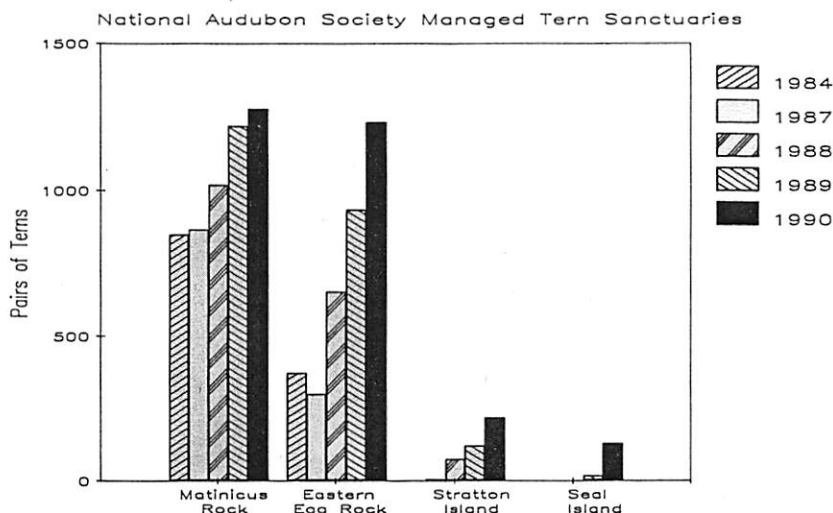


Figure 2. Since 1984, tern populations have shown major increases at Audubon's managed tern sanctuaries.

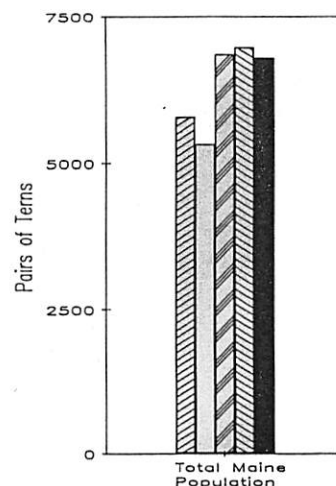


Figure 3. Tern populations throughout Maine have remained constant.

James D. Lowe

## STROBE LIGHTS DETER PREDATORS

In 1989, Audubon researchers discovered a massive die-off of newly hatched terns at Stratton Island. These mystery deaths were puzzling since neither disease nor predatory gulls were the cause. Closer study revealed two factors that contributed to the deaths. First, most of the terns left their nests at dusk and stayed away from the island until dawn. This nocturnal abandonment of newly hatched chicks exposed the young birds to chilling temperatures which caused death within a few days of hatching.

David Shealer, former supervisor of the Stratton Island sanctuary, discovered the second cause of deaths. Crouched in a blind near one of the nests, he discovered that Black-crowned Night-herons were entering the colony at night, flushing off the remaining adults and feeding on young terns. One night he surprised a night-heron before it could feed by startling it with a powerful flashlight. The night-heron left with a squawk and apparently did not return.

Flashing lights also appear to offer some degree of protection to Common Terns nesting on large navigational aids in the St. Lawrence River, New York. The terns nesting on these platforms which are equipped with flashing lights consistently produce more fledglings per nest than nearby populations that

nest on islands. Apparently, the flashing lights deter predators such as owls and night-herons.

We tested this idea at Stratton Island in 1990 by surrounding a 25' x 34' section of tern nesting beach with six Radio Shack yellow strobe lights. The lights were each mounted atop a 5.5'-tall fencepost and wired to a nearby 12-volt battery that was recharged with a photovoltaic panel.

A timing device regulated the strobes, so that they blinked out of synchrony for 15 to 45 seconds and then were off for 20 to 40 seconds. This cycle continued from dusk to dawn and was controlled by a photo-sensitive switch. The light system was installed by mid-May and was already a feature of the habitat when terns started nesting. The beach under the lights was fenced with chicken-wire mesh to prevent tern chicks from wandering away from the study site.

It was soon apparent that the adult terns were not bothered by the presence of the flashing lights. They regularly sat on the lights (even when they were flashing) and 16 pairs nested in the area surrounded by the lights. These pairs produced an average of 1.5 fledglings per nest, an exceptionally high number. In contrast, relatively few Common Terns fledged young outside of the strobe-lit area because of interference from night-herons. ■

## LANDSCAPE FABRIC AND WOOD CHIPS— NEW TOOLS FOR IMPROVING TERN HABITAT

As terns become concentrated at a few managed sanctuaries, each site becomes more significant. In 1989, we were impressed when 936 pairs crowded onto Eastern Egg Rock. Yet apparently the island still had not reached its carrying capacity because this year 1,232 pairs nested on the island. Many of these birds are refugees from nearby tern nesting islands where Herring and Great Black-backed Gulls have prevented breeding for many years.

At Eastern Egg Rock we have tested fire, rock salt, weeding, and competitive low-growing grasses as methods for increasing the amount of tern nesting habitat (see *Egg Rock Updates* 1986 and 1988). These methods have met with limited success because rank grasses, elderberry, raspberry, and ragweed will reclaim cleared habitat within a year of treatment.

In 1990 we tested a new technique for opening up patches of tern habitat. In early May, about a week before the terns set up their territories on Eastern Egg Rock, a hardy team of volunteers cleared two patches of elderberry and timothy grass. The 50' x 12' plots were first cleared by digging up sod

and pulling out the elderberry roots. Then a six-foot wide roll of DuPont landscape fabric was placed over the soil to prevent regrowth from root stocks, and covered with about three inches of wood chips. Fifteen six-inch diameter holes were cut



Stephen Kress

through the landscape mat so that small islands of vegetation could emerge to provide shade and cover for the young terns.

The fabric acts as a physical barrier, preventing plant growth; it also blocks sunlight from the emerging plants. The wood chips provide a nesting substrate for the terns, block light from the plants and protect the fabric from deteriorating in direct sunlight.

Because the fabric is porous, rain soaks through into the soil rather than pooling as it would on black plastic.

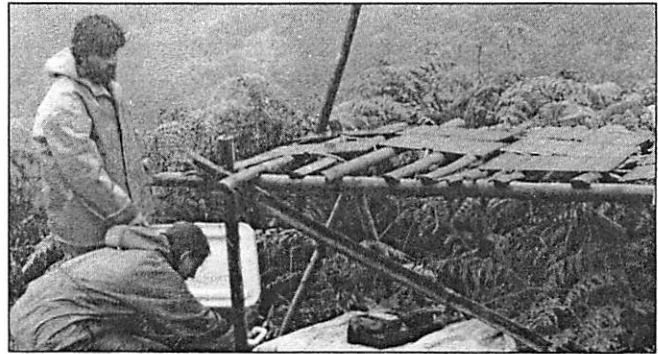
Landing and hauling 133 bags of wood chips across the rocky terrain was no small task, but the effort proved a success when terns began building nests and laying eggs in the wood chips within days of completing the plots. By late June, 45 pairs of Common Terns were nesting in the new habitat. The mix of landscape fabric and wood chips offer promise as a useful new technique for creating tern nesting habitat that will persist for several years. ■

## INTERN PROFILES

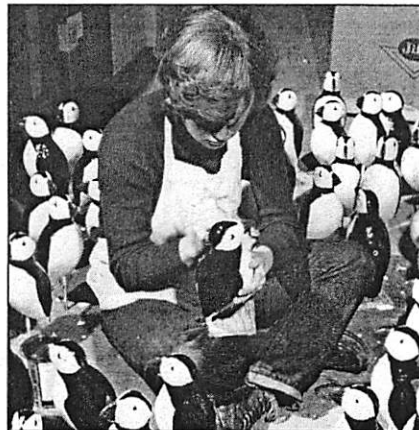
**M**ore than 100 student interns have worked on behalf of seabird conservation in Maine and the Galapagos Islands while participating in National Audubon Society's Puffin Project. From the beginning of the Puffin Project in 1973, student interns have been the hands, eyes, and spirit of the Project. The scope of the Puffin Project recently expanded to include the Galapagos Islands, providing even greater opportunities for interns. In 1990, the Puffin Project hired 12 full-time interns for its projects on the Maine coast and 4 interns for the Galapagos Islands Project. In addition, 12 part-time volunteers each donated at least two weeks of their time to assist projects on the Maine coast.

Most interns are either upper-level undergraduates or recent college graduates that are majoring in biology or wildlife management. The track record for former interns is impressive. Of the 65 full summer interns that have taken part in the program, 16 have received or are presently working on Ph.D.'s in biology, and at least 29 presently hold full-time positions as biologists or wildlife managers.

This summer marked our first two-way intern swap between the United States and Ecuador. In May, Manuel "Manolo" Fajardo and Washington "Wacho" Arevalo, two Ecuadorian students from the University of Guayaquil in Ecuador, participated in our seabird intern



Susan Schubel and Jorge Palacios inspect the tape recorder system that plays Dark-rumped Petrel calls inside Mirador Crater, Santa Cruz Island, Galapagos.



Kathy Blanchard, the first intern, painting puffin decoys in 1977.



Barbara North and Manuel Fajardo land supplies at Eastern Egg Rock.

program in Maine. Their travel expenses were paid in part by a grant from the U.S. Fish and Wildlife Service's Office of International Affairs.

Wacho and Manolo assisted our Dark-rumped Petrel Project on Santa Cruz Island during the summers of 1988 and 1989 and were eager to learn more about seabird conservation. While in Ecuador, they worked under the supervision of Dr. Richard Podolsky, co-principal investigator of the Dark-rumped Petrel Project. Richard is also an alumnus of the Maine intern program who worked at Eastern Egg Rock and Seal

Island for many summers. While Wacho and Manolo were assisting our Maine coast program, Susan Schubel spent her summer following Dark-rumped Petrels in the Galapagos Islands. Susan, a recent graduate in biology from the University of New Hampshire, had previously spent the past six summers supervising the Eastern Egg Rock Project.

Part-time volunteers also play an important role in the Puffin Project. To date, 50 volunteers from diverse backgrounds such as teaching, nursing, and dentistry have helped rear puffin chicks and watch for returning birds. This summer, the Project received special help from the curators of two captive puffin exhibits. Mary Gunther, who is responsible for puffins at the National Aquarium in Baltimore,

Maryland, and Deborah Zombek, who holds a similar position as aviculturist for puffins at Sea World in Orlando, Florida, each came to Eastern Egg Rock for a three-week stint to observe puffins in the wild.

The Puffin Project offers unique hands-on experiences actively managing seabird populations. The future of many species will be in the hands of young biologists such as our interns, who understand the dedication necessary to protect the wildlife we now take for granted. ■

Our sincere appreciation goes to the 1990 Maine and Galapagos seabird research interns and volunteers:

**Interns:** Washington Arevalo, Peter Duley, Manuel Fajardo, Milton Fiere, Mitschka Hartley, Scott Hedges, Steven Hess, Barbara North, Christopher Perks, Jonathan Rosenthal, Jorge Palacios, Susan Schubel, Jerry Skinner, Donald Smith, Andy Stamper, Nicholas Stathis, Tracy Tennant and Heather Whittaker.

**Volunteers:** Nancy Dennis, Trip Dennis, Robert Duffey, Mary Gunther, Susan Minges, Anne Peterson, Leah Sansone, Pixie Senesac, Denise Senk, Diane Tessaglia and Deborah Zombeck.

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We thank the Maine Department of Inland Fisheries and Wildlife for permission to work on Eastern Egg Rock, the U.S. Coast Guard for the privilege of working on Matinicus Rock, the USFWS for allowing us to conduct our studies on Seal Island National Wildlife Refuge, and the cooperation of the Canadian Wildlife Service at Machias Seal Island. Robert Dorrance provided use of Hog Island facilities and Joe Johansen of the Audubon Camp in Maine gave invaluable logistic support.

Thanks to Fausto Cepeda P., Hector Serrano, and the staff of the Galapagos National Park, and Dr. Daniel Evans and Fionna Walsh at the Charles Darwin Research Station for providing logistic support essential to the Dark-rumped Petrel project. Special thanks to Luis Ramos for his assistance with transportation.

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

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- Blue Earth Films for donating "Puffin Watch" videos for use in our video loan program

- Grant Connors, Foster Lott, the Maine Wildlife Woodcarvers Association, and the Adult Education Bird Carving Class at Windham High School, Maine, for creating and donating hand-carved puffin decoys for use at Seal Island
- John Flood for building bunk beds for intern use on the mainland and bird blinds for Seal and Stratton Islands
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- Terry Jason of Radio Shack (Orono, Maine) for designing the timing device for the Stratton Island strobe lights
- Anne Kilham for designing our puffin boat tour poster
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- Maine Central Power Company and Pinkham's Plantation of Damariscotta, Maine, for donating wood chips for tern habitat study plots
- Cyndy Martin, David Shealer, Jorge Saliva, Joe Zurovchak, Scott Hedges, Heather Whittaker and Susan Schubel who prepared tern study plots on Eastern Egg Rock
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- Tom Taylor for creating and donating use of his art print, "Puffin Magic," for our fundraising efforts
- Charles Walcott and the entire staff of the Cornell Laboratory of Ornithology for their continued cooperation with Fratercula Fund projects

## 1989-1990 CONTRIBUTORS

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