

ALASKA MARITIME NATIONAL WILDLIFE REFUGE  
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ANNUAL NARRATIVE REPORT  
HOMER, ALASKA

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CALENDAR YEAR 1994

U.S. Department of Interior  
Fish and Wildlife Service  
NATIONAL WILDLIFE REFUGE SYSTEM

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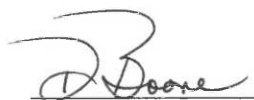
REVIEWS AND APPROVALS

ALASKA MARITIME NATIONAL WILDLIFE REFUGE

Homer, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1994

 for 7/5/98  
Refuge Manager Date

 6/15/98  
Associate Manager Date  
Refuges and Wildlife

 7/13/98  
Regional Office Approval Date

## INTRODUCTION

The Alaska Maritime National Wildlife Refuge was created by the Alaska National Interest Lands Conservation Act (ANILCA) in 1980. The purposes for which it was established were: 1) to conserve fish and wildlife populations and habitats in their natural diversity; 2) fulfill international fish and wildlife treaty obligations; 3) provide opportunities for continued subsistence uses by local residents; 4) provide a program of national and international scientific research on marine resources; 5) ensure water quality and necessary water quantity within the refuge. This Act consolidated management of eleven existing refuges with 460,000 additional acres resulting in a 3,500,000+ acre refuge. Although relatively small in land mass, its lands are scattered along most of the coast of Alaska and extend from Forrester Island in Southeast Alaska along the Gulf of Alaska to the western end of the Aleutian Islands and northward to the Icy Cape area southwest of Barrow in northwest Alaska. There are more than 2,500 islands, islets, and pinnacle rocks within the refuge which are used annually by millions of seabirds of at least 30 species. The Maritime Refuge is divided into five units which includes all former refuges and some other federal lands/waters within those designated units. Homer, Alaska, is the refuge's headquarters and the home port of the *Tiglax*, the refuge's ship which supports field operations.

### *Gulf of Alaska*

The Gulf of Alaska Unit comprises 435,156 acres and extends over 800 miles from Alaska's southcentral coast near Kodiak Island, eastward to southeast Alaska, and includes four former refuges: Tuxedni, St. Lazaria, Hazy and Forrester Islands. Major seabird colonies occur on the following islands or island groups within the unit: Chisik, Barren, Gull, Pye, Chiswell, Middleton, St. Lazaria, Hazy and Forrester. This unit is the only one which supports forest habitat on the Maritime Refuge. Spruce-hemlock forest is the dominant plant community on nearly all the islands east of Cook Inlet. The transition zone occurs in the Barren Islands, where there is only a small forested area on Ushagat Island. Shrub-comprised communities of elderberry and salmonberry associations, and coastal maritime grass communities dominate in non-forested areas. As in most of the refuge, topography in this unit is often precipitous, with seabirds using cliffs, talus slopes, burrows, boulder rubble, and rock crevices to breed and nest. About 420,000 acres of submerged lands around Afognak Island and Kodiak Island are managed as part of the Refuge. Seabird colonies in this unit are probably the most visited of any in the state. Unlike most other units, two colonies are readily accessible by marine vessel: St. Lazaria Island, which is fifteen miles from Sitka, and the Chiswell Islands, which are thirty-five miles from Seward.

### *Alaska Peninsula*

The Alaska Peninsula Unit is the second largest of the Alaska Maritime National Wildlife Refuge. More than 800 islands totaling 420,371 acres comprise this unit, which incorporated two refuges established before designation of the Maritime Refuge. The Semidi Islands,

designated a refuge in 1932, and Simeonof Island, a refuge since 1958, also are the only areas in the Alaska Peninsula Unit where jurisdiction extends below mean high tide. Over 6,000,000 seabirds comprised of at least 25 species nest in this region. Few of the islands remain truly pristine due to introductions since the 1800s of foxes, rodents, and ungulates. Foxes destroyed seabird colonies on numerous islands and left remnant populations on other islands. Ground squirrels and voles, released with foxes as food sources, do intense damage on seabird colonies.

### *Aleutian Islands*

The Aleutian Islands Unit comprises 2,395,768 acres in southwestern Alaska and extends over 1,100 miles from Unimak Island to Attu Island. The chain of islands is 20-60 miles wide with a maximum elevation of 9,400 feet above sea level. The unit includes over 200 mostly treeless islands, islets and rocks. Some islands are wave-cut platforms, less than 600 feet above sea level, while other islands are intensely glaciated mountainous islands as high as 3,000 feet above sea level. The islands are divided into seven island groups: Krenitzen Islands, Fox Islands, Islands of the Four Mountains, Andreanof Islands, Delarof Islands, Rat Islands, and the Near Islands. The AIU provides nesting habitat for several million seabirds, the Aleutian Canada goose and other waterfowl. The unit is an important migration and staging region for waterfowl, shorebirds and passerines and provides wintering habitat for emperor geese and other waterfowl. Asiatic birds are frequently seen in spring and autumn. Thirty-five percent of all bird species observed in the Aleutians breed only in Asia; some 260 bird species have been recorded in the Aleutian Islands Unit. This unit also provides habitat for thousands of marine mammals, including sea otters, harbor seals, and endangered Steller sea lions.

### *Bering Sea*

The Bering Sea Unit extends over 600 miles and comprises 147,564 acres. It includes far-flung islands and headlands between the Aleutian Islands and the Bering Strait. The topography within this unit varies from small sandy islands to large volcanic islands. These areas provide habitat for nesting seabirds, as well as haul-out and rookery areas for marine mammals. This unit is divided into five different groups: 1) Hagemester Island; 2) Pribilof Islands; 3) St. Matthew Island group; 4) Sand Islands; 5) the Norton Sound islands and capes.

### *Chukchi Sea*

Lying primarily north of the Arctic Circle, the Chukchi Sea Unit extends nearly 500 miles from west of Point Barrow to just north of the Bering Strait and comprises 132,419 acres. Unlike other units in the refuge, this one includes sizeable acreage of mainland areas. Topography varies from low, sandy barrier islands in the Arctic Ocean to high, rocky spires in the western Brooks Range. This unit includes the former Chamisso National Wildlife Refuge, established in 1912. Nearly half a million kittiwakes and murrens breed on cliffs at Cape Lisburne and Cape Thompson. Chamisso and Puffin Islands in Kotzebue Sound are the largest island colonies in the



unit. Black guillemots, a species normally found in the north Atlantic, extend as far south as Cape Thompson. The most common bird species nesting on low barrier islands between Cape Lisburne and Point Barrow is the common eider. Up to several hundred walrus haul out annually at Cape Lisburne when the sea ice recedes. In winter, polar bears roam Cape Lisburne; other terrestrial mammals in the unit include grizzly bear, musk ox, wolverine, marmot, Dall sheep and caribou. The Western Arctic Caribou herd congregate near Cape Lisburne and Cape Thompson for summer post-calving.

### Description of Major Refuge Programs

*Ecological Monitoring.*--With such a geographically diverse refuge, most of which is isolated wilderness, an ecological monitoring program has been set up using indicator species to identify ecosystem problems. The approach is to annually record population trends, several parameters of reproductive success, and favored prey for selected species of seabirds at 10 sites scattered throughout the refuge. Also at these "annual ecological monitoring sites" off-road point count routes are used to monitor passerine populations, beaches are surveyed for oil, and sea water temperatures are monitored. Even with 10 sites, coverage of the refuge is sparse, so efforts are made to survey additional sites at reduced frequency (some at 3-5 year intervals and some once a decade) to determine the geographic extent of trends observed at annual sites (see Monitoring and Studies Section).

*Support of Research.*--One of the establishing order purposes for the refuge was to support an international research program. The establishment of Research Natural Areas and an International Biosphere Reserve on the refuge has drawn further attention to the area as a research site. In most years 10-20 research projects are either conducted on the refuge or with samples collected by refuge staff from the area (see Monitoring and Studies Section).

*Technical Assistance.*--Since the Alaska Maritime NWR has one of the largest marine bird and mammal conservation programs in the world, there are numerous requests for technical information about seabirds and marine mammals from the public and other agency personnel. There are also numerous requests for members of the refuge staff to participate in technical workshops and professional meetings and to provide technical reviews of manuscripts and reports, study proposals, impact assessments, and management plans (see Technical Assistance in Monitoring and Studies Section).

*Management of Alien Species.*--A number of alien animals have been introduced to the refuge, particularly on the Alaska Peninsula and Aleutian Islands units. Some of the introductions were intentional, such as arctic and red foxes for fur ranching (prior to WWII) and reindeer and caribou for use by local people on inhabited islands like Atka and Adak. Others were accidental, such as Norway rats which became established on most islands occupied by military forces during WWII or as a result of ship wrecks. These introductions and others have extirpated some species of native birds and reduced populations of others to low levels. The refuge has ongoing programs to remove introduced foxes from selected islands to restore native

biodiversity, to prevent further introductions of rats, and to try to manage ungulates to reduce habitat damage (see Habitat Restoration and Fish and Wildlife Management sections).

*Endangered and Threatened Species Management.*--The refuge continues to be involved in recovery programs for threatened Aleutian Canada geese and for endangered Steller sea lions and Aleutian shield ferns. Although a recovery plan is not yet in place for endangered short-tailed albatrosses, a standard monitoring protocol has been developed for observations from the M/V *Tiglax*.

*Outreach and Visitor Services.*--Major elements of the refuge outreach program include: visitor centers at Homer and Adak, a naturalist on the state ferry M/V *Tustemena*, the Pribilof Stewardship Camps for children of the Pribilof Island, a school environmental education program including the Shorebird Sister Schools Program and the Kachemak Bay Shorebird Festival.

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## CLIMATIC CONDITIONS

Month	Avg Temp (°F)	Min Temp (°F)	Max Temp (°F)	Precip (inches)	Precip Dev. (inches)
JAN	30.2	-2	51	0.96	-1.44
FEB	23.2	0	50	1.31	-0.82
MAR	28.0	2	49	2.45	+0.75
APR	39.0	13	55	0.75	-0.53
MAY	45.3	32	63	1.08	-0.07
JUN	51.8	35	72	0.78	-0.25
JUL	54.6	39	70	1.18	-0.31
AUG	55.5	36	74	0.80	-1.44
SEP	47.7	28	68	3.33	+0.04
OCT	37.1	13	56	1.98	-1.26
NOV	25.3	-4	47	3.06	+0.44
DEC	25.2	1	43	3.84	+1.02

## 1. MONITORING AND STUDIES

### A. Refuge Ecological Monitoring Program

In fall 1994 a refuge biological program review was held, and the result was an approved refuge wildlife inventory plan which calls for annual observations of selected parameters for indicator species at 10 sites, selected for their geographical distribution within the refuge. Funding likely will not allow for full implementation of the monitoring program every year, but in 1994, of the annual sites were monitored and a number of less-frequently visited sites were also surveyed (see below). Abstracts from annual sites are provided below the list.

1. Cape Lisburne: No work
2. Bluff: No work
3. St. George: Refuge funding
4. St. Paul: Short visit, not specifically funded
4. Buldir: Refuge funding
6. Kasatochi/Koniuji: Short visit, not specifically funded
7. Aiktak: Short visit by NBS, not specifically funded
8. Chowiet: NBS conducted monitoring as part of a research project
9. E. Amatuli: Exxon Valdez Oil Spill Trustee Council (EVOS) Funding
10. St. Lazaria: Refuge funding

*St. George.*--The Alaska Maritime National Wildlife Refuge has monitored productivity of black- and red-legged kittiwakes and common and thick-billed murres at St. George Island annually since 1985. Productivity monitoring continued in 1994. Mean hatch date was relatively early in 1994 for both species of kittiwake. Mean clutch size of black-legged kittiwakes was 1.45 eggs/nest with eggs, the lowest since 1989. Overall productivity of black-legged kittiwakes was 0.04, while overall productivity for red-legged kittiwakes was 0.24. Reproductive success of both red- and black-legged kittiwakes varied significantly during the 10 years tested. We found a strong positive correlation between the productivities of the 2 kittiwake species, but no correlation between mean hatching date and nesting success for either species. All 7 (100%) of the black-legged kittiwakes banded in 1992 were re-sighted in 1994. We saw 88% of the black-legged kittiwakes that were banded in 1993. Annual survival of red-legged kittiwakes from 1993 to 1994 was estimated at 92%, 87% and 95% for birds originally banded in 1991, 1992 and 1993, respectively. We re-sighted 2 red-legged kittiwakes that were banded in 1992 that were not seen in 1993. Using these re-sightings we recalculated survivorship from 1992 to 1993 to be 94%. Mean hatch date was relatively late for both species of murre in 1994. Common murres produced 0.51 fledged chicks/egg laid, and thick-billed murre reproductive success was 0.52. We found a significant positive correlation between the productivities of the two murre species, but no correlation between mean hatching date and hatching success in either species (abstracted from: Dragoo, D. E., and B. K. Dragoo. 1995. Results of productivity monitoring of kittiwakes and murres at St. George Island, Alaska in 1994. U. S. Fish and Wildl. Serv. Rep., AMNWR 95/01. Homer, Alas. 77 pp.).

*St. Paul.*--Funding for seabird productivity work at St. Paul was not available in 1994, but WB Sowls was able to gather information on "boom or bust" productivity of cormorants and kittiwakes. Red-faced cormorants has only about 0.7 chicks/nest, below average. Black-legged kittiwakes experience a nearly total reproductive failure, like they did on St. George, and interestingly red-legged kittiwake productivity was not too far below normal, also similar to St. George.

*Buldir.*--Biological Science Technicians Julian Fischer and Scott Hall, along with volunteers Wendy Cruso and Peter Duley, monitored 14 species of seabirds on remote Buldir Island from late May through the end of August. They monitored productivity levels, population numbers, and food habits. Additionally, they monitored adult survival rates of red-legged and black-legged kittiwakes. Both horned and tufted puffins had low but normal levels of productivity while all auklets and murres were normal. Population levels of all species were some of the highest on record since monitoring began. Food samples were collected from storm petrels, puffins, auklets and kittiwakes. Red-legged kittiwake productivity was over 97%. Post-doctoral researchers Ian Jones and Fiona Hunter continued their work on auklet behavior and survival. Ian and Fiona continued banding of whiskered, least and crested auklets for survival analysis. Ian and Fiona also collected blood from whiskered auklet families to investigate rates of extra-pair copulations.

*Kasatochi/Koniuji.*--Kittiwakes and murres were counted during a brief visit on August 7, 1994, and Colony Status Records (V. Byrd and J. Williams) were completed and sent to the Migratory Bird Office in Anchorage for inclusion in the Alaska Seabird Colony Catalog.

*Chowiet.*-- In 1994, National Biological Survey personnel (Scott Hatch and volunteers) gathered data on populations for several species of seabirds during a brief visit, but the data had not been summarized by the time this report was written.

*E. Amatuli.*--This report summarizes the results of the third year of common murre (*Uria aalge*) restoration monitoring work conducted in the northern Gulf of Alaska for the *Exxon Valdez* Oil Spill Trustee Council. Information on population numbers, nesting chronology, and productivity of murres were collected by U.S. Fish and Wildlife Service (FWS) biologists at the East Amatuli Island - Light Rock and Nord Island - Northwest islet colonies in the Barren Islands during the 1994 nesting season. These data are presented and statistically compared with information reported in the 1989-1993 FWS murre damage assessment and restoration studies, and with data obtained during 1990-1992 University of Washington (UW) and 1991 Dames & Moore (D&M) studies. Although positive trends in population numbers were found on two FWS and three UW plots at East Amatuli Island - Light Rock over the postspill period, no trends were apparent on larger sections of habitat at this colony or at the nearby Nord Island - Northwest Islet nesting complex. Nesting chronology was similar between study sites and about one week earlier than during 1993. Productivity also did not differ between study sites. At Nord Island - Northwest Islet, productivity was similar to 1993 (0.71 fledglings per egg laid vs. 0.74 in 1993); however, at East Amatuli Island - Light Rock, it was significantly higher than in 1993 (0.73 fledglings per egg laid vs. 0.55 in 1993). In general, reproductive success in the Barren Islands was normal to high, compared with other Gulf of Alaska murres colonies.

Roseneau, D. G., A. B. Kettle, and G. V. Byrd. 1995. Common murre restoration monitoring in the Barren Islands, Alaska, 1994. Unpubl. final rept. by the Alaska Maritime National Wildlife Refuge, Homer, Alaska for the *Exxon Valdez* Oil Spill Trustee Council, Anchorage, Alaska (Restoration Project 94039). 73 pp.

*St. Lazaria.*--We monitored nine species of seabirds at St. Lazaria Island from 2 June to 1 September 1994. Population and productivity data were collected on fork-tailed and Leach's storm-petrels, pelagic cormorants, glaucous-winged gulls, common and thick-billed murres, rhinoceros auklets, and tufted puffins. Population information only was collected on pigeon guillemots. We also investigated breeding phenology of both species of storm-petrel. We collected samples of food items being brought to fork-tailed and Leach's storm-petrel, tufted puffin, and rhinoceros auklet chicks. It appears St. Lazaria is an ideal seabird monitoring site in the southeastern Alaska region. We were able to get information on populations, timing of nesting events, productivity, and/or food habits for up to 9 species representing all of the feeding guilds (e.g., diving fish-eater, surface plankton-eater). Preliminary comparisons with prior data suggest no major changes in distribution of nesting birds has occurred over the past decade. Furthermore, most indicators of population levels (e.g., burrow densities, numbers of nests for surface-nesters, or birds counted on index plots) suggested no differences between 1994 and 1995. In contrast, burrow occupancy rates (which tend to vary among years) for storm-petrels were higher in 1994 than in 1993. Offshore diving fish-eaters like murres and rhinoceros auklets had relatively low success in 1994. As data begin to accumulate, we will be able to gain a better understanding of ecosystem processes in the marine ecosystem near St. Lazaria. The ultimate

goal is to be able to assess causes of change in seabird populations to aid in their long-term conservation. No formal report was written for 1994, but plans are to write a summary report in 1996 covering 1994-1996.

Besides annual sites, we have an objective to collect similar types of data at "calibration sites" at 2-3 year intervals. The expectation for funding for these sites is low through refuge sources, but data were collected at several of these sites with other funding:

1. Chisik, 60-foot Rock, Gull and Flat islands: A special study, funded by Minerals Management Service, was conducted in Lower Cook Inlet seabird nesting colonies by WB Slater. The study, which began in 1993, was completed in 1994. The abstract from a report written in 1994 follows:

As part of the Minerals Management Service's program to monitor seabird populations in areas of oil and gas development on the Alaskan continental shelf, surveys were made of breeding seabirds at colonies in lower Cook Inlet, Alaska, in 1993 and 1994. Survey efforts were devoted to all of the most common species including cormorants, kittiwakes, gulls, murres, and puffins. The primary study areas were Chisik and Duck islands near Tuxedni bay, Gull Island and 60-foot Rock in Kachemak Bay, and Flat Islands near English Bay.

The objectives of the surveys in 1993 and 1994 were to assess population levels and reproductive success of key species. Furthermore, comparisons were made with past data to assess trends. The 1993 study was more intensive and extensive than the 1994 surveys.

During the 1993 and 1994 breeding seasons, kittiwakes appeared to initiate nesting within the normal range of dates, but murres may have been slightly late. Most species had relatively low rates of productivity in 1993 at Chisik and Duck islands. Kittiwakes also failed at 60-foot Rock, and cormorant productivity was below normal. Reproductive success for kittiwakes at Gull Island was only slightly higher than at 60-foot Rock in 1993. In contrast, tufted puffins seemed to produce well at Flat Islands in 1993. In 1994, it appeared that reproductive success was better for kittiwakes at Chisik and Gull islands than it had been in 1993. In contrast, kittiwakes failed to produce young at 60-foot Rock in 1994.

Double-crested cormorants apparently have declined since the early 1970s at Chisik Island, but there was no indication of a decline in pelagic cormorants at Chisik and Duck or on the islands in Kachemak Bay. Glaucous-winged gulls increased or remained stable between the mid-1970s and the early 1990s at all colonies.

2. Middleton: National Biological Service personnel conducted research at Middleton on seabirds which included counts of several species. Data were not summarized by the time this report was written.

3. Agattu: Biological Science Technicians Susan Woodward and Angela Palmer were on Agattu Island from late May through the end of August. They monitored black-legged kittiwake and common murre productivity at Aga Cove. In addition, they conducted population counts at Aga Cove and Island Cove. Productivity was low and numbers of birds were high relative to other years.

4. Forrester: Petrel, Forrester and Lowrie islands comprise the southeastern-most part of the Alaska Maritime National Wildlife Refuge (Refuge), and lie immediately north of the Canada-Alaska border. Over one million seabirds are estimated to breed at these islands (Sowls et al. 1978). One reason seabirds are concentrated here is that local coastal upwelling creates conditions under which prey species may be found in abundance.

These outer coast islands also fall within a transportation corridor used by large vessels. While much of the traffic remains further east in more protected waters, the islands are not immune from discharges from ocean-going vessels. This was clearly demonstrated in 1994 when some of the contents of a cargo container washed ashore on Lowrie Island from a ship located at least 1000 km to the southwest.

The value of efforts expended to understand population and productivity trends of seabirds in southeast Alaska are apparent in light of the T/V *Exxon Valdez* oil spill. If a similar event were to occur there, very few data are available from which damages to marine resources may be assessed. Lowrie, Forrester and Petrel islands are defined as "periodic" monitoring sites (Byrd 1993) and are scheduled to be visited every 2-3 years. Other Refuge sites are monitored annually to detect changes within a defined colony. Monitoring at periodic sites adds a further dimension of identifying changes in marine resources throughout a region.

The first intensive seabird studies the three islands occurred in 1976 and 1977 (DeGange et al. 1977, DeGange and Nelson 1978). Since then a comprehensive Refuge-wide plan was developed to standardize monitoring methods for seabirds (Byrd 1993). Permanent study plots were established at Lowrie Island in 1993, and Forrester and Petrel islands in 1994 to facilitate periodic seabird monitoring. The emphasis of species monitored at each island was as follows: fork-tailed and Leach's storm-petrels and tufted puffin (Petrel Island), Cassin's auklet (Lowrie Island), and rhinoceros auklet (Forrester Island). Site visits were brief, so data collected were restricted to burrow density and occupancy rate by species. Breeding phenology was estimated to determine when future site visits might best be scheduled. A small boat survey also provided a recent count of ledge-nesting seabirds and of waterfowl in the nearshore waters of Forrester and Petrel islands.

While valuable information has been collected, Refuge site visits have never been funded. Logistic support and a cooperative attitude from Alaska Department of Fish and Game (ADF&G) personnel have provided the primary means for site visits. While the Refuge "piggybacked" our work to ADF&G sea lion studies, this option will only be available as long as the sea lion program continues. Further, the information derived from these monitoring efforts could be greatly enhanced if sites could be visited two times per season.



Slater, L. 1997. Seabird monitoring at Lowrie, Forrester, and Petrel Islands, 1993-1995. U.S. Fish and Wildl. Serv. Rept., AMNWR 97/10. Homer, Alas. 29 pp.

5. Bogoslof: In summer 1994 wildlife, botanical, and geological observations were made at Bogoslof Island, Alaska. This site is part of the Alaska Maritime National Wildlife Refuge, Alaska. This site was designated as a National Natural Landmark in 1967 based on the national significance of Steller sea lion (*Eumetopias jubatus*) and seabird concentrations.

Bogoslof has been the site of periodic violent volcanic activity, and as recently as 1992 a new dome was formed. Many placed on the surface of the new dome were still warm in 1994, and hot steam was escaping to the surface. Several species of seabirds were nesting in this new habitat. Tall vegetation has substantially expanded at Bogoslof since the mid-1970s, and marine erosion has reduced the amount of seabird nesting habitat in at least two areas.

Byrd, G. V. and J. C. Williams. 1994. Status and trends of seabirds and marine mammals at Bogoslof Island, Alaska, a National Natural Landmark. U. S. Fish and Wildl. Serv. Rep. to Nat. Park Serv. under Interagency Agreement No. 9700-4-9025. AMNWR 94/10.

Finally, our plan calls for opportunistically visiting a number of other sites at least every 10 years to conduct non-replicated counts of seabirds. In 1994 the following refuge sites were surveyed with no special funding by using vessel time and available staff.

1. 60-foot Rock
2. Simeonof
3. Kagamil
4. Yunaska
5. Nagai

Surveys at 60-foot Rock were conducted as part of the MMS study referred to above.. General observations at Simeonof, Kagamil, and Yunaska made in conjunction with the fox removal project were summarized on Alaska Refuge Checklist Forms and submitted to Migratory Bird Management in Anchorage. J. Piatt, NBS, submitted survey data for Nagai to the Alaska Seabird Colony Catalog.

In addition to seabird monitoring at annual sites, off-road point count routes for passerines were surveyed as part of a statewide Partners-in-flight program. In 1994 surveys were made at:

1. St. Lazaria
2. Kagamil
3. Yunaska
4. Buldir
5. St. George

## B. Special Studies by Refuge and Other Fish and Wildlife Service Personnel

*Aleutian Canada Goose*.--Two studies were conducted on the refuge in 1994 as follows:

### Nesting and Brood Rearing at Agattu

A major goal of the Aleutian Canada Goose Recovery Plan is to reestablish self-sustaining breeding populations (i.e. >50 breeding pairs) of Aleutian Canada geese (*Branta canadensis leucopareia*) on selected islands where habitat has been restored by removing introduced arctic foxes (*Alopex Lagopus*). Agattu Island was selected for goose restoration in the late 1960s, and foxes were removed by 1977. Release of captive-reared geese and translocation of wild geese from Buldir Island resulted in geese beginning to nest again on Agattu by 1984. Infrequent surveys indicated that by 1990 the breeding population was approximately 50 pairs. We returned to Agattu in 1994 to determine whether the population has remained at a self-sustaining level. Furthermore, we evaluated the habitat used for nesting and brood rearing to determine whether there are obvious limitations for future expansion of the reestablished goose population.

In 1994 we found strong evidence that the nesting population of geese on Agattu is well on its way to recovery. Evidence was found of 273 nests in the major nesting areas along the eastern and southeastern coastal portions of the island. At least a few additional nests likely occurred outside the area we searched, so we estimate that from 275 to 300 pairs of geese nested on Agattu in 1994. This represents a 5 to 6 fold increase since 1990. As has been found elsewhere, the geese continued to favor tall-plant communities for nesting, but some pairs now are using shorter plant communities. Tall cover is restricted to a narrow coastal fringe on Agattu, but the communities dominated by shorter plants are extensive. The majority of geese reared their broods near nesting areas, but a number of families moved further inland to use sedge meadows, particularly near lakes. This type of habitat is fairly extensive on Agattu.

We found no evidence of reduced egg or nest success, but the timing of egg laying (an early peak when older birds likely laid, followed by a later peak typical of young birds) and the relatively high proportion of small clutches suggest that there is an unusually high proportion of young birds in the population. This is a situation that we would expect in a reestablished population that is experiencing rapid population growth due to high rates of recruitment.

One of the reasons restoration of geese has been successful on Agattu is that avian predators were limited. For instance, eagles (*Haliaeetus* spp.) were absent. As the population of geese has increased, avian predators have been attracted. We saw 2 bald eagles (*H. leucocephalus*) and 1 white-tailed eagle (*H. albicilla*) on Agattu, and we found 16 carcasses of Aleutian Canada geese, many which had obviously been taken by raptors.

Overall, it appears the reestablishment of Aleutian Canada geese on Agattu Island has been successful. The population is of sufficient size to have a high probability of long-term survival if the nesting and wintering areas remain secure. It appears there is sufficient nesting and brood-rearing habitat to allow the population to continue to increase, but the tall-plant

community may well become saturated within the near future. The ultimate size of the population will depend on whether large numbers of geese will use nesting areas other than tall-plant communities.

Palmer, A., S. Woodward, J. Williams and L. Vlietstra. 1994. Aleutian Canada goose nesting and brood rearing surveys at Agattu Island, AK, 1994. U.S. Fish and Wildl. Serv. Rep. AMNWR 94/08. 28 pp.

### Goose Surveys at Amchitka

The introduction of arctic foxes (*Alopex lagopus*) to most of the Aleutian Islands resulted in the near-extinction of Aleutian Canada geese (*Branta canadensis leucopareia*). Foxes were eradicated from Amchitka Island by 1957, and efforts were made between 1971 and 1987 to reintroduce geese to the island. Because of the problems involved with reestablishing geese on islands with large numbers of bald eagles (*Haliaeetus leucocephalus*), these efforts were thought to have been largely unsuccessful, but recent reports of Aleutian Canada goose brood sightings on Amchitka indicated geese may have begun to become reestablished. In 1994, a high of 16 geese were observed on a single day, and at least 2 pairs were confirmed to be nesting on Amchitka. Both nests appeared to have hatched successfully, demonstrating that at least some geese can persist on islands with extremely dense concentrations of eagles. Incidental to goose searches and as time permitted, various other surveys were conducted in order to assess the presence and abundance of species that might provide a buffer for geese against eagle predation. In spite of the apparent increase in numbers of some buffer prey species since the late 1960s, and due to the abundance of eagles and lack of suitable nesting and brood-rearing habitat, it is unlikely Amchitka will ever sustain a large breeding Aleutian Canada goose population.

Scharf, L. Aleutian Canada goose surveys and other biological surveys on Amchitka Island, Alaska, 31 May - 18 June 1994. U.S. Fish and Wildl. Serv. Rep. AMNWR 94/14, Alas. Maritime Natl. Wildl. Refuge, Aleutian I. Unit, Adak. 68 pp.

### Goose Habitat Surveys in the Islands of Four-Mountains

Since 1990, introduced foxes have been removed from four of the five islands in the Island-of-Four-Mountains group to restore nesting habitat for native birds. This island group lies 70 km est of the remnant breeding population of threatened Aleutian Canada geese (*Branta canadensis leucopareia*) on Chagulak Island. In 1994, we surveyed the islands in the 'Four Mountains group to determine their potential for nesting geese. Of the five islands surveyed, only Kagamil, which is one of the fox-free islands, had substantial amounts of the tall grass-umbel community favored as nesting habitat by Aleutian Canada geese (Byrd and Woolington 1983). The other islands contained only scattered small patches of this habitat. Bald eagle (*Haliaeetus leucocephalus*), a primary goose predator, was present on all islands, but densities were not

particularly high compared to other areas in the Aleutians (Byrd and Williams *in press*). At least 10 other species of birds were present in sufficiently high numbers to buffer geese from eagle predation. We concluded that the islands in the 'Four Mountains group have sufficient nesting habitat for at least 40-50 pairs of Aleutian Canada geese.

Byrd, G. V. 1995. The Islands-of-Four-Mountains, Aleutian Islands: their potential to support nesting Aleutian Canada geese. U.S. Fish and Wildl. Serv. Rep. AMNWR 95/03, 16 pp.

*Status of Yunaska Rock Ptarmigan.*--Yunaska rock ptarmigan (*Lagopus mutus yunaskensis*) is one of 8 subspecies of rock ptarmigan which occur in the Aleutian Islands. Predation by introduced arctic foxes (*Alopex lagopus*) has caused declines in many Aleutian bird populations, and ptarmigan have been extirpated from several islands. Currently the Yunaska rock ptarmigan is designated "Category 2, Candidate species" by the U.S. Fish and Wildlife Service. This classification is assigned to taxa for which there are concerns but for which information is insufficient to determine whether there is a need for special protection under the Endangered Species Act. Occupying similar habitat as rock ptarmigan is another species of interest, the endemic Aleutian rock sandpiper (*Calidris ptilocnemis couesi*). Two population survey areas were delineated and surveyed at Yunaska I. in 1993, and ptarmigan and rock sandpipers were counted in these areas again in 1994 to develop a basis for assessing trends in populations. Arctic foxes were removed from Yunaska during the summer of 1993, and future surveys are likely to demonstrate an increase in ptarmigan and sandpiper numbers as a result of release from fox predation.

Byrd, G. V. 1994. Counts of rock ptarmigan and rock sandpipers at Yunaska Island, Alaska, in 1994. U.S. Fish and Wildl. Serv. Rep. AMNWR 94/09. Homer, AK. 10 pp.

*Beach Oil Surveys.*--In February 1992, oil spots were observed on several emperor geese (*Chen canagica*) at Shemya Island, Alaska, on the Alaska Maritime National Wildlife Refuge (NWR). A subsequent examination of beaches on Shemya indicated that numerous tar-like spots of oil were present. There was concern that oiling might be a widespread problem, so from 1992-1994 beaches were surveyed at 34 sites throughout the Alaska Maritime NWR. Oil spots were recorded by size class and dead animals encountered were checked for oil on transects centered along the mean high tide line (identified by the row of debris). At selected sites, replicate surveys were made over the period to determine changes in the amount of oil on beaches. Oil samples were collected for "finger printing" to identify the type of oil present.

Our surveys indicated that oiling was most common in the western Aleutian Islands, particularly at Shemya and nearby Nizki-Alaid and Buldir islands. The incidence of oil diminished, but remained relatively high, through the central Aleutian Islands. We found very little oil elsewhere on the refuge. Most oil deposits were less than 5 cm in diameter. We discovered that most oil spots persisted for at least 18 months, and the amount of oil present increased between 1992 and 1994.

Analysis of samples, primarily from the central and western Aleutians, indicated the oil was mostly "bunker C", a heavy residual fuel oil used by large ships. The source of the oil is unknown. A U.S. Air Force base occurs on Shemya Island, and the military has been present in the area since WWII. It is possible that WWII era tanks, which held bunker C, may be leaking. Other possible sources include leaks from sunken ships or bilge pumping by large ships passing the western Aleutians. This latter source seems plausible because many ships traveling between the west coast of the U.S. and the east coast of Asia pass between Buldir and Shemya.

Effects of beach oil on wildlife were not measured, but we found oil on live and dead birds of nearly every species that occurs in the nearshore zone. A logical next step might be to evaluate accumulation of oil in intertidal organisms to determine whether hydrocarbons are entering the food web.

Byrd, G. V., J. C. Williams, and G. Thomson. 1995. The status of oil pollution on beaches of the Alaska Maritime National Wildlife Refuge, 1992-1994. AMNWR, Homer, AK.

*Response of Black Oystercatchers and Pigeon Guillemots to Removal of Introduced Foxes.*--The Exxon Valdez Restoration Program funded an effort to restore populations of black oystercatchers and pigeon guillemots and other native birds. Surveys of oystercatchers and guillemots were made to provide a basis for evaluating future increases after fox removal. The project will be continued in 1995 and a report written later.

*Waterfowl Surveys at Shemya I.*--The U.S. Air Force funded wildlife studies at Eraekson Air Force Base Shemya I. Abstracts from the reports on activities in 1994 follow:

Two U.S. Fish and Wildlife personnel visited Shemya Island from January 14 to January 21, 1994 to conduct winter waterfowl surveys and beach oil contamination surveys. Refuge personnel have annually visited Shemya each winter since 1988 to conduct waterfowl surveys, as several species of management concern are found in abundance at Shemya including emperor geese and harlequin ducks. This baseline data set will allow managers to identify changes in population trends, and may suggest possible management options or solutions.

Favorable weather conditions permitted three waterfowl surveys on 18-20 January. Data collected included information on flock size, sex ratios, age ratios, and distance offshore for harlequin ducks and common eiders. Counts and age ratios of emperor geese were also recorded. Juvenile emperor geese were classified into family groups when possible, collar codes of neck-collared geese were recorded, and any oil contamination on geese was also recorded. beach surveys for oil contamination were conducted on 15 and 16 January.

Up to 398 emperor geese were counted in one survey. Juvenile geese comprised from 5.2-9.8% of those geese aged, and the mean family group size ranged from two to three juveniles. Three collared geese were seen, K-88, L-79, and N-99. Up to 406 harlequin ducks and 871 common eiders were counted in one day. Twenty-five species of birds and three species of mammals were observed in total during our stay.

Approximately 11,374 meters of shoreline were surveyed for oil, primarily on the south side of the island, with 19 spots observed. Most of the oil was found concentrated in areas of sections M-4 and N-6. One oil sample was taken and forwarded to USFWS Contaminants Division for analysis. Data will be compiled in a refuge-wide report examining the impacts of low-level chronic oiling throughout Alaska.

Lipinski, L. and G. Thomson. Trip report: Winter wildlife survey, Shemya I., Alaska. 14-21 January 1994. U.S. Fish and Wildl. Serv. Rep. AMNWR 94/01. Adak, AK. 17 pp.

Two U.S. Fish and Wildlife personnel visited Shemya Island from February 11 to February 18, 1994 to conduct winter waterfowl surveys and beach oil contamination surveys. Refuge personnel have annually visited Shemya each winter since 1988 to conduct waterfowl surveys, as several species of management concern are found in abundance at Shemya including emperor geese and harlequin ducks. This baseline data will allow managers to identify changes in population trends, and may suggest possible management options or solutions to management problems.

Marginal weather conditions permitted only two waterfowl surveys on 12 and 13 February. Data collected included information on flock size, sex ratios, age ratios, and distance offshore for harlequin ducks and common eiders. Counts and age ratios of emperor geese were also recorded. Juvenile emperor geese were classified into family groups when possible, collar codes of neck-collared geese were recorded, and any oil contamination on geese was also recorded. Beach surveys for oil contamination were conducted February 12-16.

Up to 417 emperor geese were counted in one survey. Juvenile geese comprised from 6.5-7.4% of those geese aged, and the mean family group size ranged from 1.4 to 1.5 juveniles. Two collared geese were seen, K-88 and L-79. Up to 396 harlequin ducks and 559 common eiders were counted in one day. Twenty-one species of birds and five species of mammals were observed in total during our stay.

Approximately 25,287 meters of shoreline were surveyed for oil, with approximately 1,189 spots observed. The majority of the oil (98%) was found in the rugged coves on the north side of the island, including one extensively hit area in section D-10, which covered approximately 15% of an area 12 m by 5 m, and 15% of an adjacent area 3 m by 1 m. Twenty-six oil spots contained one or more bird feathers. Seven oil persistence plots were set up consisting of one to several spots of oil, and five oil samples were collected and forwarded to USFWS Contaminants Division for analysis. Data will be compiled in a refuge-wide report examining the impacts of low-level chronic oiling throughout Alaska.

Lipinski, L. and G. Thomson. Trip report: Winter wildlife survey, Shemya I., Alaska. 11-18 February 1994. U.S. Fish and Wildl. Serv. Rep. AMNWR 94/02. Adak, AK. 26 pp.

Two U.S. Fish and Wildlife personnel visited Shemya Island from March 11 to March 18, 1994 to conduct winter waterfowl surveys and beach oil contamination surveys. Refuge personnel have annually visited Shemya each winter since 1988 to conduct waterfowl surveys, as



several species of management concern are found in abundance at Shemya including emperor geese and harlequin ducks. This baseline data set will allow managers to identify changes in population trends, and may suggest possible management options or solutions to management issues.

Excellent weather conditions permitted three waterfowl surveys on 13-15 March, and two additional emperor goose surveys on 12 and 17 March. Data collected included information on flock size, sex ratios, age ratios, and distance offshore for harlequin ducks and common eiders. Counts and age ratios of emperor geese were also recorded. Juvenile emperor geese were classified into family groups when possible, collar codes of neck-collared geese were recorded, and any oil contamination on geese was also recorded. Beach surveys for oil contamination were conducted 14 and 16 March.

Up to 443 emperor geese were counted in one survey. Juvenile geese comprised from 9.4-16.9% of those geese ages, and the mean family group size ranged from 1.2 to 1.8 1.5 juveniles. Three collared birds were observed, K-88, L-79, and N-99. Goose K-88 was first sighted on Shemya this winter, December 1993 (Lipinski and Thomson, 1993). Geese L-79 and N-99 have both been seen on Shemya every winter since 1988-89, with the exception of winter 1992-93, when N-99 was not sighted (USFWS Trip Reports: Winter Wildlife Surveys, Shemya I., Alaska, 1988-1993). All three of these birds exhibited a high wintering site fidelity over this 1993-94 winter season, as each goose was repeatedly observed in the same areas each month (Lipinski and Thomson, 1993 and 1994). Up to 527 harlequin ducks and 775 common eiders were counted in one day. Thirty-two species of birds and four species of mammals were observed in total during our stay.

Approximately 13,315 meters of shoreline in sections along the north shore were surveyed for oil, with approximately 678 spots observed. One extensively hit area is in section D-10, which covered approximately 15% of an area 12 m by 5 m, and 15% of an adjacent area 3 m by 1 m. Seven oil persistence plots established February 1994 were rechecked, none of which showed any significant change. Data will be compiled in a report which examines low-level, chronic oiling throughout the Alaska Maritime National Wildlife Refuge.

Lipinski, L. and G. Thomson. Trip report: Winter wildlife survey, Shemya I., Alaska. 11-18 March 1994. U.S. Fish and Wildl. Serv. Rep. AMNWR 94/03. Adak, AK. 25 pp.

*Status of Murrelets at Adak.*--Surveys were conducted on marbled and Kittlitz's murrelets to determine areas of use and indices to abundance. The study will be continued in 1995, and no report of results was available at this time.

### C. Support of Outside Research on the Refuge

In 1994, the refuge staff coordinated with and supported to various degrees the following researchers working on the refuge:

Research projects conducted on Alaska Maritime NWR in 1994.

Researcher	Affiliation	Subject
George Hunt	Univ. of California, Irvine	Feeding ecology of auklets
Fiona Hunter	Cambridge Univ., England	Sperm competition in seabirds
Ian Jones	Simon Frazier Univ., Canada	Behavior of auklets
Doug Siegal-Causey	National Science Foundation	Cormorant systematics
Richard Merrick	National Marine Fish. Serv.	Steller sea lion ecology
Don Calkins	Alaska Dept. Fish and Game	Steller sea lion ecology
John Piatt	U.S.G.S/Bio. Resources Div.	Seabird ecology
Karen Holder	Queen's Univ., Canada	Rock Ptarmigan systematics
Vicki Friesen	Queen's Univ., Canada	Murre genetics
Jim Estes	U.S.G.S./Bio. Resources Div.	Sea otter ecology
Ed Murphy	Univ. of Alaska, Fairbanks	Aircraft disturbance
Alan Springer	Univ. of Alaska, Fairbanks	Seabird prey
Dean Kildaw	Univ. of Alaska, Fairbanks	Red-legged Kittiwake

### D. Technical Assistance, Presentations, and Publications

*Assignments to Technical Committees.*--Staff members served on various committees as follows:

SWB Byrd served as chair of the Aleutian Canada goose recovery team and as a member of the Steller sea lion recovery team.

*Technical Workshops.*--The staff participated in the following workshops in 1994.

Exxon Valdez Oil Spill Trustee Council workshop-- Term wildlife biologists Dave Roseneau and Arthur Kettle, and SWB Vernon Byrd presented papers on EVOS funded work on

the refuge (Barren Island seabird studies) and otherwise participated in the annual technical workshop in Anchorage.

Steller Sea Lion Recovery Team Meeting.--SWB Byrd participated in a recovery team meeting in Seattle, Washington.

Pacific Seabird Group Monitoring Committee--SWB Byrd was appointed the Alaska Representative for the committee and as such compiled and presented an overview of the kinds of monitoring data available for seabirds in Alaska at the annual meeting.

Beringian Seabird Group Workshop on Red-legged Kittiwake--SWB Byrd, WB Sowls, WB Williams, and BT Dragoo participated in the workshop in Anchorage.

Circumpolar Seabird Group--SWB Byrd compiled a summary of murre data for Alaska to present at this meeting where a murre monitoring strategy was being discussed as part of the Convention on Arctic Flora and Fauna.

Rat Prevention Team.-- WB Sowls organized a workshop to develop a plan for prevention of further rat introduction on Alaska islands.

Region 7 Biologists Workshop--SWB Byrd presented an overview of the refuge biological program at this workshop, and he led a group to start to develop standard approaches to monitoring wildlife on refuges in Alaska.

*Presentations.*--The refuge biological staff presented papers at the following technical meetings in 1994.

Pacific Seabird Group Annual Meeting--Titles of papers presented by staff members at the annual meeting in Sacramento in January 1994 follow. Abstracts are published in *Pacific Seabirds*. 1994. 21: 35-52.

Byrd, G.V. Status of seabird at Bogoslof Island, Alaska, site of a recent volcanic eruption.  
Sowls, A.L. and G.V. Byrd. Rats: Past damage and present threats to Alaska seabirds.  
Williams, J.C., G.V. Byrd, and V. Zubakin. Status and ecology of whiskered auklet.

North American Wildlife Resources Conference--SWB Byrd present a paper on the response of birds to removal of introduced foxes and coauthored a paper on seabird monitoring (see publications for titles).

Alaska Bird Conference--Staff members presented the following papers at the meeting in Cordova in April 1994.

*Publications.*--The following papers were published by refuge staff members in 1994.

- Bailey, E.P. Introduced rats on Alaskan islands--History, current status, and future threats. *Circumpolar Seabird Bulletin* 1:18.
- Byrd, G.V. and J.L. Martin. The Alaska Maritime National Wildlife Refuge: Its role in conservation of Alaska's seabirds. *Circumpolar Seabird Bulletin* 1:18-19.
- Byrd, G.V. and J.C. Williams. Buldir Island, Alaska: A major monitoring site for seabirds. *Beringian Seabird Bulletin*:28.
- Byrd, G.V. and J.C. Williams. Status of seabirds at Bogoslof Island, site of a recent volcanic eruption. *Beringian Seabird Bulletin*: 44-45.
- Byrd, G.V., J.L. Trapp, and C. Fred Zeillemaker. 1994. Removal of introduced foxes: A case study in restoration of native birds. *Trans. N. Am. Wildl. & Nature. Resour. Conf.* 1994:317-321.
- Hatch, S.A., G.W. Kaiser, A.Y. Kondratyev, and G.V. Byrd. 1994. A seabird monitoring program for the North Pacific. *Trans. N. Am. Wildl. & Natur. Resour. Conf.* 1994: 121-131.
- Hatch, S.A., G.W. Kaiser, A.Y. Kondratyev, and G.V. Byrd. An international program for seabird monitoring in the North Pacific. *Beringian Seabird Bulletin*: 7-13.
- Roseneau, D.G., J.A. Cooper, and A.B. Kettle. Restoration activities following the Exxon Valdez oil spill: Murre population counts and productivity in the Barren Islands, Alaska. *Circumpolar Seabird Bulletin* 1: 25-26.
- Sowls, A. and G.V. Byrd. Prevention of Norway Rat introductions in the Pribilof Islands to save some of Alaska's most impressive seabird colonies. *Beringian Seabird Bulletin*:
- Williams, Jeffrey. Status of kittiwakes and murres at Buldir Island, Alaska, 1974-1993. *Beringian Seabird Bulletin*: 48-49.

## 2. HABITAT RESTORATION

### A. Restoration of Maritime Tundra for Native Birds by Removing Introduced Foxes

In 1994, the ongoing introduced fox removal program continued. This program includes rechecking islands from which foxes have been removed in the recent past to insure that complete eradication had been accomplished, and starting new islands. A summary of the results for each island follow:

*Rechecks of Islands Where Prior Removal Efforts Occurred.*--The following islands had rechecks in 1994.

Herbert Island-- Thomson, G. 1993. Eradication of arctic foxes on Herbert Island in 1993. U. S. Fish and Wildlife Service Report, AMNWR 93/35. Adak, AK. 14pp.

Yunaska Island-- island rechecked in 1994. Memorandum located at U.S. Fish and Wildlife Service, 2355 Kachemak Bay Dr., Ste. 101, Homer, AK 99603.

Thomson, G., J. Arnold, and J. Wraley. 1993. Eradication of arctic foxes on Yunaska Island, Alaska in 1993. U. S. Fish and Wildlife Service Report AMNWR 93/34. Adak, AK. 35pp.

Kagamil Island--The introduction of arctic foxes (*Alopex lagopus*) to most of the Aleutian Islands has caused the demise of several species of breeding birds, and the Aleutian Canada goose (*Branta canadensis leucopareia*) almost became extinct. Since 1949 the policy of the U.S. Fish and Wildlife Service has been to eradicate non-native foxes from the Aleutian Islands.

Kagamil Island is the last island in the Island of Four Mountains group with arctic foxes still present and was targeted for eradication in 1994 because of its proximity to Chagulak Island, site of a remnant breeding population of Aleutian Canada geese. We removed a total of 34 arctic foxes from the island in 1994 and believe there are no foxes remaining on the island. With no predation pressure from foxes, insular avifauna should recover quickly to biodiversity levels present prior to fox introductions.

Thomson, G. 1994. Eradication of arctic foxes on Kagamil Island, Alaska and additional biological observations in 1994. U. S. Fish and Wildlife Service Report, AMNWR 94/13., Adak, AK. 33pp.

*Fox Removal.*--Fox removal efforts were continued or initiated on the following islands.

Little Tanaga, Umak and Igitkin islands--rechecked in 1994. Memorandum available at U.S. Fish and Wildlife Service, 2355 Kachemak Bay Dr., Ste. 101, Homer, AK 99603.

Fischer, J. B. and A. G. Palmer. 1993. Survey and removal of introduced arctic fox at Little Tanaga, Umak, and Igitkin islands - June - September, 1992. U. S. Fish and Wildlife Service Report AMNWR 93/04. Adak, AK. 27pp.

Simeonof and Chernabura--As part of an ongoing program to restore insular biodiversity by removing introduced species, arctic foxes were eliminated from Simeonof and Chernabura islands in the outer Shumagin Islands. Thirty-three adult foxes were trapped on Simeonof Island, but only three foxes were trapped on Chernabura, an island of which the fox population evidently was dying out. Foxes were first introduced on Simeonof (4050 ha) and Chernabura (3012 ha) for fur farming in 1890 and 1900, respectively. Foxes were released on only two other islands in the Shumagins earlier than on Simeonof Island.

No records of nesting populations of seabirds or other avifauna prior to the release of foxes on these islands are available. Because of the extensive flat terrain on Simeonof Island comparatively few seabird species and numbers probably previously nested there, but the island's extensive wetlands most likely formerly were used by large populations of breeding waterfowl and shorebirds. Judging from its more rugged coastal topography, Chernabura once probably was inhabited by substantial colonies of nesting seabirds. Indeed, one historical account indicated that huge colonies were still present 50 years ago.

Despite intensive trapping efforts on Simeonof for 5 weeks before leaving the island, fox tracks were detected at least three different locations, but sufficient traps were left in those areas to hopefully eliminate the two or three animals remaining after our departure for Chernabura. These areas must be thoroughly checked when the entire island is surveyed for fox sign in the summer of 1995.

Besides removing foxes from Simeonof and Chernabura islands, several visits were made to nearby Little Koniuji Island to ascertain whether any foxes remained following eradication efforts during the summer of 1993. Unfortunately a set of tracks initially was discovered in two places on opposite sides of this large island; however, subsequent visits after new traps were deployed revealed no fox sign.

Populations of pigeon guillemots and black oystercatchers were repeatedly surveyed on Simeonof and Chernabura as well as on three nearby fox-free islands for comparisons to record future anticipated large population increases after the annihilation of foxes. Distribution and abundance of other birds and marine mammals also were documents.

Bailey, E. P. 1994. Eradication of arctic foxes on Simeonof and Chernabura islands, and a recheck of Little Koniuji Island, Shumagin Islands. U. S. Fish and Wildlife Service Report, AMNWR 94/15, Homer, AK. 24pp.

#### 4. FISH AND WILDLIFE MANAGEMENT

##### B. Disease Monitoring and Treatment

We received reports of dead wildlife (mostly bald eagles and sea otters) throughout the year. In most cases, we salvaged specimens to distribute to education, research or government entities. The included the National Wildlife Health Research Center (NWHRC), Law Enforcement (and subsequently, the Bald Eagle Repository), and the Marine Mammals Management office.

Injured live bald eagles were evaluated by a local veterinarian, and then either euthanized or sent to "The Learning Center," a rehabilitation facility in Anchorage, or rehabilitated briefly in Homer by a veterinary health clinician and released.

WB Slater completed necropsies of 2 sea otters for Marine Mammals Management. Necropsies were completed locally on a trial basis to evaluate its cost-effectiveness with regard to the handling time involved in preparing and shipping carcasses otherwise.

##### C. Reintroductions

Translocations of wild Aleutian Canada geese (*Branta canadensis leucopareia*) has been a major component of the Aleutian Canada goose recovery plan. The Aleutian Canada goose was downlisted from endangered to threatened status, due in large part to these previous translocation efforts. Most translocation work has been concentrated in the Near Island group (Nizki-Alaid and



Agattu Is.) at the western end of the Aleutian Island chain where bald eagles (*Haliaeetus leucocephalus*) are absent. To the east of Buldir I., bald eagles have proven to be a serious deterrent to the reestablishment of geese on island such as Little Kiska and Amchitka.

Historically, there have been 3 separate populations of Aleutian Canada geese. These 3 populations, referred to as the western, central, and eastern populations, have had their centers of distribution located at Buldir, Chagulak, and Kiliktagik Is., respectively. These populations were once considered separate breeding segments for management purposes. Recent work on the central population at Chagulak I. indicated the population was not increasing in numbers. The U.S. Fish and Wildlife Service determined that the western and central populations were similar enough that birds could be translocated from Buldir I. (western population) to Yunaska I. (central population) to help bolster that population. This presented a complicated logistical problem because the distance between islands was far greater than that involved in previous translocations. As a result, alternate release sites were selected in case developing severe weather mandated a release prior to reaching the primary site of Yunaska I.

In 1994, personnel of the Aleutian Islands Unit of the Alaska Maritime National Wildlife Refuge translocated 166 Aleutian Canada geese from Buldir I. to Skagul I. (an alternate release site) and Yunaska I. Of these 166 geese, 71 were female goslings. Female goslings pair with a mate on the wintering grounds and return to the island where they first learned to fly. Therefore, these females represent a maximum potential recruitment of 71 breeding pairs at Skagul I. and Yunaska I. in 1996 when they reach 2 years ago, the minimum age at first breeding. The actual number of geese returning will be much lower than the maximum due to various sources of mortality, most notably predation from bald eagles, prior to the fall migration. A monitoring program on wintering grounds in California will provide information about survival rates that may be used to gauge the initial success of the translocations.

Williams, J.C. 1995. Banding, translocation, and monitoring of Aleutian Canada geese in 1994. U.S. Fish and Wildlife Serv. Rep. AMNWR 94/12. Adak, Alaska. 34 pp.

#### E. Predator and Exotic Control

During 1995 activities continued on two fronts related to keeping new exotic rodent species (primarily Norway rats) from becoming established on AMNWR lands and attempts to lessen the number of rats on ships were begun.

*Rat Prevention.*--During 1994 Pribilof harbor defenses continued improvement in design and numbers of stations. Bait, both peanut butter on snap traps, and weatherblock poison bait in bait stations, were becoming moldy within a few days to weeks. Moldy bait is less desirable to rats and mold was causing considerable added maintenance. Also beetles were eating the weatherblock and while they did not take noticeable quantities, they perhaps were creating a path where non-target species might get some poison from eating beetles. Mold problems were solved by wrapping peanut butter in thin plastic and switching to a bagged rodenticide (Havok). Rats can smell the bait through the packing, but mold does not grow on the baits.

An application was made to the Environmental Protection Agency for a section 18 waiver to allow for the use of rodenticides in areas not currently approved on the label. This was sought so the Service could respond to shipwrecks to stop rats/mice which might be introduced to new islands.

The FWS made a proposal to the Alaska Board of Game to implement a contingency plan to prevent rat infestation on additional islands by using rat poison and other methods to respond to shipwrecks. Unfortunately, the Board of Game denied the request. State/Federal disagreements on other issues including aerial wolf hunting, and subsistence fishing management are thought to have been a factor in the denial.

Art Sows met with the Alaska Department of Environmental Conservation (ADEC) health inspectors and discussed the rat issue and concerns about the floating processor fleet being a possible source of rat introductions. Health inspectors had many interesting comments and became more aware of the issue. Hopefully, ADEC inspections will help eliminate infested processor ships. Redenticide training classes were given in cooperation with the ADEC Pesticide Program. Classes were held in Anchorage (26 people certified) and at St. Paul (16 people certified).

While St. Paul has had house mice for over 100 years, St. George has remained house mouse free. Two cases of house mice being delivered to St. George Island through air freight were noted in 1994. One got into the store and was trapped after causing much damage. The second arrived dead in a box with rodent damaged food. Northern Air Cargo was visited in Anchorage where the mice came from and evidence of house mice in their warehouse was noted. The company is going to do structural changes and a control program. Fortunately, Anchorage does not have rats, so the threat of rats being shipped by air from Anchorage is not now a concern.

With our technical assistance, the City of Saint Paul and the City of Saint George both passed similar ordinances concerning rodent prevention. This was a critical step since it provided the strongest mandate for protection of the Pribilof Islands from introduced rodents. Saint Paul's ordinance is shown below:

#### ST. PAUL RODENT ORDINANCE 9.1.6

##### Rodent Control

- (a) The council finds that control of rodents on St. Paul Island is critical to preservation of bird species which inhabit the island and that introduction of rodents to the island could cause catastrophic irreversible impacts on the bird populations.
- (b) *Prevention Program* - All structures and the land surrounding them which are used for commercial purposes to store food, and/or which produce food wastes, fish processing wastes, or

other waste products which might be a food source of any rodent shall maintain a rat prevention program that will include general sanitation monitoring and a trap, sticky board and/or bait station program.

(c) *Publicity* - A brochure "Are Rats on Your Ship?" was produced for distribution. Also, newspaper articles about the rat issue appeared in the Anchorage Daily News, Dutch Harbor Fisherman, and was also picked up by the Associated Press for worldwide distribution. NBC radio did a piece as well.

## 6. RESOURCES PROTECTION

### C. Manage Permits and Economic Uses

Activities occurring or proposed to occur on the refuge were reviewed by biologists.

## 8. PUBLIC EDUCATION AND RECREATION

### A. Visitor Services

*Proposed Visitor Center and Refuge Headquarters.*--The Environmental Assessment for the proposed visitor center and refuge headquarters was released in September followed by public meetings in Anchorage, Homer and Soldotna. The preferred alternative called for a 15,000 sq.ft. visitor center including a controversial seabird aquarium, 12,800 sq.ft. office, and 26,000 sq.ft. in support buildings: bunkhouses, warehouse and shop.

*Homer Visitor Center.*--Park Ranger Denise Witte ran the visitor center this summer, her second season on the refuge. Visitation of 15,758 was down 5% from 1993. This was probably due to 1993 being the 50th anniversary of the Alaska Highway which brought an unusual number of highway travelers to Alaska.

Center outreach remained stable with daily beach and bird walks and weekly children's programs. Volunteers Terry Carten, Jordana Leeb, Heather Dickenson and Robbie Smith manned the center.

*Cooperating Association.*--This was a good year for the Homer branch of the Alaska Natural History Association (ANHA) as sales increased dramatically to \$21,000, up 20%. A greatly expanded product line and better displays were responsible for this success. ANHA funds were used to support the Shorebird Festival - speaker travel, advertising and speaker reception; the Shorebird Sister Schools Program - AOL internet access costs for refuge and some participating schools; and the ferry program - lending library acquisitions.

## B. Outreach

*Environmental Education.*--This was an outstanding year for our environmental education program. A total of 2108 students were served almost a 100% increase over the preceding year. This was due to Witte's full time position which allowed us to take on many more programs. Programs were given on nearly every school day in May. Seabird, shorebird and wetland programs were the most popular.

Benson and Witte held the refuge's first teacher in service for 11 teachers from the Russian Old Believer Schools of Razdolna and Voznesenka. The day-long session focused on seabirds and led to further involvement between the refuge and those schools.

*Shorebird Sister Schools Program.*--The idea for an internet based, migration tracking program uniting schools up the flyway grew out of the shorebird festival. A volunteer Homer committee working with the refuge created the program including recruiting schools and scientists and developing the curriculum. Susie Alexander was contracted to run the program and prepare the curriculum under PR Witte's guidance. Funding for the program was tacked onto the Shorebird Festival Challenge Grant with the Chamber of Commerce and additional money was received from a grant from the Alaska Wildlife Federation.

Seventeen schools along the Pacific flyway participated in tracking the shorebird migration and communicating with the other sister schools on America On-Line. Field trips, on-line chats with scientists, regular student reports on the migration over KBBi radio, and a draft curriculum were the highlights. However, computer problems, the newness of the internet, and the difficulty of motivating schools far away were problems.

*Kachemak Bay Shorebird Festival.*--This is the second year for the Festival which is now widely recognized as a success. Guided shorebird stations, bird walks, pelagic birding trips, seminars, art gallery migration, the keynote brunch and book signing were all well attended. Keynote speaker was Julie Sibbing, Program Manager of the Western Hemisphere Shorebird Reserve Network.

PR Willy Dunne again managed the refuge's efforts which included planning and managing all the talks and birding events. Dunne and ORP Benson participated in planning sessions with the Chamber all year long. Derotha Ferraro was hired by the Chamber for festival director.

*Pribilof Stewardship Camps.*--This was the third year for this nature day camp for the mainly Aleut children of St. Paul and St. George islands in the Pribilof Island group. The camp is the result of a challenge cost share agreement with the cities of St. Paul and St. George; the Native Corporations, Tanaq and Tanadgusix; St. Paul Traditional Council; St. George IRA Council; the Pribilof School District and the Nature Conservancy. The Fish and Wildlife Service is the principle funder at \$21,000 with the school district next at \$12,000. Other funds came from National Marine Fisheries Service, a high school employment program and fundraising.

This was the first year that ORP Benson handled the grant administration including a mid-winter planning trip and a mid-summer monitoring trip to the islands. The school district handled the

day-to-day administration including hiring most of the employees. Aquilina Bourdukofsky headed up the St. Paul camp aided by Mike Etnier, Marissa Mercurieff and Patience Mercurief. Diane and Greg McGlashan were the St. George instructors.

The camps greatly expanded this year to seven weeks on St. Paul and four weeks on St. George with several overnight camping trips. About 70 kids participated in the camps over the course of the summer. Fur seals, seabirds, invertebrates, flowers, Native culture including foods and crafts, outdoor skills and the seal harvest were the principle topics covered in camp.

*State Ferry Naturalist.*--This program is a challenge cost share agreement between the refuge and the Marine Highway Program which provides passage, room and board for the refuge naturalist. PRS Carmen Field and Jim Barrett were hired as the ferry naturalists for the trips from Homer to Kodiak and the week long trips from Homer to Dutch Harbor.

The refuge naturalists present interpretive programs including slide shows, videos and demonstrations, spot and identify marine wildlife, provide roving interpretation and maintain a lending library onboard. The ferry passes through refuge waters, past refuge islands and past four other refuges. Three ports also host refuge headquarters.

## 9. PLANNING AND ADMINISTRATION

### C. Miscellaneous

#### 1. Personnel

##### PERMANENT FULL-TIME:

Susie Alexander	Auto Ofc. Clerk	GS-4	08/08/94-pres
Edgar Bailey	Wildlife Biologist	GS-11	10/01/81-pres
Al Bayer	Ship Operator	WG-12	06/06/86-04/18/94
Kevin Bell	Ship Oper. 1st Mate	WG-11	07/08/87-pres
Laurie Benson	Outdoor Rec. Planner	GS-9	07/17/88-pres
Daniel L. Boone	Deputy Refuge Manager	GS-12	06/24/94-pres
G. Vernon Byrd	Superv. Wildl. Biologist	GS-12	09/23/92-pres
Trina Fellows	Accounting Technician	GS-5	11/28/83-pres
Carol Hagglund	Budget Assistant	GS-7	08/21/83-pres
John Martin	Refuge Manager	GM-13	12/21/81-pres
Gary Montoya	Deputy Refuge Manager	GS-12	12/27/92-pres
Eric Nelson	Marine Machine Mech.	WG-10	02/21/89-pres
B. Leslie Slater	Wildlife Biologist	GS-11	11/16/92-pres
Al Smith	Ofc Auto Clerk	GS-4	12/26/93-04/30/94
Katherine Smith	Ofc Auto Clerk	GS-4	06/01/92-pres
Arthur Sowls	Wildlife Biologist	GS-11	09/28/86-pres
Denise Witte	Park Ranger	GS-5	05/20/93-pres

## TERM:

Arthur Kettle	Biological Technician	GS-6	05/16/93-pres
Joseph Meehan	Wildlife Biologist	GS-7	07/23/95-pres
David Roseneau	Wildlife Biologist	GS-11	01/10/93-pres
Lisa Scharf	Biological Technician	GS-5	05/01/94-pres

## PERMANENT INTERMITTENT:

Ivan Davies	Marine Machinery Mech.	WG-10	03/25/90-pres
Don Dragoo	Biological Technician	GS-7	05/27/87-pres
Marcia Macone	Cook/Deckhand	WG-8	08/08/88-pres
Gregory Snedgen	Deckhand	WG-5	06/01/89-pres
Robert Ward	Cook (Deckhand)	WG-8	04/19/92-pres

## TEMPORARY:

Jim Barrett	Park Ranger	GS-5	05/15/94-pres
Barbara Blackie	Biological Technician	GS-5	05/24/94-09/30/94
Margi Blanding	Biological Technician	GS-5	06/26/94-10/30/94
Joel Cooper	Biological Technician	GS-5	05/17/92-pres
Belinda Dragoo	Biological Technician	GS-5	04/29/89-pres
William Dunne	Park Ranger	GS-5	05/20/91-pres
Mike Etnire	Training Instructor	GS-7	06/01/94-08/15/94
Carmen Field	Park Ranger	GS-5	04/15/93-pres
Julian Fischer	Biological Technician	GS-5	02/20/94-09/30/94
John Jamieson	Deckhand	WG-5	05/04/91-pres
Jeff Keyes	Relief Mate	WG-11	08/10/94-09/08/94
Angela Palmer	Biological Technician	GS-5	02/20/94-09/30/94
Susan Woodward	Biological Technician	GS-6	05/01/94-09/30/94
Jeffrey Wraley	Laborer	WG-2	05/19/91-pres

## VOLUNTEERS AND STUDENT CONSERVATION ASSOCIATION (SCA):

Jeremy Bahr	Columbus, OH	St. Lazaria
Barbara Bingham	Sitka, AK	St. Lazaria
Terry Carten	Connecticut	Homer Visitor Center
Wendy Cruso	New York	Aleutian Islands Unit
Heather Dickens	New Hampshire	Homer Visitor Center
Kent Hall	Sitka, AK	St. Lazaria
Neil Herring	Homer, AK	St. Lazaria
Jordana Leeb		Homer Visitor Center
Bev Minn	Sitka, AK	St. Lazaria
Carl Pallister	Sitka, AK	St. Lazaria
Robbie Smith	Oregon	Homer Visitor Center
George West	Homer, AK	Homer Visitor Center



Table 1. Staffing Pattern, Fiscal Years 1990 to 1994

	<u>Permanent</u>			Total
	<u>Full-Time</u>	<u>Part-Time/ Intermittent</u>	<u>Temporary</u>	FTE
FY 94	19.4	5.6	9.9	34.9
FY 93	14	7	13	21.8
FY 92	13	7	9	19.10
FY 91	15	6	15	28.88
FY 90	13	5	11	28.00

## 5. Funding

Table 2. Alaska Maritime Refuge Funding FY 1990 to FY 1994 (thousands).

	<u>FY 94</u>	<u>FY 93</u>	<u>FY 92</u>	<u>FY 91</u>	<u>FY 90</u>
1260	2,130.1	1979.1	2,087.0	1,715.7	1,392.3
1113	126.0	114.0	206.0	206.0	206.0
8610	52.0	45.3	--	14.0	26.6
1971	215.9	341.4	14.7	--	121.7
5390	--	--	--	14.3	55.0
1975	--	--	--	--	--
6850	--	--	--	--	--
4650	--	103.4	206.0	--	--
6320/30	--	10.0	45.0	--	--
8381	--	182.5	--	--	--
TOTAL	2,524.0	2,775.7	2,558.7	2,131.0	1,961.3

## E. *M/V TIGLAX* OPERATIONS

A draft ship's schedule was prepared by RM Martin and sent to all user groups. Supervisory Biologist Byrd reviewed the schedule and made comments.

Chief Mate Bell hired a local upholstery contractor and then assisted in measuring and removing the worn out galley benches and couches.

In mid January Chief Mate Bell, and three refuge staff members conducted a vessel tour for the Homer Intermediate school fourth grade classes. Approximately 85 students, teachers, and parents attended the class trip.

Chief Mate Bell worked with Fire Control Systems in conducting the annual fire inspection onboard *Tiglax*. The fixed engine room halon and galley suppression systems were tested, and reset.

Engineer Nelson ordered spare engine room parts and made repairs onboard the *Tiglax*. Maintenance work was also completed on refuge outboards, and vehicles. In March a local diver was hired to scrub and inspect the hull. During the same period, fuel, food, and deck supplies were purchased for the upcoming field season. The zincs on the keel coolers were inspected and replaced during the same period. In late March Chief Mate Bell inventoried the ship's medical chest and ordered out of date drugs.

In late April Captain Will Anderson was hired as the interim Master aboard *Tiglax*, replacing retiring Captain Alvin Bayer. Captain Anderson proceeded to inspect the ship, testing all four steering stations, and engine controls. The ship's whistle, running lights, radios, radars, and general alarms were tested.

On April 29 the *Tiglax* shifted from the transit dock to the outside ferry dock for loading fuel, food, and cargo. The engineer pumped dirty oil off the ship and replaced it with new oil and filters. Gasoline was also taken aboard for the outboards and the first cruise of the field season.

The *Tiglax* departed Homer for the Alaska Peninsula with BIA archeologists onboard. Several sites were surveyed during this first trip and the ship returned to Homer to drop off field personnel.

The ship reloaded cargo and supplies for the regular season and departed May 22. After getting underway all passengers and crew attended a fire and emergency drill. The emergency pump was tested for suction and the general alarm and ship's whistles were sounded.

The vessel and crews spent the next several months traveling thousands of miles across the Bering Sea and North Pacific Ocean setting up field camps and supporting many scientific parties. The Ship returned to Homer in late September, off loaded field camps and cargo; the *M/V Tiglax* then was secured alongside the transit dock for winter berthing.