ALASKA MARITIME NATIONAL WILDLIFE REFUGE

HOMER, ALASKA

ANNUAL NARRATIVE REPORT

CALENDAR YEAR 1991

U.S. Department of Interior
Fish and Wildlife Service
National Wildlife Refuge System

HOMER OFFICE

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REVIEW AND APPROVALS

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Refuge Manager — Date: 8/29/92

Associate Manager, Refuges & Wildlife — Date: 03/23/93

Regional Office Approval — Date: 3/23/93

INTRODUCTION

Homer Headquarters Office

Alaska Maritime National Wildlife Refuge

The 3,500,000 acre Alaska Maritime National Wildlife Refuge (Maritime Refuge) was established in 1980 by the Alaska National Interest Lands Conservation Act (Lands Act). This act added 460,000 acres of additional lands to eleven existing refuges combining practically all coastal refuge areas under one office. There are about 3,000 headlands, islands, islets, and pinnacle rocks within the refuge. These areas are used annually by about 75 million nesting seabirds representing about 80 percent of Alaska's seabird population.

Each of the eleven refuges included in the Maritime Refuge had their own establishing authority and purposes, but the Lands Act added to these stating management shall: 1) conserve fish and wildlife populations and habitats in their natural diversity; 2) fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats; 3) provide the opportunity for continued subsistence uses by local residents; 4) provide a program of national and international scientific research on marine resources; and 5) ensure, to the maximum extent practicable, water quality and necessary water quantity within the refuge. The Lands Act also established five distinct geographic refuge units: the Chukchi Sea Unit, the Bering Sea Unit, the Aleutian Islands Unit, the Alaska Peninsula Unit, and the Gulf of Alaska Unit (Figure 1).

The five units which comprise the Maritime Refuge have headquarters located in Homer, Alaska. Homer is situated on the south end of the Kenai Peninsula about 220 miles by road from Anchorage. There is a sub-headquarters at Adak which administers the Aleutian Islands Unit.

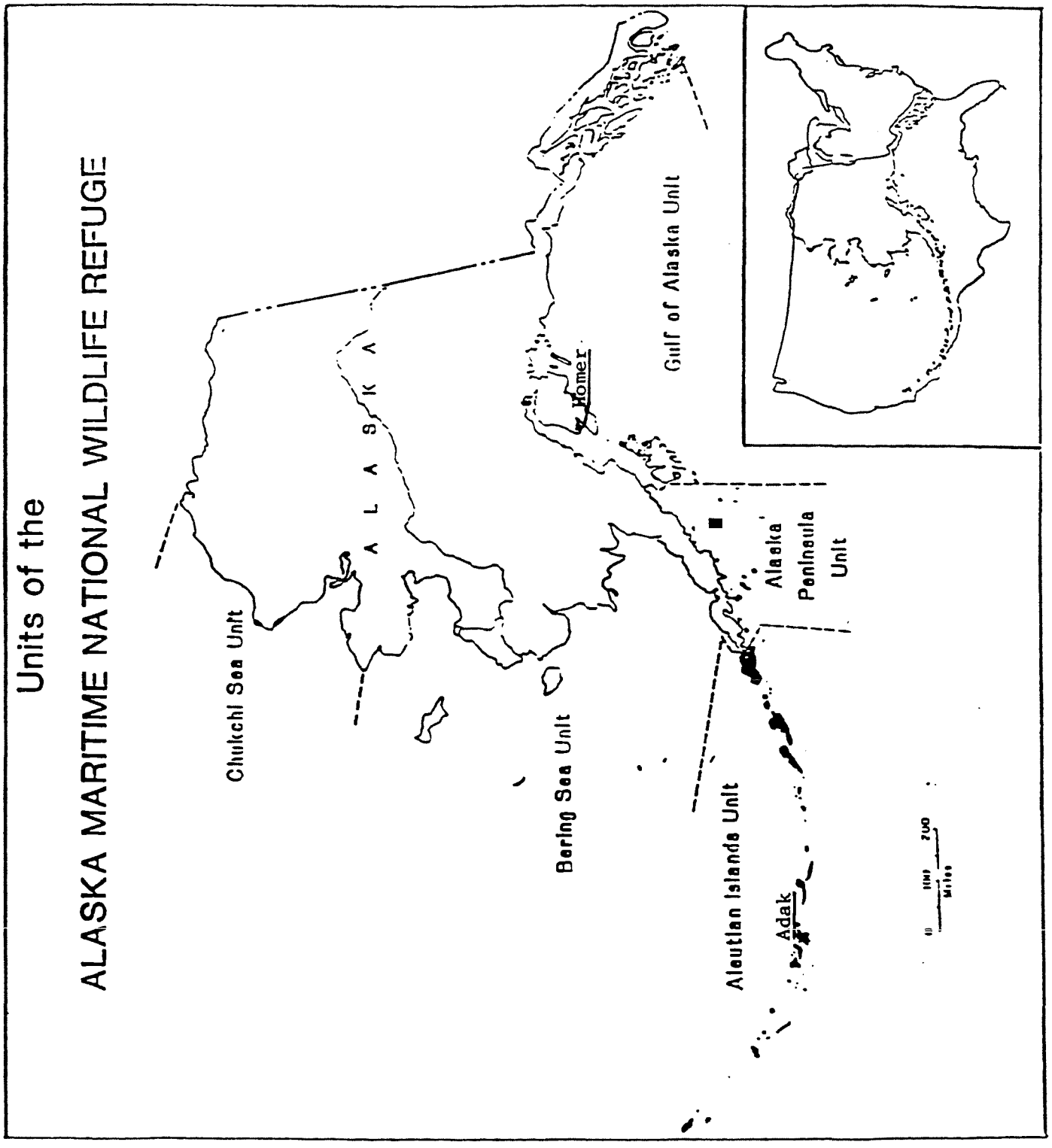
The sea is common to all refuge areas, but each unit has its own unique features. Lush rain forests dominate much of the precipitous small islands in the Gulf of Alaska Unit; there are mountains rising directly from the sea to over 9,000 feet on the volcanic and treeless Aleutian Islands Unit; and areas of permafrost and high coastal escarpments are found in the Chukchi Sea Unit.

Overall remoteness, bad weather and accompanying rough seas, swift currents, rocky shorelines, poor anchorages, and high cost of transportation make administration of the refuge difficult. Recent interests in the oil-rich areas off Alaska's coast, increased demand for fishery stocks, increased population, and increases in efficient and more comfortable tourist transportation to remote areas are adding to management responsibilities of the refuge.

Homer, Alaska is the home port for the motor vessel *Tiglax*. This vessel was commissioned in 1987 and services the needs of Region 7, Alaska Maritime National Wildlife Refuge and a variety of other users. Operation of the *Tiglax* is administered from refuge headquarters in Homer.

Prior to 1987 the refuge relied on chartering privately owned vessels. This arrangement resulted in too many compromises in safely accomplishing our mission.

Figure 1. Location of the units of the Alaska Maritime National Wildlife Refuge



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A. HIGHLIGHTS

- Funds received for visitor center land purchase and design.
- *M/V Tiglax* crew members receive Valor and Exemplary Act awards.
- Operational Review conducted.
- Tiglax has another successful season

D. PLANNING

1. Master Plan

The refuge was notified at the end of 1990 that the Service had received $3.4 million for land purchase and design of the refuge's proposed headquarters and visitor center complex. The refuge owned no land in Homer, was housed in a collection of rental buildings, and offered only a small storefront visitor center. The proposed headquarters would include offices, a warehouse, shop, bunkhouse, and a 16,000 square foot visitor center. By the end of 1991, a design firm was chosen as the top ranked firm, the statement of work for the contract was nearly complete, and the land acquisition was in progress.

A. Land acquisition

In February the money was finally received by the region which allowed the land acquisition process to begin. Criteria for land selection was developed and distributed to all realtors. A public meeting was held and talks were given to the Chamber of Commerce and the Rotary Club on the land selection process. A Service team composed of Manager Martin, ORP Benson, Regional Engineer Rudy Berus, Realty Specialist Bob Rice and Landscape Architect Leslie Kerr narrowed the 24 submittals down to the top three with a preferred choice. The project's citizen working group met and recommended the same top choice as the Service. After a regional office briefing, the decision was made to begin acquisition of the top site.

Unfortunately, this site consisted of 98 separate parcels with over 30 different owners or owner groups. The acquisition was to take 14 months, slowing the entire project. The site is on the main highway through town and contains ocean front beach berm, a tidal slough, wetlands, and a coastal spruce forest. It was the only site offering ocean views and ocean access necessary for marine education activities.

B. Project planning and contract preparation

Since this was the largest facility every constructed in the region and more projects were waiting in the wings, the regional engineering office, project lead, staffed up in anticipation. Three new engineers, an architect, a landscape architect and Carolyn Shelton, a part time interpretive specialist with extensive large center planning experience, were hired to form the team along with ORP Benson who was detailed to engineering. A trip to Homer plus visits to several visitor centers in the Anchorage area helped orient the team to the project.

Preparation of a statement of work for the design contract began with a "Vision" trip to some of the west coast's finest marine education facilities for manager Martin, ORP Benson, project manager Sherwood, and construction coordinator Art Weimerus. The group joined the National Habitat Center's D.C. planning team to tour the San Francisco Bay National Wildlife Refuge visitor center and environmental education center and Monterey Bay Aquarium. The Royal Museum of British Columbia, Pt. Defiance Aquarium, and Padilla Bay Environmental Education Center were also visited. Particularly eye-opening were the space needs of an environmental education program, a large volunteer program, and of course storage. Monterey Bay Aquarium was an impressive example of the impact of quality live animal displays as well as the creative use of volunteers.

The refuge hopes to capitalize on Homer's reputation as the marine field trip destination for Anchorage area schools with a significant EE program. To define the program and needed EE spaces, ORP Benson with the help of RO EE specialist Beverly Farfan prepared a questionnaire for local and Anchorage area teachers. Over 100 were distributed and 43 were returned. This was followed up by a one day brainstorming session for 19 selected teachers and EE leaders including some flown down from Anchorage. Farfan and Benson led the session which resulted in many creative ideas and generated a lot of excitement for the project.

Facilities most favored by the teachers were discovery labs with prepared activities, a resource library, an observation area, a nature trail, hands on objects, maps, and short subject videos. The most favored themes were marine pollution and threats, marine food webs, human/wildlife interactions and seabirds.

The visitor center theme was defined through a questionnaire and two workshops for selected refuge and RO staff led by interpretive specialist Shelton. Seabirds was selected as the unifying topic to which others such as work of the refuge, habitat, and marine threats would be tied. Making a big deal out of seabirds seemed most appropriate for a refuge with more nesting seabirds than the rest of the continent.

Work on defining the program and needed spaces for the visitor center and offices continued throughout the year culminating in a two day workshop put on by the planning team for all the refuge staff in early December.

C. Design firm selection

The planning team chose to hire one firm under an architectural and engineering qualifications based selection process to be responsible for the entire project including exhibits. The hope was that this method would better integrate the interpretive and architectural elements and provide better coordination.

Proposals were solicited in the "Commerce Business Daily" in July and twenty-two were received. A selection committee composed of ORP Benson, interpretive specialist Shelton, project manager Sherwood, architect Bales, and landscape architect Schrooten spent a week reviewing the telephone book-sized proposals and short-listing six firms. On an 11 day trip which took them from Fairbanks to Corpus Christi, the team interviewed the six and visited projects completed by each of them.

The Portico Group of Seattle was informed by year's end that they were the top ranked firm. Aldrich/Pears of Vancouver B.C. is their interpretive sub-consultant, Wildlife Concepts International is their live bird exhibit sub and about six other firms perform other sub-consultant design services. Portico et al were selected because of their creativity, experience with live exhibits including birds, and experience with government visitor centers. Portico with a different design firm had recently completed the Oregon Trail Center for BLM in Baker, Oregon. Aldrich/Pears did the Museum of Flight in Seattle.

2. Management Plan

Associate Manager George Constantino and Leslie Kerr from the Regional Planning office were here on May 8 assisting in development of a refuge operational plan. This plan will be a ready handbook, setting refuge goals and objectives for the next five years.

3. Public Participation

When concept planning first began for the visitor center in 1989 the refuge formed a citizens' working group composed of leaders from all facets of the Homer community to advise the refuge on the project. This group met once in 1991 to review the sites that were offered and make a recommendation as to the preferred site.

In addition, the refuge held a public meeting attended by 28 to gather citizen input on selecting a site. Briefings or meetings

were held with the city council, the public works department, the planning commission, the chamber of commerce, the rotary club, and the Seward Association for the Advancement of Marine Science. The refuge also had meetings with the board of the Center for Alaskan Coastal Studies and the director of the college to explore possible cooperative activities at the new center. A questionnaire seeking design advice was distributed to 100 teachers and 19 teachers participated in a brainstorming session on the new center. Refuge manager Martin and ORP Benson briefed aides for Senators Stevens and Murkowski, Benson briefed Representative Young.

E. ADMINISTRATION

Personnel

PERMANENT:

Bekki Andrew-Miller	Clerk-Typist, GS-3	10/25/89-06/24/91
Edgar Bailey	Wildlife Biologist GS-11	10/01/81-present
Alvin Bayer	Ship Operator WG-12	06/06/86-present
Kevin Bell	Ship Oper. 1st Mate WG-11	07/08/87-present
Laurie Benson	Outdoor Rec. Planner GS-9	07/17/88-present
Mike Blenden	Deputy Refuge Manager GS-12	02/27/89-present
Crispin Dippel	Wildlife Biol. (Term) GS-9	11/13/89-present
Trina Fellows	Refuge Clerk GS-4	11/28/83-present
Carol Hagglund	Budget Assistant GS-7	08/21/83-present
John Martin	Refuge Manager GM-13	12/21/81-present
Eric Nelson	Marine Machine Mech. WG-10	02/21/89-present
Michael Nishimoto	Wildlife Biologist GS-11	03/15/84-present
David Nysewander	Supervisory Wi. Biol. GS-12	09/28/86-present
Susan Schulmeister	Biological Technician GS-6	05/22/89-09/10/91
Arthur Sowls	Wildlife Biologist GS-11	09/28/86-present

PERMANENT INTERMITENT:

Jerry Andrew-Miller	Deckhand, WG-5	12/01/89-present
Ira Bailey	Relief Ship Operator WG-11	06/25/89-present
Ivan Daves	Marine Machin. Mech. WG-10	03/25/90-present
Don Dragoo	Biological Technician GS-7	05/27/87-present
Marcia Macone	Cook/Deckhand WG-8	08/08/88-present
Gregory Snegden	Deckhand WG-5	06/01/89-present

TEMPORARY:

Belinda Bain	Biological Technician GS-5	04/29/89-present
Andrew Brown	Biological Technician GS-5	06/17/91-09/06/91
William Dunne	Park Ranger GS-5	05/20/91-09/30/91
Julian Fischer	Biological Technician GS-5	06/09/91-09/30/91
Paul Grubb	Clerk Typist GS-3	06/24/91-09/12/91
Rebecca Howard	Biological Technician GS-3	06/07/91-09/30/91
John Jamieson	Deckhand WG-5	05/04/91-09/15/91
Thomas Fawcett	Biological Technician GS-3	06/03/91-09/08/91
Susan Matthews	Outdoor Rec. Planner GS-9	04/01/91-12/10/91*
Christine Minch	Biological Aide GS-3	05/10/91-09/07/91
Leslie Mulcahy	Cook/Deckhand WG-8	08/16/91-09/05/91
Cynthia Newton	Biological Aide GS-3	06/07/91-present
Greg Thompson	Biological Technician GS-5	05/21/91-08/26/91
Peter Waddington	Cook/Deckhand WG-8	04/16/91-10/01/91
Jeffrey Wraley	Laborer WG-2	05/19/91-present

*Converted to Career

VOLUNTEERS AND STUDENT CONSERVATION ASSOCIATION (SCA):

Kathy Broughton	Pribilof Islands, SCA	06/18/91-08/01/91
Lynn Denlinger	Cape Thompson, Volunteer	06/29/91-07/20/91
Carolyn Gove	Pribilof Islands, Volunteer	06/18/91-08/01/91
Jim Gove	Pribilof Islands, Volunteer	06/18/91-08/01/91
Jean Hulbert	Visitor Center, Volunteer	03/15/91-05/30/91
Michele Melendez	Semidi Islands, SCA	05/12/91-09/07/91
Jay Nelson	St. Mathews Is., Volunteer	06/18/91-08/01/91
Joana Przybilla	Visitor Center, Volunteer	05/31/91-09/05/91
Tom Staudt	Cape Thompson, SCA	06/09/91-08/24/91
Paula White	Pribilof Islands, Volunteer	07/01/91-08/25/91
Gregor Yanega	Cape Thompson, SCA	06/09/91-08/24/91

Four of the five units of the refuge are supported by personnel located in the Homer office. Personnel for the Aleutian Islands Unit are presented in that section. The staffing pattern for the Homer office is presented in Table 1.

Table 1. Staffing Pattern, 1987 to 1991

	Permanent			Total
	Full-Time	Part-Time/ Intermittent	Temporary	FTE
FY91	20	1	8	28.88
FY90	13	5	11	28.00
FY89	13	3	21	25.77
FY88	13	3	4	15.20
FY87	10	0	0	10.00

4. Volunteer Program

The volunteer program is actually the backbone of the summer field program. We have had tremendous success with this program by utilizing Student Conservation Association volunteers and other non-Association/refuge volunteers. We pay $88 per week per student through the Student Conservation Association or $20 per day for a refuge volunteer. Transportation costs are provided for all volunteers recruited from outside the local area.

Homer office personnel, (left to right) Hagglund, Sowls, Wood, Kuty, Nishimoto, Blenden, Dunne, Fellows, Sowls, Martin. M. Blenden 1991.

Tiglax crew, (left to right) Bayer, Bell, Nelson. M. Blenden 1991.

5. Funding

Alaska Maritime Refuge funding by programs for the last five fiscal years is presented in Table 2. Funding for the entire refuge is through the Homer headquarters office. Funds internally distributed to the Aleutian Islands Unit are discussed in that unit's section.

Table 2. Alaska Maritime Refuge Funding, FY 1987 to FY 1991

	1260	1400/ 1480/1113	1520	8610	1971	5390	1975	Totals**
FY91	1,715,671	206,000	-	14,000	180,979	14,330	-	2,130,980
FY90	1,392,300	206,000	-	26,597	12,697	55,000	-	1,801,594
FY89	1,544,000	330,000	-	15,933	60,036	-	11,438	1,961,407
FY88	1,395,600	340,000	-	17,700	-	-	69,498	1,823,023
FY87	1,154,000	346,000	-	19,000	-	-	68,201	1,587,201

**Includes 6850 funds of $225 for 1988.

The Alaska Maritime National Wildlife Refuge is headquartered at 202 Pioneer Avenue in downtown Homer. A total of $59,400 (which includes utilities, snow and refuse removal) is paid for approximately 4,032 square feet of leased office space. An additional 1,400 square feet of storage space located at 509 Sterling Highway, is leased at the rate of $769 per month.

6. Safety

First aid and CPR training were given to field people before leaving for field camps. In addition, all employees receive survival suit training and must complete the U.S. Coast Guard Water Survival Series of video tape training. All permanent employees who operate boats must complete the U.S. Coast Guard Auxiliary Small Boat Safety and Seamanship course.

Following last year's boating accident on the refuge, Region 7 has taken a hard look at its watercraft safety policy. Kevin Bell, First Mate on *M/V Tiglax*, participated in a working group appointed by the Regional Director tasked with updating the watercraft safety policy. By year's end a new policy had been drafted with an ambitious training schedule, staffing requirements and equipment specifications, effective next year. Once approved, this policy will represent a large step forward in personnel safety.

On June 5, DRM Blenden, SWB Nysewander, WB Nishimoto, WB Dippel and BT Fawcett attended a bear safety training session held at Kenai National Wildlife Refuge.

On June 19, RM Martin and DRM Blenden conducted a bear safety training session for six refuge bio-techs and volunteers that will be working in bear country.

RM Martin, DRM Blenden, and SWB Nysewander attended an aircraft safety training session held at Kenai National Wildlife Refuge on March 11. WB's Sowls and Nishimoto attended this training provided by the Regional Aircraft Manager in Anchorage during September.

During April the *Tiglax* received a letter of inspection by the U.S. Coast Guard certifying all safety equipment and operations met their standards.

RM Martin, DRM Blenden, SWB Nysewander and WB Dippel took evening classes in preparation to take the U.S. Coast Guard "Six Pack" license test.

First Mate Kevin Bell participated in a Small Boat Safety School for instructors sponsored by the Department of Interior at Lake Mead, Nevada in November. Both the National and Region 7's Boating Safety Policy will benefit from his participation at this school.

8. Other

Thirty-four Special Use Permits were issued for activities in all refuge units except the Aleutian Islands Unit, which are prepared in the Adak office (see Aleutian Islands Unit section).

Eighteen permits were issued for the following activities in the Gulf of Alaska Unit (number issued): oil spill related activities (6), commercial set net fishing (2), commercial guided hunts and hunter transport (2), cattle grazing (1), charter vessel operation in refuge waters (3), helicopter access (1), survey Department of Defense debris (1), study northern sea lion (1), and collection of seabirds (1).

Three permits were issued for the following activities in the Alaska Peninsula Unit (number issued): cattle grazing (2), and operation and maintenance of seismic stations (1).

Three permits were issued for the following activities in the Chukchi Sea Unit (number issued): commercial guided hunts (1), mineral investigation and surficial geology (1), and vegetation surveys (1).

The following employees received Performance Awards during the year as a result of their last 4 or 5 performance evaluations.

Al Bayer	Captain *M/V Tiglax*
Crispin Dippel	Wildlife Biologist
Marcia Macone	Cook/Deckhand *M/V Tiglax*
Greg Snegden	Deckhand *M/V Tiglax*

For her efforts in 1989 Marcia Macone, Deckhand on *M/V Tiglax* travelled to Washington, D.C. to receive the Department of Interior valor award. Macone and Bob Schulmeister, maintenance worker at Izembek National Wildlife Refuge, rescued a man suspended from a fender, over the side of his burning vessel anchored in Dutch Harbor.

Kevin Bell, First Mate *M/V Tiglax* travelled to the Anchorage Regional Office to receive the Department of Interior Exemplary Act award for his role in coordinating the rescue and providing emergency medical attention to the victim.

Tiglax crew members Captain Al Bayer, Kevin Bell, Eric Nelson, Marcia Macone, Greg Snegden and Jerry Andrew-Miller were presented Exemplary Act awards from Regional Director Walt Stigletz for the rescue of a sailing yacht and two crew members from imminent danger. See attached letters of citation.

A complete refuge operational review was conducted on the Alaska Maritime National Wildlife Refuge during the week of March 4, 1991. The review followed national and regional guidelines, and concentrated on: 1) examining Refuge operations to ensure compliance with established policies, administrative guidelines, and public initiatives; 2) reviewing established goals, objectives, and management strategies to ensure they conformed with current philosophies; 3) assessing the Refuge staff's efforts to properly manage the Refuge towards the attainment of Refuge objectives; and 4) providing opportunities for in-depth discussions between the Regional Office and the Refuge staff on ways to improve operations and to identify situations or issues that are or will soon become management problems.

The team consisted of George Constantino, Associate Manager; Bill Seitz, Assistant Director, Alaska Fish and Wildlife Research Center; Bob Leedy, Chief of the Division of Migratory Bird Management; Ron Hood, Manager, Alaska Peninsula and Becharof National Wildlife Refuges; and Fred Nolke, Program Coordinator.

The intensive week of interviews and meetings resulted in a better understanding of the refuge program and a list of suggestions and action items for improving our operations. An additional benefit was the opportunity for refuge and regional office staff to interact in a social setting. Several evenings were devoted to cross country skiing and a dinner party.

Regional Director Stieglitz presents Exemplary Act Award to:

Tiglax Captain Bayer (right).

First Mate Bell (right).

Engineer Nelson (right).

Cook/Deckhand Macone (right).

Supervisory Biologist Nysewander (right) presents Performance Award to Biologist Dippel.

Deputy Refuge Manager Blenden (right) presents Performance Award to *Tiglax* Captain Bayer.

Supervisory Biologist Nysewnader (eyes closed) presents Perfomance Award to Biological Technician Bain.

F. HABITAT MANAGEMENT

6. Other Habitats

On May 10, DRM Blenden attempted to conduct a shoreline assessment with Exxon on Ushagat Island, but the flight was aborted due to weather. They did make it the following date when two beach segments were formally surveyed. No oil of any consequence was found and no further cleanup was recommended. Finally, we may be getting out of the oil spill cleanup business, at least this time.

H. PUBLIC USE

1. General

1991 was another year of expansion and change for visitor services at the Homer Office. Work began on land acquisition and planning for the new visitor center/headquarters complex for the refuge. The new visitor center will be about 16,000 square feet and contain a live bird exhibit, an auditorium, environmental education classrooms, and nature trails. (See the discussion under planning.) ORP Benson was detailed to the RO engineering staff, the lead office, to work full time on the project.

Sue Matthews, a former Service employee, was hired as a GS-09 Outdoor Recreation Planner temporary to take Benson's place. ORP Matthews created a highly successful outreach program for the refuge visitor center including evening slide shows and movies and a children's program at the library. SCA volunteers increased from one to two. The only disappointment in the summer was that the highly successful ferry naturalist program was drydocked along with the ferry for most of the summer.

2. Outdoor Classrooms - Students

The refuge was very involved with local schools particularly during the spring Sea Week period. ORP Matthews, dressed in a puffin costume, gave a presentation on seabirds to eight different groups, a total of 250 students at Paul Banks Elementary during Sea Week. In addition, Matthews did a presentation on seabirds and whales to a pre-school class, a presentation on the refuge, seabirds, and marine mammals to home school students and their parents. The *M/V Tiglax* crew helped out with cook Marsha Macone giving a presentation on migration to the kindergarten and first mate Kevin Bell a study unit on the Aleutian Islands to fourth graders. Matthews also created a four session course on birds for the local 4-H Club. As one of the projects the 4-Hers constructed an eagle nest for use in the visitor center.

Elderhostel, a college sponsored education program for senior citizens, held two sessions in Homer this year. Matthews gave presentations on marine mammals and seabirds to both sessions.

As part of the new refuge outreach program created by Matthews, SCAs Pitts and Przybilla and Park Ranger Dunne put on children programs twice a week in July and August. The younger children programs at the library were almost too popular with over 30 kids showing up for some sessions. The older children sessions were held at Bishop's Beach Park. A hit for this group was a visit from bird bander George West and recently captured birds. Total attendance at all the children's programs was 162 children and 55 adults.

Student Conservation Association volunteer, Przybilla helps children make puppets as part of a lesson on walrus. The twice weekly summer children's programs at the library were appreciated by local families. P. Benson 1991.

3. Outdoor Classrooms - Teachers

An unusual statewide gathering of all environmental education staff for the Service occurred in the fall, and allowed each refuge to bring a teacher from a local community near the refuge. Third grade teacher, Debbie Poore, accompanied ORP Matthews and both enjoyed the training as well as the opportunity to establish contacts within the Service from all over the state.

6. Interpretive Exhibits/Demonstrations

The refuge continued to make do with the cramped "storefront" it uses for the visitor center. Although the regional office had approved expansion of the visitor center, the money did not arrive in this calendar year. Due to an extremely poor tourism year in Homer and the space limitations of the facility particularly for parking and group activities, visitation at the refuge leveled off at 6189 visitors, the same as the preceding year. SCA volunteer Mary Ellen Pitts returned for a third year, joined by newcomer SCA volunteer JoAnna Pryzybilla.

Local volunteer Jean Hulbert created a new exhibit for the visitor center on alcids and improved two others prior to the start of the season. A local volunteer taxidermist, Doug James, prepared 10 new mounts for the visitor center.

ORP Matthews created a summer outreach program for the center to get beyond the space limitations of the site. Once a week eagle films were shown at the college and slide shows on the refuge were given at Pier I Theater on the Homer Spit. The slide shows proved particularly popular because people could easily get to the theater from their campsites.

7. Other Interpretive Programs

The successful naturalist program on the state ferry begun in 1990 continued this year with another challenge grant. ORP Matthews renewed the cooperative agreement with the state marine highway system for another five years. Under the terms of the agreement the state supplies passage, berth, and food and the Service provides a trained naturalist. Park Ranger Willie Dunne, a Homer resident and commercial fisher, was hired for the job. Unfortunately the state ferry *Tustemena* remained in drydock undergoing repairs for much longer than anticipated. Ferry service did not resume until August 20th limiting Dunne to a total of four trips on the ferry.

Park Ranger DeZeeuw answers wildlife questions on the state ferry *Tustemena*. A refuge naturalist accompanies the ferry to Kodiak and Dutch Harbor in the Aleutians. P. Benson 1990.

The route of the *Tustemena* passes through waters and near lands of the Alaska Maritime refuge and four other refuges, Kodiak, Izembek, Alaska Peninsula, and Becharof. Nearly all of the scenery viewed from the ferry is part of a refuge and the ferry calls in three ports which are home to refuge headquarters.

Park Ranger Dunne presented programs on wildlife topics, ran a lending library of wildlife oriented materials, showed videos and slides, and helped with wildlife spotting and identification.

The refuge staff gave a variety of other presentations to various community groups including the Homer Senior Center, the Anchor Point Chamber of Commerce, and the Homer Long-Term Care Center.

ORP Matthews put together a challenge grant with The Nature Conservancy, City of St. Paul, the children of St. Paul, and TDX, the island Native corporation to put out a brochure on visitor guidelines for St. Paul Island in the Pribilofs. The Pribilof Islands bird colonies, the largest in North America, are under increasing risk of disturbance by the growing commercial fishing fleet's large crews who come ashore for recreation. This brochure received a "Take Pride in America" Certificate of Merit award.

8. Hunting

Currently the State of Alaska is debating ways to legally allocate guide/outfitter areas across Alaska. In case the Fish and Wildlife Service decides to institute its own system, all refuges were solicited to suggest logical areas on their areas of responsibility. Two distinct guide areas were proposed on Alaska Maritime National Wildlife Refuge. One would be Cape Thompson and Cape Lisburne on the Lisburne Peninsula, and the second area would be Sutwik Island south of the Alaska Peninsula.

11. Wildlife Observation

Wildlife watching opportunities continued to increase in the Homer and Seward areas as new boats and new companies entered the marine wildlife tour business. No numbers are available for Homer but Seward use increased to over 40,000 passengers to the Chiswell Islands unit of the refuge.

The successful Seward charter boat operator training session put on by the refuge and Kenai Fjords National Park in 1990 was repeated again this year. ORP Matthews did a talk on seabirds to the enthusiastic crowd of over 100 people, which included all of the staff from the military recreation camps in Seward.

The refuge again put out an information sheet on marine wildlife charters in the Homer area to help tourists get out on Kachemak Bay.

As part of the refuge outreach program, weekly bird walks were offered on the Spit by Park Ranger Dunne or ORP Matthews. A total of 74 people attended the walks during the summer.

17. Law Enforcement

DRM Blenden and Regional Aviation Manager/Pilot Sarvis flew to Chisik Island on May 7 in response to a report of unpermitted commercial herring fishing on the island. No one was there when they arrived, but evidence was found indicating one or two individuals had been there for a short time earlier in the spring.

DRM Blenden spent May 21-24 at Yukon Delta National Wildlife Refuge conducting spring waterfowl hunting patrols with Special Agent/Pilot Kim Speckman. Blenden acquired an increased sensitivity for the difficulties of managing the Arctic nesting goose issue.

18. Cooperating Associations

This was the third year of operation for the Homer branch of the Alaska Natural History Association. Our product line was

expanded to include more children's books but the number of items was still limited by the display space. Sales were up 8.4% and the per customer dollar take rose from $1.08 in 1990 to $1.17 in 1991.

I. EQUIPMENT AND FACILITIES

3. Major Maintenance

The *M/V Tiglax* was commissioned on July 2, 1987 in Homer, Alaska. The keynote speaker at the ceremony was Senator Ted Stevens, and Kathryn Stevens christened the vessel. The 120-foot vessel was designed by Jenson Maritime Consultants of Seattle, Washington, and built by Moss Point Marine Inc. of Escatawpa, Mississippi. This report describes the 1990 operations of the *Tiglax*. The Refuge Manager, Alaska Maritime National Wildlife Refuge is responsible for the operation and management of the *Tiglax* and for the coordination of the U.S. Fish and Wildlife Service's (Service) science program utilizing the vessel. The vessel provides essential support to all aspects of management to this refuge and enables the Service to collect the information needed to monitor the condition of various marine resources, especially marine birds. It is used to transport personnel, equipment, and supplies from remote work sites. Scientists use the vessel to monitor seabird colonies, survey island habitats, work to reestablish endangered species, identify archaeological and historical resources, monitor human impacts on wildlife habitats and populations, monitor commercial activities in refuge waters, assess populations and distribution of forage fishes upon which seabirds feed, and respond to oil spills and other pollution incidents. *Tiglax* provides a seagoing research platform used by refuge personnel and scientists from the Alaska Office of Fish and Wildlife Research, other research offices and other agencies.

The *Tiglax* has been very dependable in the past five years but has been and still is plagued with several serious design and/or application problems which have worsened and will continue to create operational or safety hazards to a more severe state.

We hope to accomplish the following work during the refit period upcoming next spring.

1. Propellers are incorrectly designed, do not allow crash tops and overload the main engines creating excessive wear.

2. Starboard propeller is out of pitch and prevents the full use of the starboard engine.

3. The main engine keel cooling system is inadequate (design error) which creates an overheating condition on both main engines. This prevents the full use of main engine power

and neither engine could be used independently in an emergency situation without over heating.

4. Auxiliary engine cooling systems are inadequate (design error). The auxiliary engines overheat. The vessel depends on these engines for everything except propulsion.

5. The auxiliary engines are not marine type engines. The exhaust gases leak into the engine room (very hazardous). The engines are a very old model and are not being manufactured any more. These engines do not provide a long working life and are almost wore out.

6. The generator sets are under sized. It requires both generators to raise the anchor, an unacceptable system. One generator must be able to power all necessary equipment and machinery.

7. Marcon, the manufacturer of our ships alarm system is going out of business. The alarm system is computerized and repair, technical expertise and parts will probably become unavailable. This event would require replacement of the alarm system.

8. The back up anchor was not provided with a fairlead, making it very dangerous to use.

9. The step down transformers which provide 280 and 120 volt power are not designed for intended use aboard the *Tiglax*. Improper voltage supply causes havoc with electricity and electronics.

10. Piping installed during construction in the bilges and fuel tanks is poor quality and several pipes have let go spraying sea water into the engine room. If allowed to deteriorate more a very hazardous situation will occur.

11. Sea chest valves are leaking and must be rebuilt to allow securing of all sea water lines.

12. Yard arms were constructed improperly, allowing excess vibration to occur. This causes failure of navigational and communications equipment antennas.

13. A fill well on the hull of the ship below the water line was discovered to be unfinished. This weldment is susceptible to cracking which would allow sea water to enter the cargo hold.

14. The *Tiglax* is due for its three-year shipyard drydocking and 5-year refit.

4. Equipment Utilization and Replacement

The *M/V Tiglax* spent five months at sea and traveled over 14,000 nautical miles in support of Service and BIA projects. The work itinerary was:

April 23-27: *Tiglax* underway for Adak

April 28 - May 15: Transporting BIA archaeologists to numerous islands in the Delarof group, Tanaga, Kanaga, and Adak Islands in support of ANCSA.

May 16 - 23: Support oil assessment studies and set up field camp at Chowiet Island and the Semidi Islands.

May 24 - 30: Support fox eradication at islands of the Four Mountains and Kasatochi Island. Held open house at Atka Island.

May 31 - June 15: Transport and set up field camps at Buldir and Agattu Islands in support of Alaskan Canada Geese, Puffin and other seabird studies. Support Aleutian Canada Goose translocation habitat studies, surveys for returning geese and surveys for potential release sites.

June 16 - 18: Transport and set up field camps on Amatignak and Ulak Islands for fox eradication.

June 19 - 23: Move field camp at Agattu to a new location. Re-supply two Agattu Island camps and Buldir camp.

June 24 - 27: Transported and set up field camps at St. Matthew Island in support of seabird and walrus studies.

June 28 - July 15: Support joint USA-USSR seabird and hydro-acoustical studies in Soviet and American waters from the Seward Peninsula to Big and Little Diomede Islands, to the Chukots Peninsula.

July 16 - 20: Pick up St. Matthew field camp and transport to St. Paul Island.

July 21 - 22: Pick up personnel at Amatignak Island for transport to Shemya.

July 23 - August 19: Translocate Aleutian Canada Geese, set up spike camps at two goose release sights, deliver field crews to Shemya, pick up two field camps at Agattu Island, held open house at Shemya Air Force Base, picked up two spike camps and Buldir Island main field camp for the Aleutian Canada Geese. Picked up boats and gear at Amchitka Island,

picked up Ulak Island field camp and transported all camps and personnel to Adak.

August 20 - Sept.5: Supported puffin/pollack and seabird hydro-acoustical studies in eastern Aleutians, Pavlov Island, Shumagin Islands, Semidi Islands, the Alaska Peninsula and Kodiak Island.

Arrived in Homer the evening of September 5, 1991.

During five continuous months at sea the *Tiglax*:

1) Traveled 14,991 nautical miles.

2) Held four open houses, three at remote villages and one at Shemya Air Base.

3) Performed work at 52 different islands, many of them on numerous occasions.

4) Transported, set up and picked up 15 main field camps and six spike camps.

5) Had 72 people aboard (not all at once):

60 Americans
5 Soviets
4 Canadians
1 Frenchman
1 Britain
1 Australian

6) Three federal agencies, BIA, MMS, and USF&WS utilized the *M/V Tiglax*.

7) From May 31 through June 23 numerous sea lion counts were made and sea lion scat collected for further study.

In addition to its scheduled work, the *Tiglax* provided support to:

1. The University of Kansas in their efforts to survey an archeological site at Buldir Island in search of bones from a possibly unknown commorant.

2. Plastics pollution studies conducted by "Defenders of Wildlife".

3. Soviet marine biologists while conducting plankton studies in the Bering Sea (Siberia).

4. Two Minerals Management Service biologists conducting

seabird studies aboard the *Tiglax* and on Little Diomede Island.

5. Maintenance personnel during reconstruction of damaged cabins on remote islands.

6. Region 7 archaeologists while they conducted :midden site" surveys in the Aleutian Islands.

7. National Marine Fisheries Service in connection with the decline Stellar Sea Lions and their subsequent listing as an "endangered species".

8. The American Museum of Natural History in their collection of seabird specimens in western Alaska.

On September 6, 1991 the M/V *Tiglax* was secured at Homer Harbor transit dock and went on shore power.

The *Tiglax* will be in Homer to give the crew a rest, allow the ships officers to perform inspection and administrative duties. The *Tiglax* is due for a five-year shipyard refit.

Vessel Accomplishments FY 91

Following are some accomplishments which do not show up in schedules and work advices:

1. Kevin Bell presented a program and gave tours of the *Tiglax* to 80 4th grade students and the Kachemak Bay Yacht Club.

2. Greg Snegden received advance working diver training through N.O.A.A.

3. Implemented a fuel spill and hazardous waste response plan for the *Tiglax*.

4. Implemented a shipboard fire fighting response plan; including additional fire team drills.

5. Re-wrote *Tiglax* safety plan.

6. Posted additional caution and warning signs as suggested by Public Health Service. Replaced worn and damaged safety placards.

7. Chief Mate Kevin D. Bell completed the U.S. Coast Guard exam for Master of Motor Vessels of 1600 TONS and received his license.

8. The Captain, Chief Mate, Chief Engineer and able bodied

seaman received U.S. Coast Guard approved training in ship board fire fighting and all received certificates.

9. Chief Engineer, Eric Nelson, after extensive training on his own time, became a nationally qualified Emergency Medical Technician. Eric now provides a very useful service to the community, as a volunteer EMT. This training is also very valuable aboard the *Tiglax*.

10. Compiled a "5-year refit" contract requirement proposal to allow the *Tiglax* to go to a shipyard for refit work.

11. Sounded and charted previously uncharted coastal waters and bays at Little Diomede Island, Big Diomede Island (Siberia) and parts of the Chukotsk Peninsula (Siberia). The Semidi Islands, Mitrofania Island, Mitrofania Bay, B. Konuiji Island, St. Paul Island, St Lawrence Island, St. Matthew Island, Hall Island, Bogoslof Island and Egg Island in Beaver Inlet.

12. Made one positive I.D. of an immature short-tailed Albatross.

13. Made arrangements with the Homer Harbor for semi-permanent berthing along side our newly installed 480 volt shore power outlet.

14. At our request a hazardous materials specialist with U.S. Public Health Service inspected the *Tiglax*, inventoried all hazardous materials aboard, provided "materials Safety Data Sheets" for all hazardous materials, pointed out possible hazards and provided U.S. Fish and Wildlife with a report on his findings and recommendations.

15. The MSO Kenai Station shipping safety inspector for the U.S. Coast Guard inspected the *Tiglax* for possible safety violations and issued the Captain of the *Tiglax* a letter of "compliance" with U.S.C.G. safety standards.

Special Notes

The *Tiglax* supported the translocation of the "threatened" Aleutian Canada Geese. The *Tiglax* transported two "border collies" and a dog handler to Buldir Island to round up the geese for capture and transport to other islands. This was a record year, more geese were transported this year than ever before.

The *Tiglax* continued support of the Bureau of Indian Affairs work at identifying Aleut midden sites in the Aleutian Islands for ANSCLA. BIA was able to complete their work ahead of schedule and completed all required coastal studies this year. This ends BIA`s need to use the *Tiglax* in the future. The cooperation

between the U.S. Fish and Wildlife Service and BIA was very fruitful.

The captain of the *Tiglax* initiated a cooperative agreement with the Division of Marine Mammals, N.O.A.A. Sand Point, WA to provide photographs of Killer whales in the Aleutian Islands and Bering Sea for National Marine Fisheries program to identify and catalog all Killer whales from numerous area's of the Aleutian Islands, Bering Sea, Shumagin Island, and Kodiak Island.

The *Tiglax* was host to the Region 7 Coastal Project Leaders annual meeting. The *Tiglax* housed 16 people, provided conference room space and all the amenities necessary for everyone's comfort and convenience. Marcia Macone cooked two meals each day plus a few sweets.

A joint USA-USSR seabird and hydro-acoustical study was conducted with the cooperation of Alaska Maritime National Wildlife Refuge, the *M/V Tiglax*, Minerals Management Service, Migratory Birds-Region 7, Research-Region 8, and the Soviet Union.

Five Soviet scientists plus Research Region 8 and MMS personnel were supported in their studies in American and Soviet waters in the Bering Sea and Bering Straits.

Two Soviet scientists were transported from Nome to Big Diomede Island (Siberia) to conduct land based seabird studies. Meanwhile, the *Tiglax* directly supported ships board hydro-acoustical, pelagic seabird transects and plankton studies along the Chukotsk Peninsula (Siberia).

The Tiglax visited a Soviet Border Guard Station at Big Diomede. All passengers and most of the crew went ashore to visit and promote cooperative relations. All Americans were greeted and given a tour of the facilities. Small gifts were exchanged and friendship was the order of the day.

4. Equipment Utilization and Replacement (Cont.)

The services provided by our office landlord continue to deteriorate along with his financial standing. By year's end we were notified that his lending institution was now responsible for the building. Contracting and General Services has suggested we take over some of the routine maintenance and deduct these costs from our rental payments. We now pay for plumbing repairs, snow removal and sanding, and anything else necessary to keep the place functional.

The 21 foot Munson work boat, originally constructed to be used from the *Tiglax* was transferred to the National Marine Fisheries Service's Homer Law Enforcement Office.

J. OTHER ITEMS

4. Credits

The Homer office section was written and edited by Hagglund, Blenden, Martin, and Benson and typed and edited by Smith.

K. FEEDBACK

L. INFORMATION PACKET

ALASKA PENINSULA UNIT

ALASKA MARITIME NATIONAL WILDLIFE REFUGE

Homer, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1991

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

INTRODUCTION

Alaska Peninsula Unit

Alaska Maritime National Wildlife Refuge

The Alaska Maritime National Wildlife Refuge was created by the Alaska National Interest Lands Conservation Act in 1980. It was established to conserve fish and wildlife populations and habitats in their natural diversity, fulfill international fish and wildlife treaty obligations, provide opportunities for continued subsistence uses by local residents, provide a program of national and international scientific research on marine resources and 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 through most of coastal Alaska and extends from Forrester Island in Southeast Alaska along the Gulf of Alaska to the Aleutian Islands and northward until near Barrow in northwest Alaska. There are over 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 has five units with all former refuges designated subunits.

The Alaska Peninsula Unit is the second largest unit of the Alaska Maritime National Wildlife Refuge. Over 800 islands, totaling 600,000 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 which extend beyond mean high tide.

Except for the Aleutians, the greatest diversity of breeding seabirds is found along the south side of the Alaska Peninsula. Over 6,000,000 seabirds comprised of at least 25 species nest in this region.

Surprisingly, few of the islands remain truly pristine due to past introductions of foxes, rodents, and ungulates. Foxes destroyed fossorial and surface-nesting seabird colonies on numerous islands and left only remnant populations on others. More damaging than foxes on some islands, are the ground squirrels and voles which were released with them as an added food source.

Few people visit refuge islands except in the vicinity of villages, primarily Sand Point, Squaw Harbor, and King Cove; six other villages are located in the region. Egging and hunting of seabirds is generally negligible in this region where most residents derive their livelihoods from commercial fishing. The first contact between Russians and Alaska Natives occurred in 1741 in the Shumagin Islands. The islands have been little affected by off shore oil exploration and development, but exploration has begun in Shelikof Strait to the north and is planned elsewhere off the Peninsula. Human competition for fish relied upon by marine birds and mammals probably poses the greatest potential threat.

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G. WILDLIFE

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H. PUBLIC USE (cont.)

I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS

K. FEEDBACK

A. HIGHLIGHTS

In 1991 no time was spent by Alaska Peninsula Unit personnel on islands off the Alaska Peninsula. Instead, the Alaska Peninsula Unit crew removed alien foxes from two islands in the Aleutians. Oil spill funded monitoring of seabirds continued in the Semidi Islands. Aleutian Canada geese were found nesting on Anowik; they evidently originated from the nesting colony on nearby Kaliktagik Island. The Division of Research also conducted studies off several islands between the Sandman Reefs and the Semidi Islands.

B. CLIMATIC CONDITIONS

Cold Bay provides the only long-term weather records available for the south side of the Alaska Peninsula. Intermittent records are available from Sand Point in the Shumagin Islands and from Chignik, which lies 100 miles to the northeast. Sand Point's annual mean temperature is 37.9 F, and it averages 60.3 inches (four-year record) of precipitation. Chignik, one of the wettest stations in the state, averages 127 inches of precipitation and has an annual mean temperature of 38.5 F, based on 8 years of data.

In 1991 the annual mean temperature at Cold Bay was 39.1 degrees F, which was 1.1 degrees F above average (Table 1). Mean temperatures were above normal every month except February when -5 degrees F was recorded. The warmest reading was 70 degrees F in July. Annual mean precipitation (39.4 inches) was 4.39 inches above average in 1991, ranging from only 0.45 inches in July to nearly 6 inches in September.

D. PLANNING

1. Master Plan

See Homer office section.

2. Management Plan

See Homer office section.

5. Research and Investigations

Eight puffin colonies were visited by Research personnel from Anchorage for studies of chick diets in 1991 using the U.S. Fish and Wildlife research vessel "M/V Tiglax" between 20 August and 5 September. The field party consisted of Drs. John Piatt and Scotch Hatch, Jen Gervais, and Martin Robards of the Alaska Fish and Wildlife Research Center, Dr. Jay Piticchelli of the American Museum of Natural History, and volunteers Nancy Naslund and Martin Schultz.

Table 1. Weather Summary, Cold Bay, Alaska, 1991

	TEMPERATURES (F)				PERCIPITATION (INCHES)				WINDS (MPH)		
	Extremes										
Month	High	Low	Average	(Deviation)	Amount	(Deviation)	#Days	(≥.01)	Average	1-Minute*	Gust
January	45	12	31.1	(+2.8)	2.74	(+0.04)	18		20.1	49	60
February	50	-05	22.8	(-4.7)	2.95	(+0.68)	21		16.5	39	52
March	54	15	34.3	(+5.7)	4.33	(+2.02)	24		20.8	39	64
April	47	21	35.6	(+2.6)	1.96	(+0.01)	18		14.9	35	47
May	52	26	40.0	(+0.5)	2.47	(0.00)	22		16.1	53	73
June	55	35	45.5	(+0.1)	3.78	(+1.62)	22		16.2	37	53
July	70	40	50.8	(+0.5)	0.45	(-2.05)	11		13.7	41	54
August	64	39	51.6	(+0.4)	4.17	(+0.47)	25		16.8	43	58
September	58	36	49.5	(+2.0)	5.82	(+2.05)	27		16.5	48	75
October	54	26	42.0	(+2.5)	5.83	(+1.54)	19		17.6	58	77
November	50	22	36.0	(+1.7)	1.55	(-2.49)	19		16.8	45	55
December	45	08	29.7	(+0.2)	3.32	(+0.47)	24		18.0	45	61
	70	-05	39.1	(+1.1)	39.4	(+4.39)	250		17.0	53	75

* Greatest sustained wind for a 1 - minute period.

Colonies were sampled in the area between Umnak Island in the west and the Semidi Islands in the east. A total of 693 chick meal "loads" were collected from burrow entrances, for a total of about 1500-2000 individual prey types, although some 25-35 different prey species were collected and preserved (specimens not yet analyzed).

The most notable finding was the conspicuous absence of juvenile pollock from sampled areas in which juvenile pollock have historically been a dominant prey item (i.e., eastern Aleutians including Egg, Puffin, Aiktak, and Midun Islands). Larval surveys conducted by the National Marine Fisheries Service showed a near-complete failure of Shelikof Strait age-0 pollock year-class in 1991. Another surprise was the finding of a large proportion of age-1 pollock (ca. 180-210mm) delivered to chicks at Egg Island (near Unalaska I.). These prey appeared to be too large for chicks to consume, and many age-1 pollock were scattered on the ground around the colony-- apparently because they were rejected by chicks. We interpret this to mean that age-0 pollock were very scarce, and no suitable alternative prey (sandlance, capelin) were available to puffins in this area. Food also appeared to be scarce in the eastern part of the study area (Semidis) where sandlance typically dominate diets. Most common prey in this area were euphausiids, prowfish, and capelin. At Bogoslof Island, myctophids and squid dominated chick diets.

The number of burrows occupied by chicks-- a measure of breeding success-- varied considerably between sites. Occupancy was highest at Bogoslof Island and at a few sites in the Aleutians, and lowest at sites further east (although some chicks may have already fledged at eastern sites). Measures of chick growth suggested that birds in eastern colonies bred earlier, although birds at Bogoslof Island appear to be advanced in breeding compared to birds in the eastern Aleutian Islands. A colony at Kodiak Island was visited on 4 September, and very few birds were observed because fledging was almost complete by that time.

In addition to chick meal collection, 72 adult tufted puffins and other seabirds (n=65) were collected by shooting to examine stomach contents. An additional 25 puffins and 96 other seabirds were collected in the Shumagin Islands area in late July from the NOAA vessel "Miller Freeman". These stomachs show similar trends to the chick-meal collections, with some exceptions. Pollock were the dominant fish in diets of puffins and other seabirds in the Shumagins in late July. In late August, squid and myctophids dominated diets of puffins and murres at Bogoslof Island, and pollock formed the third most important prey for adults despite their scarcity in chick meals. Squid, polychaetes, and a few pollock were the most frequent prey eaten by adults at Egg and Aiktak Islands in the eastern Aleutians. Pollock dominated diets of adult puffins at Midun Island, in the Sandman Reefs, but were scarce in chick diets.

E. ADMINISTRATION

1. Personnel

See Homer office section.

2. Youth Programs

See Homer office section.

4. Volunteer Program

See Homer office section.

5. Funding

See Homer office section.

6. Safety

See Homer office section.

F. HABITAT MANAGEMENT

7. Grazing

Cattle remain on two islands with refuge lands, but no inspection was made on either island in 1991. Still no vegetative surveys have occurred t denote change after the removal of cattle on Caton, Simeonof, and Chernabura five years ago. In February an aerial survey of Sanak and surrounding islands revealed a total of 414 cattle and 15 horses. Some use ambient refuge islands.

G. WILDLIFE

2. Endangered and/or Threatened Species

While conducting seabird studies on nearby Chowiet Island (Semidis), Don Dragoo and Belinda Bain visited Kaliktagik Island to ascertain the number of Aleutian Canada geese nesting there. Geese also were found nesting on adjacent Anowik Island. Besides Amukta in the central Aleutians this is the only other island on which Aleutian geese have nested without being translocated after the absence of foxes.

5. Shorebirds, Gulls, Terns, and Allied Species

Don Dragoo and Belinda Bain continued field work at Chowiet Island, Semidi Islands, in the summer of 1991 as part of the T/V Exxon Valdez oil spill damage assessment studies. Productivity and population monitoring of northern fulmars, black legged kittiwakes and common thick-billed murres was conducted from 21 May to 31 August. Our 1991 estimate of numbers of northern fulmars on population plots was higher than all other estimates except for those from 1981 and 1989. We found significant differences between fulmar counts among years, but no trends. Northern fulmar productivity (0.18 chicks fledged /egg laid) was one of the lowest records for Chowiet Island fulmars. We found significant differences between fulmar productivity estimates among years, but no trends. The population estimate of black-legged kittiwakes on plots was the lowest on record, as was the number of nests counted on plots. We found a significant difference between kittiwake population estimates among years, but no trends. Black-legged kittiwakes failed to produce any fledged chicks on Chowiet Island plots in 1991 (0 chicks fledged/nest with eggs). They laid eggs in only 10% of the nests they built. Mean clutch size was 1.06 eggs/nest where eggs were laid. We found a significant difference between productivity estimates among years, but no trends. A significant positive correlation exists between the number of kittiwake nests counted on plots and kittiwake productivity. The 1991 population estimate of murres (species combined) was the highest on record. We found a significant difference between murre estimates among years, but no trends. Common murre counts from 1989 were significantly lower than those from 1991. There was no significant difference between the counts of thick-billed murres taken in 1989-1991. Productivity of common murres on our plots (0.52 chicks fledged/breeding site) was the second lowest on record for Chowiet Island. Thick-billed murre productivity (0.47) was similar to other years. The ratio of sites where an egg was laid to mean number of adults on productivity plots was 0.58 for common murres and 0.77 for thick-billed murres.

H. PUBLIC USE

Very little recreational use takes place on refuge islands south of the Alaska Peninsula. Sea kayaking occurs in rare instances because of the costly and different logistics and frequent foul weather. Increasing numbers of people ride the state ferry to Sand Point in the Shumagins and on to Dutch Harbor and thus at least have an opportunity to see some of our islands at a distance.

1. General

See Homer office section.

17. Law Enforcement

See Homer office section.

I. EQUIPMENT AND FACILITIES

4. Equipment Utilization and Replacement

See Homer office section.

J. OTHER ITEMS

3. Items of Interest

See Homer office section.

4. Credits

Most of the Alaska Peninsula section of this report was compiled by Edgar Bailey and typed by Jean Kuty and Kathy Smith. The Section on the Semidi Islands was excerpted from a report by Don Dragoo and Belinda Bain.

ALEUTIAN ISLANDS UNIT
ALASKA MARITIME NATIONAL WILDLIFE REFUGE

Adak, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1991

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

INTRODUCTION

Aleutian Islands Unit

Alaska Maritime National Wildlife Refuge

The Alaska National Interest Lands Conservation Act (ANILCA) combined a majority of Alaska's seabird habitat into one refuge by adding 1.9 million acres of land to 11 existing refuges to create Alaska Maritime National Wildlife Refuge.

The Aleutian Islands Unit (AIU) comprises about 3.3 million acres in southwestern Alaska and extends over 1,100 miles from Unimak Island west to Attu Island. The Aleutians are actually tips of an arc of 57 submerged volcanoes, 27 of which are active and rise 2,000 to over 9,000 feet above sea level. Izembek National Wildlife Refuge borders the east end of the unit.

Bounded by the Pacific Ocean to the south and the Bering Sea to the north, the unit includes over 200 treeless islands, islets and rocks. These surrounding oceans affect the climate and weather, and provide habitat and migrational pathways for fish, birds, and marine mammals.

The AIU is divided into seven island groups; The Near Islands, Rat Islands, Delarof Islands, Andreanof Islands, Islands of the Four Mountains, Fox Islands, and Krenitzen Islands. Unimak Island is also presently part of the unit but is not considered part of the Aleutian chain.

Approximately 68 percent or 2.3 million acres of the AIU is congressionally designated wilderness; this includes Unimak Island which has 910,000 acres of wilderness. Unimak has been proposed for transfer to Izembek National Wildlife Refuge.

The Aleutians have a maritime climate characterized by overcast skies, frequent, violent storms, high winds, fog and precipitation. Year-round temperatures are cool but not normally severe, with a mean annual temperature of 40 degrees F. Strong winds, sometimes approaching 100 m.p.h., can induce very cold wind chill factors.

The AIU provides unique nesting habitat for several million seabirds, the threatened Aleutian Canada goose, and other waterfowl. It is also an important migration and staging area for a wide variety of waterfowl, shorebirds and passerines and provides wintering habitat for emperor geese and other waterfowl. The refuge is one of the few places in North America where Asiatic birds are frequently seen in spring and fall. Fully 35 percent of all bird species observed in the Aleutians breed only in Asia; most are seen at the western end of the chain. Some 260 bird species have been recorded in the AIU.

The AIU has the largest nesting population of seabirds (approximately 10 million) in North America. It is one of the few refuges in the United States managed primarily for seabirds. A major problem affecting seabirds in the AIU is the widespread introduction of foxes. The Aleutians' 10 million seabirds is probably a fraction of what it was prior to fox introduction. Only 44 units of over 100 named islands, islets and rocks in the Aleutian Islands Unit, are fox-free; this constitutes approximately 6% of the total acreage.

Land mammals found in the AIU (other than Unimak Island) are generally non-native. Reindeer were introduced to Atka for food and for antlers to be sold as an aphrodisiac. The commercial venture failed and over 2,000 feral reindeer remain on the island. Caribou, from mainland Alaska, were released on Adak in 1958 for emergency food and recreational hunting. The herd is managed for a post-season population of 250 animals.

The Norway rat was accidentally introduced by early Russians and again during World War II and is now found on 20 islands throughout the chain. Introduced rodents act as predators of ground nesting birds; voles and ground squirrels cause erosion by overgrazing the vegetation.

Arctic and red fox were originally found on a few of the eastern Aleutians, but were introduced to over 80 other islands between 1836 and 1930. The damage to native bird populations on these islands is significant. Plans call for eradication of introduced foxes to allow native bird species to recover.

The Aleutian Islands were originally established as a refuge in 1913 to protect the sea otter. Since that time, the sea otter has made a dramatic recovery. Their population in the Aleutians is estimated to be 55,000-75,000.

An estimated 85,000 harbor seals are found throughout the Aleutians and can be seen hauled-out on offshore reefs, rocks, ledges, and beaches along the main islands. The northern or Steller sea lion is also found throughout the Aleutian Chain. The world population of northern sea lions has decreased by more than 50 percent in a decade, prompting National Marine Fisheries Service to classify them as "threatened" in April 1990. On certain rookeries in the eastern Aleutian Islands, the sea lion population is estimated to be 20 percent or less of its original numbers. In the western Aleutians, populations may have declined by over 60%.

Fourteen species of cetaceans have been observed in the waters of the Aleutian Chain: orcas, Dall porpoises and Minke whales are the three species most commonly observed.

The Aleutian Canada goose, short-tailed albatross, Chinese egret, Steller sea lion, and the Aleutian shield fern are the five

endangered/threatened species that have been observed in the Aleutians.

The Aleutian Canada goose historically nested throughout the Aleutians. Since the introduction of arctic foxes, these birds occur naturally on only two islands (Chagulak and Buldir) in the AIU. Neither island had foxes introduced. Reintroduced goose populations are developing on Agattu, Nizki-Alaid, and Little Kiska Island following fox removal.

To aid in the recovery, fox are being eradicated on selected islands and geese transplanted from Buldir to fox free islands where the birds historically nested. The Aleutian Canada goose population is estimated to be over 5,000 birds, up from its 1975 population of 700 geese.

The Aleutian shield fern, historically found only on Adak and Atka islands, was listed as endangered in 1988. Field work continues in an effort to prepare a recovery plan for this species, recently found only on Adak.

The Aleutians were originally occupied by the Aleuts, related to the Eskimos. Subsistence was entirely maritime, with extensive exploitation of local whales, sea mammals, fish, invertebrates, seabirds, eggs and plants.

The Russian fur trade and Russian Orthodox Church dominated Aleut life from the 1750's until the American purchase of Alaska. The early years, before the founding of the Russian-American Company, saw considerable loss of population from epidemic and other causes. Today's Aleut population numbers some 2,000 in only four villages but up to 20,000 once called these islands home.

The later history of the Aleutians was marked by a continuation of fur trapping, the introduction of fox farming, and the development of commercial fishing. The 20th century was dominated by World War II including the first occupation of America soil since the War of 1812.

During World War II, the Japanese seized Kiska and Attu islands after bombing the military bases on Dutch Harbor. The U.S. constructed large bases in the Aleutians with thousands of structures erected on Adak, Amchitka, Shemya, and other refuge islands. An assault on Attu Island resulted in a hard-won victory for the United States, followed by the Japanese evacuation of Kiska Island. Prior to the invasion of Kiska, there were 100,000 American and Canadian soldiers in the Aleutians. The recapture of Attu was the only battle of the war fought on U.S. soil; also the only battle fought in a National Wildlife Refuge.

Several sites in the Aleutians are National Historic Landmarks due to their significance in World War II. Attu, Shemya, Amchitka, and Adak are military bases. The Coast Guard maintains

a base on Attu Island and Shemya is an Air Force Base while the Navy is on Amchitka and Adak islands, the latter AIU headquarters. With over 5,000 people, Adak is the eighth largest community in Alaska.

The Department of Defense continues its Defense Environmental Restoration Program (DERP) to rehabilitate World War II military sites including chemical sampling and analysis for contaminants. Sites on Alaid, Agattu, Buldir, Amchitka, Tanaga, Atka, Great Sitkin, and Unimak islands in the AIU are targeted for cleanup.

Olaus Murie called the Aleutians "a melting pot" for species from two continents while Michael Frome described them as a "great oceanic crossroads". Ironically, the Aleutians' remoteness has not guaranteed their preservation and may have hastened their demise. Would Amchitka Island have been thrice-choked by nuclear blasts were it near Anchorage? Was it not the isolation that allowed a "forgotten war" of three years to leave a legacy of debris and toxic wastes that we are unable to clean up after half-a-century? And was it not this isolation that allowed foreign foxes to wipe out native birds as native Aleuts were being exterminated by foreign entrepreneurs and armies?

Geologically, the Aleutians are the youngest part of Alaska. But in 100 years, humankind has inflicted considerable damage by manipulating these islands, trying to make them something other than the Aleutians. Aldo Leopold said the first rule of intelligent tinkering is to "save all the pieces". Only time will tell if we have done so in the Aleutians. If we have not, time will not matter...

INTRODUCTION

G. WILDLIFE

H. PUBLIC USE

I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS

K. FEEDBACK .....Nothing to report

L. APPENDICES

M. INFORMATION PACKET

A. HIGHLIGHTS

Several personnel changes occurred during 1991; RM Boone arrived in January, ORP Cline transferred to Subsistence Management in April, CT Wiles resigned in July, CT Bradford was hired in November, and ORP Greffenius was hired in December.

The Field Financial Tracking System was implemented in April 1991.

A lightly attended public meeting was held in Unalaska to explain the draft EIS for Subsistence Management.

CT Wiles and BT Williams received Level 5 Performance Ratings; CT Wheeler and WB Byrd received Level 4's.

In 1991, 54 rare and accidental bird species were recorded in the AIU.

A successful Aleutian Canada goose translocation moved 183 birds to Agattu, Nizki-Alaid, and Little Kiska.

Tufted puffin - driftnet study at Buldir I. completed.

A program of weekly bald eagle surveys was begun in an effort to learn more about the age structure of the population.

A number of interesting research projects were initiated or are on-going throughout the AIU.

Caribou harvest for 1990-91 is 201.

Juvenile walrus seen on Agattu I. in June.

Fox eradication efforts continued; Amatignak, Ulak, and Little Tanaga were target islands in 1991.

Funding was received from several sources for the Clam Lagoon Auto Tour Route.

WB Byrd received "Professional Conservationist of the Year" award.

B. CLIMATIC CONDITIONS

The complex, highly irregular Aleutian weather is a frequent subject of discussion in and away from the islands. Conditions vary greatly and change abruptly. Individual islands have their unique micro-climates based upon storm tracks and topography. Weather data for 1991 were available from Shemya and Adak.

Due to the lack of nearby mountains to snag passing clouds,

Shemya receives considerably less precipitation than other Aleutian weather stations. In 1991, they received 32.4 inches of rain compared to 50.7 inches at Adak. Rainfall and the number of days of measurable precipitation were about the same each year. Even though incomplete, snowfall totaled 18 inches more than in 1990 (Table 1). Overall the winter/spring months had higher temperatures and the summer/fall months were cooler.

Total precipitation on Adak was about equal to 1990's; however, both years were approximately 30% below normal (Table 2). Snowfall in 1991 was 15.3 inches below normal. Above average amounts of snow occurred in March, April, and December, but all other months were below average. Maximum, minimum, and average temperatures were similar between years.

Storm force winds and drifting snow on January 15th prevented the daily Reeve Aleutian Airline flight from arriving. Near blizzard conditions occurred several times during the year but never caused an "Alpha" condition - complete close-down of majority of NAS activities.

Earthquakes are a monthly occurrence and residents soon learn to "roll with the punch" and go on about their business. Major rockers measured 5.6 (January 22nd), 6.5 (February 20th) and 5.2 on September 9th. A 3.5 occurred on October 2nd directly under Adak (it felt like a 5 or 6 magnitude).

An unusual thunder and lightning storm took place on March 3rd. The Naval Weather Service states that such storms are not uncommon; however, they normally happen at very high altitudes and we just don't hear or see them.

Several reports of volcanic activity were received throughout the year.

Plus tides and heavy seas washed rock from the seawall in front of our office, effectively closing the road for several days in December. (EVK)

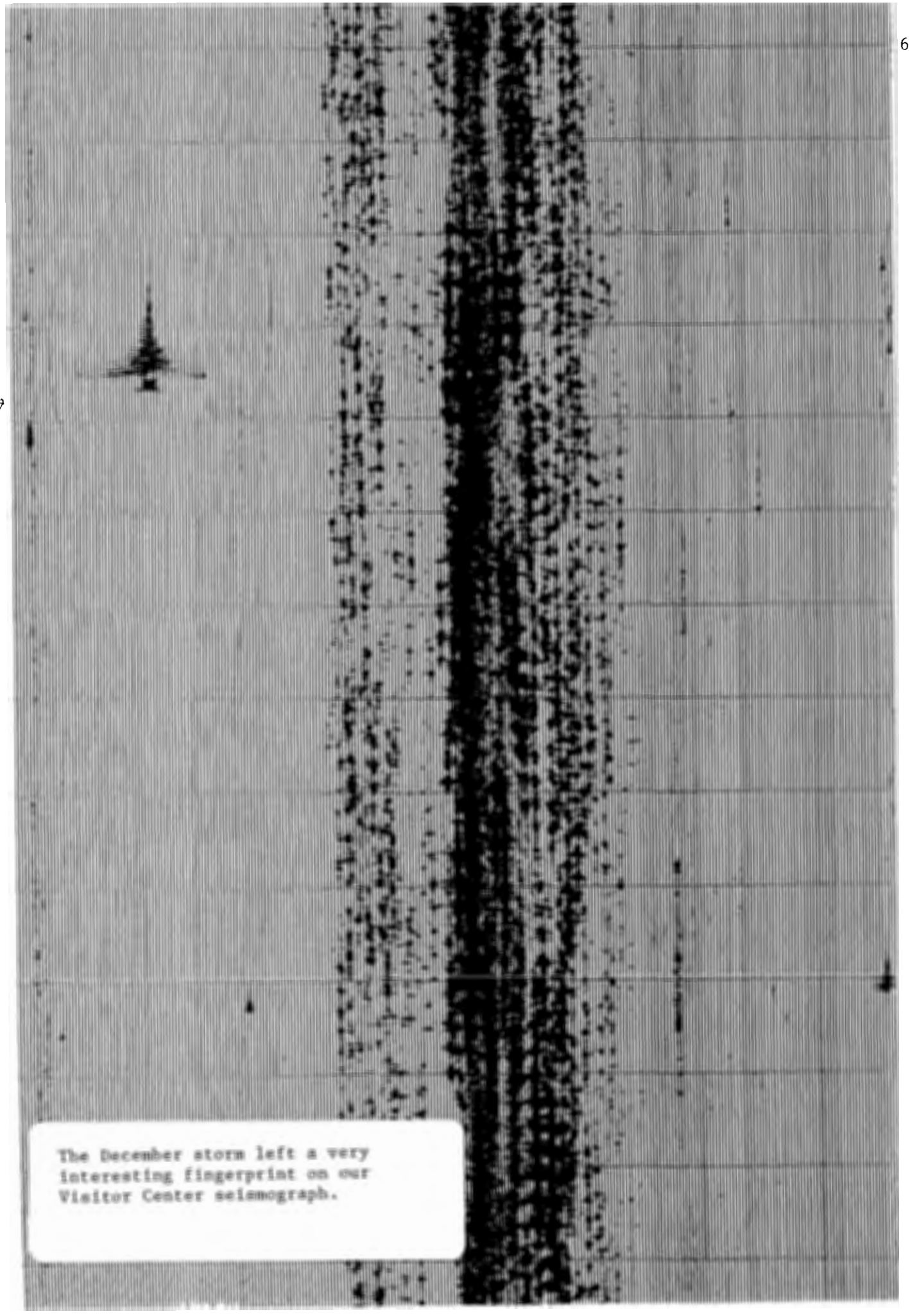
Table 1. 1991 Shemya, Alaska weather summary with comparisons to 1990.

	Inches of precipitation		Inches of snow		Days of measurable precipitation		Degrees fahrenheit				
							Maximum		Minimum		Average
	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1990
JAN	2.91	2.24	8.7	17.4	25	23	42	39	22	20	31
FEB	2.26	2.63	10.7	20.5	19	23	41	38	23	18	30
MAR	2.50	1.32	16.9	8.4	25	19	42	39	27	27	34
APR	1.23	0.62	7.6	1.1	22	11	44	45	28	32	38
MAY	2.06	2.06	1.2*	T	20	20	46	48	35	35	40
JUN	2.27	1.13	0.0	0.0	13	14	54	49	36	39	44
JUL	4.89	2.68	0.0	0.0	23	12	54	59	42	41	49
AUG	2.60	9.36	0.0	0.0	19	20	55	56	40	46	51
SEP	3.34	2.02	0.0	T	19	17	55	56	41	37	48
OCT	2.42	1.91	0.0	T	23	20	50	53	37	35	44
NOV	3.24	1.40	2.9	2.6	26	18	45	48	28	28	40
DEC	2.64	2.93	23.2	4.1	28	25	40	44	24	29	37
Totals:	32.36	30.30	71.2*	54.1	262	222					
Extremes:							55	59	22	18	
Dates:							8/28	7/26	1/16	2/9	

* Incomplete data

Table 2. 1991 Adak, Alaska weather summary with comparisons to 1990.

	Inches of precipitation			Inches of snow			Days of measurable precipitation		Degrees fahrenheit				
									Maximum		Minimum		
	1991	1990	NORM	1991	1990	NORM	1991	1990	1991	1990	1991	1990	NORM
JAN	10.87	6.60	6.11	5.2	36.5	17.5	31	31	47	44	13	9	32
FEB	0.66	3.62	4.75	10.8	14.2	19.2	17	24	45	45	9	17	31
MAR	4.71	6.11	5.85	22.3	1.5	20.1	27	25	50	43	24	20	35
APR	2.69	1.97	4.50	12.8	2.2	9.9	22	14	47	47	23	22	37
MAY	3.51	4.36	4.10	0.4	T	2.1	26	21	50	52	27	31	41
JUN	3.48	0.90	3.17	T	0.0	T	16	10	58	57	32	36	46
JUL	2.76	2.47	2.98	0.0	0.0	0.0	18	10	60	63	42	40	51
AUG	2.93	6.20	4.15	0.0	0.0	T	19	19	69	68	44	42	52
SEP	7.25	5.01	5.36	0.0	T	0.1	24	21	59	59	30	30	45
OCT	4.64	2.58	6.61	T	0.0	1.9	22	23	52	53	28	30	42
NOV	4.46	3.10	8.17	6.0	3.7	12.4	23	20	46	56	20	27	39
DEC	2.69	6.10	7.33	30.5	3.9	20.1	31	28	45	48	18	22	37
Totals:	50.65	49.02	63.08	88.0	62.0	103.3	276	246					
Extremes:									69	68	9	9	
Dates:									8/28	8/03	2/13	1/24	



The December storm left a very interesting fingerprint on our Visitor Center seismograph.

D. PLANNING

2. Management Plans

RM Boone drafted and revised an Office Automation Plan. The plan had not received final approval by year's end, but did provide the basis from which an update of station computer equipment was begun.

Kenai Fishery Assistance Office developed a draft Fishing Management Plan for the Alaska Maritime NWR. Issues pertinent to AIU were discussed in several sections; Shemya Island stocking/monitoring program is listed as a priority task for 1993.

WB Byrd assisted in preparation of a draft Recovery Plan for Steller Sea Lion (Eumetopias jubatus). National Marine Fisheries Service has legal responsibility for protection of sea lions, but the FWS has become involved because of the many rookeries and haulouts on refuge lands. WB Byrd has extensive knowledge of these areas in AIU and has been able to provide valuable input.

A draft Alaska Seabird Management Plan was prepared by Marine and Coastal Bird Project (Division of Migratory Birds). The plan was broader than AIU, but discussed many issues of importance to the unit.

3. Public Participation

Bill Knauer (Subsistence Management) and RM Boone conducted a public hearing, complete with a court recorder, in Unalaska/ Dutch Harbor on November 6, 1991. The hearing was held to explain the draft EIS and proposed regulations regarding subsistence management and accept public comments. The meeting was lightly attended - only three people signed the register - but questions and discussions were enlightening.

The Aleut community of Atka was contacted regarding the holding of a subsistence hearing in their community, but they declined.

5. Research and Investigations

Alaska Maritime NR91 - "Behavior and Survival of Crested and Least Auklets at Buldir I., Alaska"

Ian L. Jones, post-doctoral fellow at Cambridge Univ., U.K.

This was the second season of research on the behavioral ecology of crested auklets at Buldir Island, which Ian L. Jones (ILJ) is conducting as part of his post-doctoral program at Cambridge University. Christine Adkins acted as co-investigator for this year's field work. In 1991, a total of 138 crested auklets (129

adults and 9 sub-adults) and 52 least auklets (35 adults and 17 sub-adults) were captured and banded at the study plot at Main Talus, compared to 215 crested auklets and 114 least auklets banded in 1990. Crested auklet sub-adults were identified by their worn flight feathers, short crests and small bills. Each auklet was marked with a single USFWS alloy metal band and a unique combination of three color bands. Because of reduced capture effort, fewer auklets were banded in 1991 compared to 1990. Banding effort was reduced in 1991 to minimize disturbance at the study plot, because of our late arrival at Buldir, and because poor weather precluded banding on many days in June. Few of the auklets banded in 1991 were recaptures: only 8 crested auklets and 3 least auklets originally banded in 1990 were re-trapped in 1991. Much of the work was involved with an experimental study of the function of crested auklet ornaments.

Adult survival

Resightings, during the 1991 field season, of auklets banded in 1990 allowed the first ever estimate of annual adult survival for crested auklets, and provided more survivorship data for least auklet. To estimate survivorship, we made daily observations at the study plot to check for banded birds (Figure 1). The resighting rate was low during June (the incubation period) and relatively few banded birds were observed during this time (mean of about 10 birds/day). However, once chick rearing commenced, banded birds were seen at a much higher frequency (mean of about 75 birds/day). From this, ILJ concluded that breeding crested auklets spend virtually no time on the surface during the incubation period. The cumulative count of auklets resighted approached an asymptote by mid chick-rearing (late July). Auklets resighted were classified as survivors, while those we never observed were classified as disappeared (assumed to have died), and the annual survival rate was calculated as: number of survivors to 1991/number of auklets banded in 1990. To avoid including non-breeding visitors in the sample of birds for this analysis, ILJ included only banded birds that were adult breeders in 1990. Breeders were identified by the presence of food in their throat pouches. The survival estimate is based on the assumption that immigration of breeding auklets from the study plot is negligible, and so represents only a minimum survival estimate. Breeding crested auklets had a survival rate of 86% (101 survivors sighted out of 117 known breeders banded in 1990). This gives an estimated future life expectancy of 7.7 years. Breeding least auklets had a survival rate of 77% (13 survivors sighted out of 17 known breeders banded in 1990), giving an estimated future life expectancy of 4.9 years. The measured survival rate for crested auklets at Buldir is intermediate between that of large alcids (e.g., the murres Uria spp., c.95%) and smaller species for which survival estimates are available (ancient murrelets 77% and least auklets 78%). The survival rate measured for least auklets at Buldir is extremely similar to that

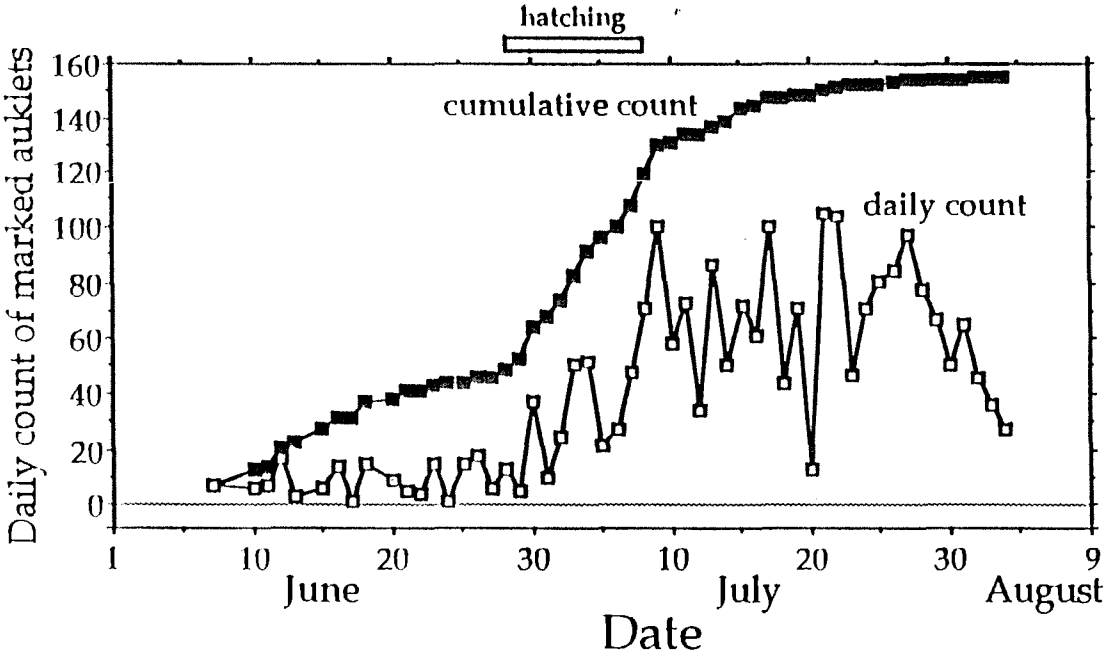
recorded for this species at St. Paul Island.

Population estimates for the study plot and Main Talus

Based on the observation that few banded breeding birds were active on the surface during the incubation period, while at the same time the plot was swamped by large numbers of adult and sub-adult birds (presumably non-breeders), it is certain that the auklet population at Buldir includes large numbers of non-breeders. Unfortunately, ILJ does not have the quantitative data to estimate the size of this population. However, sub-adults reached a peak frequency of about 33% of the crested auklets loitering on the surface during late incubation - early chick rearing.

By combination of approximate figures, it is possible to make a rough guess of the breeding population of Main Talus. The auklet colony at Main Talus occupies an area of approximately 3 ha (30,000 m2). If we assume the mean breeding density of crested auklets at Main Talus is (only) 25% of that of the study plot, this gives a population estimate of 52,500 breeding pairs. This figure is considerably higher than previous estimates of the crested auklet population of this area. These results emphasize that the actual auklet population of an area of breeding habitat is much greater than the total number of birds visible at any one time. Furthermore, the observation that the breeding population is virtually invisible during the incubation period is significant for the design of population monitoring methods (e.g., surface counts).

Figure 1 Sightings of color-marked Crested Auklets at the study plot at Main Talus.



Alaska Maritime NR91 - "Ecology of Breeding Giant Song Sparrow (Melospiza melodia maxima) at Buldir I., Alaska"

Christine A. Adkins, Dept. of Biology, Queens University, Kingston, Ontario, Canada.

Christine A. Adkins (CAA) banded 14 adults and 20 juvenile song sparrows near camp. Adults were captured using potter traps and mist nests; juveniles could be captured using potter traps alone. In two cases, CAA found nests - in the first, all nestlings were banded; in the second, fledging occurred before CAA could return with banding equipment so only two of four were marked. Capture and banding were conducted with the assistance of Ian Jones.

Where possible, the birds were weighed, and (unflattened) wing chord, culmen and tarsus lengths measured. A single USFWS metal band (size 2) was placed on the right leg, and two colored plastic bands placed on the left leg of each bird. Birds were released at or near points of capture.

Observations of banded birds were made opportunistically, as we performed our camp chores. (Clearly, this biased re-sightings toward those birds whose home ranges included the areas near the cabin and the paths.) Three banded breeding pairs were identified.

The mean mass of 13 adult song sparrows weighed during the period 11-22 June was 43.6g (SD=2.8g). Four of these were known to be males, with a mean mass of 45.2g (SD=1.3g), and three were known to be females, mean mass 41.3g (SD=3.6g). The difference is not significant (Mann-Whitney U test). The mass of a single adult captured on 23 July was 49.0g, greater than any of the other 13. This may reflect the summer abundance of food, but CAA did not recapture any of the previously-weighed adults to test this. The mean mass of 10 independent juveniles was 47.2g (SD=3.6g).

Breeding pairs appeared to have distinct nesting territories, and males would sing at their boundaries. Occasional aggression toward conspecific intruders was observed, though in general resident birds seemed to be quite tolerant toward other sparrows.

A monogamous breeding system seems to predominate among the song sparrows at Buldir. Most males seem to participate heavily in the chick-feeding process. We did not observe any incubation behavior.

CAA found four nests with chicks. The first was on Adak I. about 500km east of Buldir, on May 24, and contained three chicks, estimated about two days old. On Buldir, a nest with three young was found by other camp members on June 7, and another containing three well-feathered young was found on June 13 (fledged by June 17). On June 15, CAA found a nest with four chicks which fledged

immediately following her disturbance.

CAA estimated that most first broods on Buldir fledged around June 10-20; however, it is possible that some may have fledged as early as the first week of June (when some short-tailed sparrows were observed). CAA started seeing and hearing copulations for second broods around June 23, and saw one adult carrying nesting material on June 29. Most first-brood fledglings seemed to be independent by about July 9. Second brood fledglings began to appear around July 20, continuing through the first week of August.

Presumably, most breeding pairs remain together from one brood to the next. However, in one case a banded male that we initially thought was a non-breeder (since he sat around all June and did nothing except sing or feed occasionally while most other sparrows were busy feeding chicks) was seen copulating with one of the banded females around July 1, and only then started feeding chicks.

Alaska Maritime NR91 - "Avifaunal Remains in an Aleut Midden, Buldir I., Alaska"

Douglas Siegel-Causey, Christine Lefevre, Debra Corbett

A preliminary excavation on the single known midden site on Buldir Island was conducted by Douglas Siegel-Causey (Museum of Natural History, University of Kansas, Lawrence, KS), Debra Corbett (U.S. Fish and Wildlife Service, Anchorage, AK), and Christine Lefevre (Museum National d'Histoire Naturelle, Paris, France) during 11 days in July - August 1991.

During this time they were able to plot the dimensions of the midden site, make standard profiles along the main exposure, and excavate two test pits. The Buldir midden is unique in the Aleutians because the soil is water-saturated throughout most of the site, enabling excellent artifactual preservation. In addition to large quantities of bird and mammal bones, they found numerous wood and ivory artifacts in near perfect condition. The wooden objects were diverse and ranged from fragments and pieces to near complete tools. At all other midden sites, wood is rare because it is quickly degraded.

They resurveyed the linear extent (180m) of the beach exposure of the apparent midden located on North Bight Beach and field-checked the accuracy of a surface mapping done earlier by BIA archaeologists. They selected nine points along the exposure for profiling; each was one meter wide and depths varying with location. In addition, they excavated two test pits located at 0 and 143 meters from the westernmost extent of the beach exposure. They retained numerous samples of wood, charcoal, bone, and ivory

for further study, in addition to wood and charcoal samples for radiocarbon dating.

Alaska Maritime NR91 - "Beach Debris and Wildlife Entanglement"

Al Manville, Senior Biologist, Defenders of Wildlife, Washington, D.C.
This is an ongoing study by Dr. Manville designed to estimate the amount of plastic and other debris on Alaskan beaches. He records types and amounts of debris and all instances of entanglement. Field surveys were conducted in 1991 on Bogoslof, Tangik, Sedanka, Egg, and Midun Islands.

Alaska Maritime NR91 - "Food Habits of Seabirds in the Western Bering Sea"

Alan Springer, Inst. of Marine Sciences, Univ. of Alaska, Fairbanks
BT Williams and Ian Jones collected chick food regurgitations from several species of seabirds at Buldir Island during August 1991 (red-legged kittiwake, black-legged kittiwake, crested auklet, least auklet, and whiskered auklet). Samples were collected and forwarded to Alan Springer for identification and analysis of results.

Alaska Maritime NR91 - "Taxonomy of Aleutian Rock Ptarmigan (Lagopus mietus)"

Dan Gibson, Univ. of Alaska Museum, Fairbanks, Alaska
RM Boone and WB Byrd collected specimens on three different islands to assist in better understanding of the distribution of rock ptarmigan species throughout the island chain.

Alaska Maritime NR91 - "Sea Otter Ecology"

Jim Estes, U.S. Fish and Wildlife Service Research
Jim is continuing a long term study to evaluate changes in the nearshore marine community as sea otter populations recover in the Aleutians. He conducted studies at Adak, Attu, and Shemya during 1991.

Alaska Maritime NR91 - "Sea Otter Population Monitoring"

Tony DeGange, Marine Mammals Branch, U.S. Fish and Wildlife Service, Anchorage
Tony is conducting aerial surveys for sea otters throughout the Aleutians over a several-year period to evaluate population trends. His work was concentrated in the central Aleutians during 1991.

Archaeologists Douglas Siegel-Causey, University of Kansas, Christine LeFevre, National Museum of Natural History, Paris, France, and Debra Corbett, RO, conducted surveys for avian remains in an Aleut midden site on Buldir Island. They also collected selected artifacts. (ES)

Alaska Maritime NR91 - "Steller Sea Lion Population Trends and Productivity)"

Tom Loughlin and **Dick Merrick**, NMFS, Seattle

An aerial survey of sea lion populations was conducted throughout the Aleutians by National Marine Fisheries Service biologists from the Marine Mammal Laboratory in Seattle, WA. Furthermore, pups were counted at selected rookeries in the eastern and central Aleutians. These studies are the main monitoring component of the recovery program for this threatened species.

Publications

Byrd, G.V. 1991. Bering Sea Seabirds. Pages 15-18 in Swartzman, G.L. and R.J. Hofman (eds.). Uncertainties and research needs regarding the Bering Sea and Antarctic marine ecosystems. Marine Mammals Commission Final Report PB91-201731, Washington, DC.

Byrd, G.V. et al. in press. Offshore fish-feeding alcids (murres and puffins) in Ecology and conservation of marine birds of the temperate North Pacific. Proceed. of Pacific Seabird Group Symposium. Canad. Wildl. Service Special Publ.

Byrd, G.V. in press. Current breeding status of the Aleutian Canada goose, a recovering endangered species. Proceed. Intern. Canada Goose Symposium.

Byrd, G.V. and N. Norvell. Submitted to Murrelet. Summer distribution and habitat use of Pribilof shrew.

Hatch, S.A., G.V. Byrd, D.B. Irons, and G.L. Hunt, in press. Status and ecology of kittiwakes in the North Pacific. Proceed. of Pacific Seabird Group Symposium. Canad. Wildl. Service Special Publ.

Hipfner, M. and G.V. Byrd. Submitted to Colonial Waterbirds. Breeding biology of parakeet auklet at Buldir Island, Alaska.

6. Other

Wildlife Biologist Byrd continued to fulfill the position as leader of the Aleutian Canada Goose Recovery Team. A team meeting was held to complete the revision of the Aleutian Canada Goose Recovery Plan.

WB Byrd also served as a member of the Steller Sea Lion Recovery Team. In this capacity he attended several team meetings and was involved in writing the recovery plan and drafting critical habitat recommendations.

Alaska Sea Grant Workshop, "Is it Food" (March 12-14, 1991, Fairbanks, AK). WB Byrd was an invited participant in this workshop designed to examine evidence about causes of declines in populations of marine birds and mammals in the Bering Sea and Gulf of Alaska regions. He served as a co-chair of working sessions on fish-eating seabirds, and presented data on trends and productivity of seabirds in western Alaska.

International Canada Goose Symposium (April 23-25, 1991, Milwaukee, WI). WB Byrd prepared a presentation entitled "Current Breeding Status of the Aleutian Canada Goose, a Recovering Endangered Species" for this meeting, and he submitted a manuscript which has been accepted for publication in the proceedings.

Region 1 Biologists' Workshop on Monitoring Wildlife Populations and Habitats (Sept. 10-12, 1991, Tule Lake, CA). WB Byrd was invited to speak at this workshop about monitoring colonial waterbird populations, and he participated in practical field demonstrations on monitoring techniques.

Alaska Bird Conference, "Shared Avian Resources of Beringia" (November 19-22, 1991, Anchorage, AK). WB Byrd presented five papers at this conference: 1) Recent Trends in Populations of Kittiwakes and Murres in the Western Aleutian Islands, Byrd and Williams; 2) Monitoring Tufted Puffin Populations and Productivity: Problems and Potential, Byrd and Boone; 3) Response of Aleutian Birds to Removal of Introduced Fox, Byrd and Bailey (Homer); 4) Nesting Strategy of Parakeet Auklet Compared to Closely-Related Species at Buldir Island, SCA volunteer Mark Hipfner and Byrd; and 5) Status of Aleutian Canada Goose, Byrd.

E. ADMINISTRATION

Personnel

1. Daniel L. Boone, Refuge Manager, GS-12, PFT
2. Evan V. Klett, Refuge Operations Specialist, GS-11, PFT
3. G. Vernon Byrd, Wildlife Biologist, GS-11, PFT
4. Cheryl L. Cline, Outdoor Recreation Planner, GS-9, PFT (transferred 4/24/91)
5. Laura M. Greffenius, Outdoor Recreation Planner, GS-7, PFT (EOD 12/01/91)
6. Dorothy G. Wheeler, Clerk-typist, GS-4, PFT
7. Brenda J. Wiles, Clerk-typist, GS-3, PFT (resigned 7/20/91)
8. Melita K. Bradford, Clerk-typist, GS-3, PFT (EOD 11/04/91)
9. Robert P. Schulmeister, Maintenance Worker, WG-8, PFT (transferred 2/9/91)
10. Thomas Morey, Maintenance Worker, WG-8, PFT (EOD 2/10/91)
11. Jeffrey C. Williams, Biological Technician, GS-6, PI
12. Jeffrey W. Lewis, Maintenance Worker, WG-5, PI

Dan Boone (ES)

Van Klett (LG)

Vernon Byrd (ES)

Jeff Williams (KR)

Dorothy Wheeler (LG)

Jeff Lewis

Tom Morey (unk.)

Seasonals

1. Geoffrey S. Beyersdorf, Biological Technician, GS-6, 5/13/91-8/22/91
2. Laura M. Greffenius, Biological Technician, GS-6, 5/2/91-9/21/91
3. Ronald K. Walder, Biological Technician, GS-5, intermittent
4. Karen S. Kriesel, Biological Technician, GS-4, 6/13/91-9/07/91
5. Kenneth Russell, Biological Technician, GS-6, 5/02/91-9/07/91

Volunteers

1. Mark J. Hipfner, SCA Biological Aide, 1/10/91-9/20/91
2. William J. Romberg, SCA Biological Aide, 10/17/91-12/23/91
3. Amy M. Prosser, SCA Resource Assistant, 10/31/91-1/24/91
4. Ian L. Jones, Biological Research, 5/14/91-8/15/91
5. Christine A. Adkins, Biological Research, 5/14/91-8/15/91
6. Christine Lefevre, Archaelogical Research, 7/22/91-8/7/91
7. Douglas Siegel-Causey, Archaeological Research, 7/22/91-7/31/91
8. Scott Crabtree, U.S. Navy, local volunteer, 1/01/91-6/30/91
9. James Schneeweis, Minnesota Department of Natural Resources, 7/22/91-8/20/91
10. Daniel Lambert, U.S. Navy, local volunteer, 6/01/91-8/31/91

Although RM Boone was officially assigned to AIU in December 1990, he didn't actually arrive on station until January 1991. His family and household goods finally joined him in August in time for everyone to get settled before school started.

In February, Maintenance Worker Bob Schulmeister and Maintenance Worker Tom Morey exchanged positions; Bob and Sue moving to Izembek NWR in Cold Bay and Tom and Donna coming out to Adak.

Brenda Wiles, the GS-3 Clerk-typist, resigned her position effective July 20, 1991 because her husband was being discharged from the Navy. Brenda actually stayed several weeks after her husband's departure to complete her one year probationary period. This evidently worked to her advantage as DEA (Drug Enforcement Agency) hired her almost immediately after her relocation to the Seattle area.

Melita "Mel" Bradford was hired in November to fill the vacant Clerk-typist position. She jumped right into the word processing; letters, memos, reports, etc. are once again moving through the system smoothly and quickly. Mel's husband is in the Navy with a rotation date of November 1992, so we probably will be faced with looking for yet another Clerk-typist before the end of the year.

Laura Greffenius, Geof Beyersdorf,
Ken Russell, Ian Jones (ES)

Mark Hipfner (EVK)

Karen Kreisel (JW)

Ron Walder (ES)

Jim Schneeweis (ES)

Bill Romberg (unk.)

Amy Prosser (unk.)

Rob Lewis, Cap and Peet (JW)

After an eight month detail to the Subsistence Management Office in Anchorage, Cheryl Cline's position there was made permanent. Cheryl returned to Adak briefly to gather her belongings, sell her car and say good-bye to friends, then it was off to the big city.

Then began the arduous task of hiring a new Outdoor Recreation Planner. After several tries, the "green sheet" route proved futile and we moved on to the OPM register. Laura Greffenius, one of our seasonal Bio-Techs, made us aware of the Administrative Careers with America/Outstanding Scholar Program. Laura was eventually hired through this program. She and her husband, Joe Meehan, arrived on Adak from Florida in December. Laura brings with her a wealth of environmental and natural resource knowledge and experience, so we are sure an active public use program will soon be up and running again.

Awards

Clerk-typist Brenda Wiles and Bio-Tech Jeffrey Williams both received Level 5 Performance Ratings. Wildlife Biologist Vernon Byrd and Clerk-typist Dorothy Wheeler received Level 4 Performance Ratings. All recipients of superior performance ratings were duly recognized, presented with certificates, and received cash awards.

WB Byrd received the "Professional Conservationist of the Year" award in 1991 from the Alaska Wildlife Federation for his work with Aleutian Canada geese.

5. Funding

The Field Financial Tracking System was implemented for AIU in April of 1990; prior to that, all budget tracking had been accomplished by the administrative staff in Homer. RM Boone has warrant authority, which simplified purchasing activities for AIU and was the impetus for moving AIU budget tracking from Homer to Adak.

Table 3. Aleutian Island Unit Funding, FY 1987 to 1991.

	FY 87	FY 88	FY 89	FY 90	FY 91
1261	*	*	*	*	302,000
1262	*	*	*	*	111,732
1113	*	*	*	*	206,000
8610	*	*	*	*	15,900
5390	-	-	-	-	14,700
Total	-	-	-	-	650,332

* Funding and budget tracking accomplished by AMNWR in Homer.

6. Safety

On January 23, a year after the accident, we finally received an incomplete copy of the Kittiwake Board of Enquiry Report from Jim Fuller, one of the survivors. The report did not contain the conclusion or recommendation sections. It is interesting that we had to receive this copy from someone involved and not from the Service. The accident did focus attention on safe boating and generated a refuge and regional boating safety plan.

Refuge Operations Specialist Klett served as station safety officer during 1991. Eight structured safety meetings were held and twelve movies/videos were shown. Topics included winter driving tactics, drunk driving, misuse of drugs, CPR certifications, flotation and survival suits, first aid, defensive driving and highway safety, office safety and fire safety in office and homes. A new station safety plan was written and submitted for approval in April.

A variety of safety training was taken by refuge personnel during the year. Ten permanent, seasonal, and volunteer employees were certified for CPR and basic first aid. A week long spring training session for field personnel included viewing U.S. Coast Guard cold weather/cold water survival films, actual use of personal flotation and survival suits via swimming in the small boat harbor, use of compass and maps, the care and use of outboard motors and inflatable boats, radio operation and communication procedures. We spent a lot of time with hands on boating practice with stress on safe operation, paying attention to weather reports and radio procedures.

MW Lewis completed a four day NAS sponsored Hazardous Waste workshop.

All field personnel were given a safety tour of the refuge vessel Tiglax, shown the location of all safety and survival equipment and its use discussed or demonstrated. All personnel participated in fire and abandon ship drills.

Safety related purchases included new batteries for ELT's and EPIRB's and new EPIRB's. The old first aid kits were checked and old, outdated, contaminated medications/compresses replaced.

Two radios were assigned to each AIU field camp in 1991. One served as the primary communication unit and the other was a backup in the event of failure of the primary unit. Multi-frequency whip antennas were used at all field camps.

Due to the remote locations of our field camps, all field personnel received briefings regularly on the safety aspects of their duties relating to sea conditions, weather, getting lost and the necessity for maintaining equipment in good working

All field personnel received CPR and first aid training as well as first hand experience on how well survival and exposure suits work. (EVK, FD and VB)

order. Minimum of twice-daily radio contact was maintained between Adak and all field camps as well as with the M/V Tiglax. Weather conditions could isolate field camps for days; they are no place for an accident to occur.

MW Jeff Lewis, vice president of the Adak Boating Association and U.S.C.G. Auxiliary member, assisted in conducting a U.S. Coast Guard boating safety class for 12 people.

7. Technical Assistance

RM Boone attended two meetings in Anchorage regarding the replacement of a unique WW II bridge, a contributing structure to the National Historic Landmark, and contaminant inspection/ cleanup on several islands within the AIU.

The proposal to replace the bridge across Henderson River was initiated last year. The initial request was denied. The U.S. Air Force has been working on alternate plans and wanted to obtain comments from all concerned (Service, National Park Service, Corps of Engineers, and State Historic Preservation Office) before proceeding further. The river needs to be crossed somewhere to reach a remote seismic monitoring facility installed years ago to monitor underground nuclear testing in Russia.

U.S. Army Corps of Engineers contractors visited Attu, Kiska, Amchitka, and Great Sitkin Islands during the summer to conduct chemical and contaminant sampling on old military sites. Their report has not been received as of year's end.

RM Boone also made two trips to Amchitka. Status of the proposed second Relocatable Over the Horizon Radar was discussed and an inspection tour was made of an area where an unknown amount of WW II ordnance was buried when the island was vacated in 1945.

RM Boone and ROS Klett met with consulting design engineers to inspect sites for 450 proposed housing units. ROS Klett reviewed draft and final EA's and site investigation reports covering the sites. Construction of the first 132 units is scheduled to begin in FY 93. With the cutbacks in the FY 92 military budget and proposed reductions/closeouts on this base, it appears that this construction will never start.

The NAS Oil Spill Contingency Plan was reviewed during the early part of the year and was found to be deficient in necessary details. An update was initiated. ROS Klett met with the rewrite team on two different occasions to provide input for protection of the resource and environmental cleanup.

Planning continued on the Clam Lagoon auto tour route. ORP Matthews, AMNWR, Homer, spent three days in May touring the site, developing initial drafts. Funding was received from the America

the Beautiful" program, U.S. Navy "Watchable Wildlife" program, Ducks Unlimited, and the State of Alaska.

ROS Klett provided information to Wildlife Adventures for an "Outdoor Atlas and Recreation Guide" to be released in 1992.

Klett also assisted the new curator of the local Adak Museum conduct an inventory of items that the AIU had loaned them for display. Klett and Boone were also selected to serve on the Board of Directors of the Adak Historical Society.

A request for salvage and restoration of selected parts of a WW II B-24 bomber that crashed on Great Sitkin Island was received from the U.S. Navy and submitted to our Regional Archaeologist for review. The Navy would like to salvage selected parts for display at the new Adak museum when it reopens this summer.

8. Other

The Naval Air Station continued cleanup of sites mandated by an investigation conducted in 1990 by a team from the Environmental Protection Agency and Alaska Department of Environmental Conservation. Seven sites have been targeted as primary areas of concern. ROS Klett met twice during the year with NAS, private consulting firms and state personnel to discuss/review proposed cleanup operations.

The refuge staff remains involved with the Aleutians West Coastal Resource Service Area Management Plan. The refuge staff was involved in reviewing drafts of the organization's goals and objectives as set forth by their parent organization.

Military bases on Adak, Amchitka, Shemya and Attu received technical assistance from our office on a number of projects including the demolishing of the old wooden pier next to the SeaBee Battalion complex, construction of a new LORAN transmitter, replacement of a WW II era bridge, contaminant cleanup, disposal of WW II ordnance, snow mobile use, and military exercises, as well as general hunting/fishing information.

With a staff of nine and the challenge of managing 1,100 miles of islands and the wildlife, historical and cultural resources scattered throughout them, cooperation is the name of the game in the Aleutians. That means cooperating with agencies such as the Alaska Division of Fish and Wildlife Protection to combat commercial fishing violations, the National Park Service and the Aleut Corporation to prevent violations of archaeological or historical resources, EPA and the State's Department of Environmental Conservation to prevent pollution of air, soil or water and insure legal disposal by the military of hazardous wastes.

Special Use Permits were issued to the following: 1) Alaska Plant Materials Center, Palmer, AK for the collection of cuttings and seeds from mountain ash and willow from Attu and Adak. These samples will be used to develop young native shrubs for planting in the NAS housing area. The use of native plants was one of the big issues worked out in the NAS Adak Natural Resource Management Plan. 2) U.S. National Marine Fisheries Service for the placement of temporary radio receivers on selected islands in the eastern Aleutians to track migratory subadult fur seals during the fall. The information will assist in better management of the species.

F. HABITAT MANAGEMENT

1. General

The AIU contains some 300 islands totaling 3.3 million acres. These islands stretch over 1,100 miles from the tip of the Alaska Peninsula to within 500 miles of the Soviet Union's Kamchatka Peninsula. All but portions of the seven larger eastern Aleutian Islands are included in the refuge unit. Due to their close proximity to the Alaska Peninsula, Unimak (1.0 million acres) and Amak islands are administered by the Izembek National Wildlife Refuge, headquartered at Cold Bay, Alaska. The refuge's Comprehensive Conservation Plan (CCP) recommends that these islands be formally transferred to Izembek NWR. The Sanak Islands south of the Alaska Peninsula are managed from refuge headquarters at Homer, Alaska. Except for the Aleut village at Atka, the Navy bases at Adak and Amchitka, the U.S. Air Force base at Shemya, and the U.S. Coast Guard LORAN Station at Attu, the only recent signs of human activity on the AIU are the unhealed scars and debris remaining from World War II.

2. Wetlands

Many of the islands have numerous freshwater "potholes", some superficially resembling the prairie pothole country of the midwest. A few areas at lower elevations produce aquatic growth and support modest waterfowl populations, especially Amchitka, Kanaga and Agattu islands. We have been working with a "no net loss of wetlands" years before Bush established the "policy". Refuge management efforts include orienting military development away from wetlands and lagoons. The AIU staff monitors construction projects on military installations at Adak, Amchitka, Shemya and Attu, and provides recommendations on proposed activities by Native Corporations on the refuge as well. The military, especially at Adak and Amchitka, are cooperative and sensitive to our suggestions.

6. Other Habitats

Beach Debris Surveys--Increasing use of man-made materials that are highly resistant to decomposition has resulted in the presence of large amounts of debris in the oceans and on our beaches. Plastic straps, netting, lines, and other material are deposited on refuge beaches in large amounts, and its effect on wildlife can be deadly (e.g., entanglement, ingestion, etc.).

In 1991, we conducted debris surveys and also recorded dead animals along selected beaches on Buldir and Agattu islands. The purpose of the surveys was to further document the quantity and type of items present and to provide a basis for future comparisons. Very little change was noted when the results were compared with past surveys.

World War II buildings provide additional nesting habitat for rosy finches. (EVK)

7. Grazing

Two grazing operations continue under Special Use Permits. The $100.00 administration fee is working well. The third permittee, taken to court last year by a Native Corporation for non-payment of his permit, was found guilty and lost the lease. Part of the judgment included the removal of the cattle from the island. The case was further mudded by questionable ownership of the livestock. As far as we know, the cattle are still on the island. The Service wrote our small loss ($200.00) off as uncollectible.

12. Wilderness and Special Areas

The Alaska National Interest Lands Conservation Act (ANILCA) designated approximately 2.3 million acres of the Aleutian Islands Unit as Wilderness. Notable areas of the refuge unit excluded from the designation include 127,870 acres on Shemya, Attu, Adak, Amchitka and Ugamak islands for military and lighthouse purposes or World War II debris and approximately 200,000 acres selected by Native Corporations under the Alaska Native Claims Settlement Act (ANCSA).

Other special designations which occur on the AIU are as follows:

Area	Designation
Aleutian Islands Unit	International Biosphere Reserve
Agattu Island	Research Natural Area
Buldir Island	Research Natural Area
Naval Air Station, Adak	National Register of Historic Landmarks
Kiska Island Occupation Site	National Register of Historic Landmarks
Attu Island Battlefield	National Register of Historic Landmarks
P-38 G Lightning Aircraft, Attu Island	National Register of Historic Landmarks
B-24 D Liberator Bomber Aircraft, Atka Island	National Register of Historic Landmarks

G. WILDLIFE

1. Wildlife Diversity

Not surprisingly, the diversity of breeding animals is low in the Aleutians due to low terrestrial habitat diversity. Nevertheless, the islands provide breeding sites for a diverse suite of marine taxa, and there is relatively high species richness within the migrant avifauna because of the juxtaposition of the islands and the mainlands of Asia and North America. Indeed, the Aleutian Islands were classified as an "International Biosphere Reserve" because of the high diversity of breeding marine birds and mammals (i.e., 26 species of seabirds, 4 species of marine mammals).

Although the breeding terrestrial fauna is not characterized by high species diversity, several endemic forms occur, and at least two species (i.e., rock ptarmigan and winter wren) include multiple unique subspecies within the refuge.

Spring migrant birds are monitored on the refuge annually by a commercial birding tour, "Attours" at Attu Island, and refuge field crews record all species seen at field camps in the western Aleutians and at Adak. In 1991, 54 species that are extremely unusual were recorded in the Aleutians (Table 4).

Common Cuckoo - Buldir Island (JW)

2. Endangered and Threatened Species

a. Aleutian Canada goose. In 1991, recovery program tasks included pair surveys at two locations where we are trying to reestablish breeding populations, translocation of geese from Buldir to selected release sites, and habitat surveys of fox-free islands to assess their potential to support geese.

Pair survey at Agattu Island. (Excerpts from Greffenius, L. et al. 1991. Surveys of Aleutian Canada geese at Agattu I., Alaska in 1991. U.S. Fish and Wildlife Service Report, Adak, AK). Due to removal of introduced foxes and translocations and release of captive-reared birds, birds have been found nesting in tall vegetation along the coastal fringe of the southeastern portion of the island. The nesting density within this area has been doubling about every three years since 1982, and over 50 pairs of geese were found nesting in this area in 1990. In 1991 we surveyed areas west of known breeding sites to determine if geese are beginning to expand to other parts of the island and to determine the extent of potential breeding habitat away from the high density area.

Table 4. Sighting of rare and accidental species in the Aleutian Islands in 1991.

Species	Locations Observed
Arctic loon	Adak
Western grebe	Adak
Short-tailed albatross	Umnak
Sandhill crane	Buldir
Whooper swan	Attu, Shemya, Adak
Bean goose	Attu, Kiska, Kavalga
Falcated teal	Attu
Common pochard	Attu, Agattu, Buldir, Adak
Eurasian wigeon	Attu
Tufted duck	Shemya, Buldir, Adak
King eider	Adak
Steller's eider	Shemya, Adak
Surf scoter	Adak
Smew	Attu
Mongolian plover	Buldir
Whimbrel	Buldir
Terek sandpiper	Attu
Sharp-tailed sandpiper	Attu
Pintail sandpiper	Attu
Common sandpiper	Attu, Buldir, Kiska
Gray-tailed tattler	Buldir, Adak
Wood sandpiper	Buldir, Adak
Semipalmated sandpiper	Buldir, Adak
Common greenshank	Attu
Spotted redshank	Attu
Long-toed stint	Buldir
Little stint	Attu
Temmicks stint	Adak
Rufous-necked stint	Attu, Buldir, Adak
Slaty-backed gull	Attu
Kamchatka gull	Attu
Common black-headed gull	Buldir, Kiska, Adak
Common black-tailed gull	Buldir
White-tailed eagle	Attu
Northern harrier	Adak
Merlin	Adak
Oriental cuckoo	Attu
Common cuckoo	Buldir
Eurasian skylark	Attu
Eyebrowed thrush	Attu
Siberian rubythroat	Attu
Pechora pipit	Attu
Olive tree-pipit	Attu
Red-throated pipit	Attu
Black-backed wagtail	Attu
Yellow wagtail	Attu

Table 4. (continued)

Species	Locations Observed
American tree sparrow	Adak
Golden-crowned sparrow	Adak
Dark-eyed junco	Adak
Rusty blackbird	Adak
Rustic bunting	Attu
Hawfinch	Attu
Oriental greenfinch	Attu
Brambling	Attu

At least 75 geese were seen along the south side of Agattu west of areas where they had previously been known to nest. Clearly many of these birds were non-breeders, but five nests were also found. Fewer birds and only one nest were found along the north shore where habitat was patchy and relatively restricted. Clearly geese are expanding to previously unused parts of Agattu, and potential for additional expansion is high.

Brood rearing habitat survey at Agattu (see Greffenius et al. op cit). As part of the project to assess the potential for expansion of Aleutian Canada geese at Agattu, surveys were made of habitats near the high density nesting area during the brood rearing period to characterize main areas of use. The majority of observations of families of geese or signs of their presence (droppings, molted feathers, trails through vegetation) were within the tall-plant coastal fringe or near its inland edge. Edges of lakes within 300 m of the coastal bluff were also used. More inland areas did not seem to be used, at least prior to fledging of goslings.

Pair survey at Little Kiska Island. (Excerpts from Russell, K. and G. Beyersdorf 1991. Observations of Aleutian Canada geese on Little Kiska I. in 1991. U.S. Fish and Wildlife Service Report, Adak, AK). Following translocations in 1988 and 1989, two pairs of geese were found nesting at Little Kiska in 1990. In 1991 the western end of the island was surveyed for geese, and evidence of four nests was found. Furthermore, a flock of 64 non-breeding geese was seen on the island June 3. The increase in nesting pairs is encouraging.

Coming and going from Buldir I. can be a bit rough.
Believe it or not, this boat made it - right side up!

Translocation. (Excerpts from Williams, J. and V. Byrd. 1991. Translocation and banding of Aleutian Canada geese in the western Aleutian Islands in 1991. U.S. Fish and Wildlife Service Report, Adak, AK). Translocation of Aleutian Canada geese is a principal component of the Aleutian Canada goose recovery program. Due to past translocations, geese have become reestablished on Agattu Island (over 50 pairs there in 1990), and pairs are again nesting on Nizki-Alaid Island (10-12 pairs in 1990) and Little Kiska Island (2 pairs in 1990). The goal is to continue to enhance populations at these latter two sites until they attain reasonably safe levels (e.g., 25 pairs).

In 1991, the specific goals for translocation were to release approximately 100 geese at Nizki-Alaid, and approximately 50 geese at Little Kiska. Fewer geese were targeted for Little Kiska than for Nizki-Alaid because bald eagles preyed heavily on released geese when large numbers were liberated at Little Kiska in 1988. Following that experience, the Aleutian Canada goose recovery team recommended that fewer birds subsequently be released, hopefully to reduce attraction to eagles. Eagles do not nest at Nizki-Alaid.

Translocation release site on Little Kiska. (ES)

In late July and early August 1991, a total of 183 Aleutian Canada geese were translocated from Buldir Island to three other islands where efforts are underway to reestablish nesting populations of this threatened goose. Of 56 geese hauled to Little Kiska Island, one died in transport, but the others were successfully released. All 92 geese hauled to Nizki-Alaid were released. One load of 36 birds destined for this island had to be released at Agattu Island instead because rough seas precluded a boat landing on Nizki-Alaid. Although we had not planned to release birds on Agattu, the release will augment the recently reestablished population of geese there.

Monitoring released geese at Little Kiska. (Excerpts from Russell and Beyersdorf op cit). Resident bald eagles are known to prey on translocated geese following their release at Little Kiska, so we monitored the situation as closely as possible to try to evaluate the rate of predation in 1991.

Our surveys indicated that nine bald eagles were present on Little Kiska during the study period. Eagles were seen daily in the Little Kiska Head/Navy Cove area and in the area near Yug Point. Both of these areas contained nests. Occasionally, eagles were seen soaring over Terrace Lake and the area of our camp. On only one occasion did we see an eagle near any Aleutian Canada geese. On July 28, we were observing one adult Aleutian Canada goose and fifteen goslings on Goose Lake when an adult bald eagle flew over. The eagle was being chased and harassed by two glaucous-winged gulls at the time and did not appear to notice the geese. The geese quickly gathered in a tight group and were very alert for several minutes after the eagle left.

Two active eagle nests were located during the summer surveys. The nest at Navy Cove contained one young that was within a few days of attaining flight when last observed on August 14. The second active nest was located just west of Yug Point and the pair there produced two young that fledged. The first juvenile attained flight on August 11 and its sibling was observed in flight on August 12. A nest, located on the offshore rocks just west of camp, had two adults present during the June survey but did not contain any chicks when we returned on July 27. At least one adult was seen perching at that nest site in July. In addition to the eagles associated with nests, at least one second-summer bird was seen daily in the area bounded by Little Kiska Head, Navy Cove and our camp. No eagles were observed east of Yug Point.

We discovered evidence of five Aleutian Canada geese that had been killed by bald eagles. Three of these carcasses were of banded geese from the translocation: yellow "J35"; yellow "J57" and yellow unknown. One carcass was an unbanded adult and the fifth carcass was too dismembered to determine if it had been banded. One carcass was found in each of the active eagle nests

"OK, they're in here somewhere - let's go get 'em!" (ES)

Jim Fuller and Peet show how it's done. (ES)

and the other three were found in the Big Gun Hill area. No other goose carcasses were found, and no other known mortality occurred after the release. Foggy conditions just after the releases may have provided security from eagles. Dense fog was present throughout much of the study period and this may have drastically reduced chance encounters between geese and eagles.

An eagle-killed glaucous-winged gull was discovered near the dismembered goose carcass discovered on August 5. Glaucous-winged gulls are a primary eagle prey on the island. Several colonies are located in the same areas of Little Kiska used by the geese. Many gull nest cups were found in these areas, but few hatched in 1991. We saw at most seven fledged gulls. The absence of a large number of glaucous-winged gull chicks as a prey buffer on Little Kiska in 1991 may have resulted in more predation of Aleutian Canada geese by eagles than in 1990 when gulls produced numerous chicks.

Monitoring released geese at Nizki. (Excerpts from Fuller, J.P., J.C. Schneeweis, and G.V. Byrd. 1991. Observations of Aleutian Canada geese at Nizki Island following translocations in 1991. U.S. Fish and Wildlife Service Report. Adak, Ak). No bald eagles occur at Nizki (this is west of the bald eagles' range); predation of translocated geese is not a problem. After being released near Mallard Pond, the translocated geese remained in drainages with tall cover. No mortality was recorded but two of the released birds seemed lethargic after liberation. The remaining 90 geese showed no obvious problems immediately after release.

Habitat surveys. (Excerpts from Byrd, G.V. 1991. Aleutian Canada goose habitat in the central Aleutian Islands. U.S. Fish and Wildlife Service Report. Adak, Alaska). Since 1989, several islands each year have been evaluated to determine their potential to support geese. The primary vegetation type used by Aleutian geese for nesting is dominated by Elymus arenarius or some other grass and one or more of the umbelliferous species; Heracleum lanatum, Angelica lucida, and Conioselinum chinense. This community, which tends to provide cover because it is one of the tallest found in the islands, has been named "Elymus-umbel". Important food plants for geese are Carex spp., Festuca rubra, and Empetrum nigrum.

The primary reason for the demise of Aleutian geese was predation by introduced arctic fox. These predators currently remain on many islands within the goose's former range. Nevertheless, in the Rat and Delarof island groups of the central Aleutians, foxes no longer occur on 11 of 16 islands over 500 acres in size, and foxes are currently being removed from two additional islands in this group. As a result, this region offers the largest aggregation of fox-free islands in the Aleutians. We surveyed 7 of the 11 fox-free islands in the Rat and Delarof groups.

Besides foxes, Norway rats (Rattus norvigicus) and arctic ground squirrels (Citellus arctica) have been introduced to one or more islands in the central Aleutians. These rodents are potential predators on goose eggs and goslings, but the likelihood of these predators limiting the reestablishment of geese is not known. On fox-free islands the predator most likely to limit reestablishment of Aleutian geese is the native bald eagle. Eagle predation was so severe at Amchitka Island that attempts to reestablish geese there have been halted.

The general procedure for evaluating the potential of islands to support nesting populations of Aleutian Canada geese was to walk over an island's surface and delineate patches of Elymus-umbel, or other tall plant communities, that resembled nesting habitat used in areas with remnant or restored populations. Besides distribution of breeding habitat, relative abundance of known food plants was either delineated or the relative abundance was described. Observations of bald eagles and their nests were recorded, and annotated lists were made of other species of birds and mammals observed. Droppings or other evidence that geese had recently used islands was also recorded.

Of the islands surveyed, two, Ogliuga and Skagul, had the greatest potential for nesting geese. Kavalga and Little Kiska seem to have moderate potential, but Rat, Davidof, and Khvostof had little breeding habitat.

b. Steller sea lion. Refuge personnel collected sea lion scat at Agattu and Buldir islands for scientists at the National Marine Mammal Laboratory who are studying food habits of these threatened animals.

Pups were counted on beaches where scat was collected.

In November 1991 we began periodic counts of sea lions at haul sites at Amchitka and Shemya islands incidental to emperor goose surveys at these islands. The objective is to determine the day-to-day and seasonal variability in use to determine the importance of haul sites in winter and to calibrate winter counts.

c. Short-tailed albatross. The only sighting of a short-tailed albatross in the Aleutian Islands in 1991 was a lone juvenile north of Umnak Island on August 23 by Al Bayer and Brian Anderson. Over the past decade we have recorded 1 - 5 sightings almost annually.

d. Aleutian shield-fern. Rob Lipkin, a botanist working for the Nature Conservancy, came to Adak in August to monitor shield fern populations on Mt. Reid, following the protocol developed by Gerald Tande in 1989.

In September, BT Jeff Williams collected spore-bearing fronds from 11 different plants for the University of Alaska's propagation program. The fronds sent to the University in September 1991 were from different plants than those from which previous fronds had been collected. This provides the maximum possible genetic diversity in the greenhouse stocks. Propagation has been successful at the University.

3. Waterfowl

a. Emperor goose. In 1991, emperor goose work on the refuge focused on obtaining counts, determining adult:juvenile ratios, and resighting neck-collared birds banded on the breeding and fall staging grounds of the Yukon Delta NWR. Work in the Aleutians was conducted at three sites, Adak, Amchitka, and Shemya.

Results of winter 1990-1991 monitoring were presented in last year's narrative and data collection for winter 1991-1992 is still ongoing. However, it appears that adult:juvenile ratios are similar to last year (about 5.7:1). Additional information on family group size and distribution at localized sites is also being collected to evaluate the feasibility of rocket-netting a sample of birds for banding. If we could band a large enough sample here on the wintering grounds, it would be much easier to monitor survival since we now believe emperors exhibit fidelity to winter areas based on our previous observations.

Emperor geese enjoying the sun. (FD)

b. Aleutian green-winged teal. BT Williams and WB Byrd operated a hunter check station near Clam Lagoon on the opening weekend of waterfowl season and collected 33 teal gizzards and proventriculi for analysis of food habits. Of those birds which had food in the gizzard, 35% contained seeds, amphipods, or both. The remainder of stomachs with food contained unidentifiable organic matter or fibrous plant material. Biological staff hope to continue the check station and compile several years' food habit data for comparison with data for North American green-winged teal. Measurements of culmen, tarsus, wing, tail and mass were recorded for all teal. In the future, morphometrics of Aleutian teal will also be compared to North American teal in hopes of further understanding differences and similarities between the subspecies.

c. Harlequin duck. WB Byrd and BT Williams have begun to look more closely at our most abundant wintering waterfowl in hopes of better understanding their wintering biology and present status. Additionally, we hope to establish a baseline of information from which to detect change. In contrast to elsewhere in North America, Alaska harlequin populations appear to be doing well. We have just begun to look at harlequin sex ratios, flock size, habitat association and relative abundance on existing survey routes. As harlequins become more of a species of concern, we hope to have a monitoring system in place for comparison with other locations. Sex ratio data was collected on Shemya, Amchitka, and Adak. Initial analysis indicates sex ratios ranged from 0.88-1.3:1 males:females; the lowest ratios were found at Adak and highest at Shemya.

d. Other waterfowl. Waterfowl surveys were conducted by vehicle at Adak and Shemya islands during the winters of 1989-90, 1990-91, and 1991-92 (Tables 5 and 6). The objectives of this program were to provide indices to relative abundance and seasonal occurrence of wintering waterfowl against which future counts can be compared. At Shemya, we were especially interested in obtaining counts and sex ratios of common eiders and harlequin ducks along a pre-established route during the winters of 1990-91 and 1991-92.

Table 5. Peak counts of common waterfowl during winter (December-February) at Adak I., Alaska

Species	Winter 89-90	Winter 90-91	Winter 91-92
Mallard	98(144)[a]	185 (54)	62 (16)
Alaska Green-winged Teal	6(144)	67 (51)	35 (44)
Northern Pintail	115 (29)	149 (159)	98 (75)
Greater Scaup	111(465)	210 (367)	221(114)
Black Scoter	32 (81)	40 (24)	52 (10)
White-winged Scoter	61 (0)	16 (63)	33 (0)
Harlequin Duck	173(993)	212(1055)	237(424)
Oldsquaw	48(338)	94 (177)	125 (65)
Common Goldeneye	120(614)	191 (386)	183(385)
Bufflehead	38(128)	25 (98)	67 (56)
Red-breasted Merganser	25(261)	48 (271)	99 (74)

[a] Christmas Bird Count totals in parentheses

Table 6. Peak waterfowl counts of common waterfowl during fall and winter (Nov.-Feb.) in various years at Shemya I., Alaska

Species	1988-89	1989-90	1990-91	1991-92
Mallard	38	77	88	73
Alaska Green-winged Teal	30	24	12	39
Northern Pintail	20	19	17	30
Black Scoter	2	2	11	41
Common Eider	545	395	631(52%)	572(46%)
Harlequin Duck	570	298	386(61%)	457(60%)
Oldsquaw	100	13	48	0
Common Goldeneye	40	15	14	12

5. Shorebirds, Gulls, Terns, and Allied Species

a. Storm-petrels. Work on storm-petrels in 1991 consisted of monitoring reproductive success of fork-tailed and Leach's storm-petrels on pre-established plots. Burrows within plots were checked in late June, well into incubation, by feeling under birds for the presence of eggs. Birds were then identified by call or, only if they did not call, by removing the bird from the burrow. 1991 was the third continuous year we have monitored reproductive success on the same plots. Additionally, we have comparative data on the same plots from 1976. Eggs were laid in 43% - 66% of all burrows with chambers from 1976 - 1991 with 1976 the lowest and 1989 the highest. In 1991, mean reproductive success (total number of chicks and eggs still alive at last check/total with eggs) was about 82% for both species, compared to 77%, 61%, and about 70% in 1990, 1989, and 1976, respectively. Although more eggs were laid in 1989, fewer chicks fledged (defined as still alive at last check) than other years.

BT Williams, RM Boone, and Jim Schneeweis installed 20 new artificial nesting burrows for storm-petrels. The boxes are roughly 4" X 4" X 16" in length with a 1.5" diameter hole for an entrance. In subsequent years, these nest boxes should make productivity checks less stressful on the birds and burrows (not to mention the arms of researchers!). There has been a high rate of use by storm-petrels in boxes that were previously established

and we believe that storm-petrels will readily accept the nest structures.

b. Glaucous-winged gulls. There appeared to have been a nearly complete reproductive failure throughout the Aleutian chain in 1991. Indeed, BT Williams counted no more than five chicks all summer on Buldir, an island with normally thousands of breeding gulls. Few adult birds even attempted to build nests on Agattu, Nizki, Little Kiska, Egg, Bogoslof, and Aiktak islands. Virtually no chicks or nests were found on Bogoslof in August where nesting gulls are abundant. The situation in the Aleutians contrasted sharply with that of the Alaska Peninsula when BT Williams visited Midun I. and noted large numbers of immature gulls rafting immediately offshore. Apparently, gull colonies along the Peninsula fared better than their counterparts in the Aleutians. Exact reasons for the failure are unknown.

c. Ledge-nesters. We monitored populations and reproductive performance of kittiwakes and murres at Agattu and Buldir islands in the Western Aleutians between late May and mid-August 1988-1991 on index plots delineated in 1988. The objectives of the monitoring program were to detect changes in population size and reproductive performance of these ledge-nesting seabirds for comparison with similar efforts elsewhere in Alaska. This information can be used to detect problems in marine bird populations, and to provide a basis for directing management actions and assessing the effects of management.

Periodic counts of kittiwakes and murres on plots at Agattu and Buldir suggest populations have increased since the mid-to-late 1970's (Figures 1 and 2). We have no way of knowing whether relatively high recruitment, immigration from other colonies, or a combination of these factors has been responsible for the increases. Fewer birds in general attended plots and built nests than in 1990.

Black-legged kittiwake productivity was low at Buldir (0.10 chicks fledged/nest) and Agattu (0.06 chicks fledged/nest) and only slightly better at Buldir for red-legged kittiwakes (0.20 chicks fledged/nest). Productivity of thick-billed murres at Buldir was modest (0.64) while common murres at Agattu fared similarly (0.58).

Results of red-legged kittiwake banding and resighting efforts at Buldir continue to indicate high adult survivorship and a high degree of nest site fidelity for this species. We banded nearly 30 red-legged kittiwakes and 15 black-legged kittiwakes during 1991. We accounted for all kittiwakes banded in 1988 through at least 1990.

Common loon nests were found on many interior lakes on Agattu Island. (EVK)

Kittiwake production plot at
Spike Camp, Buldir Island. (ES)

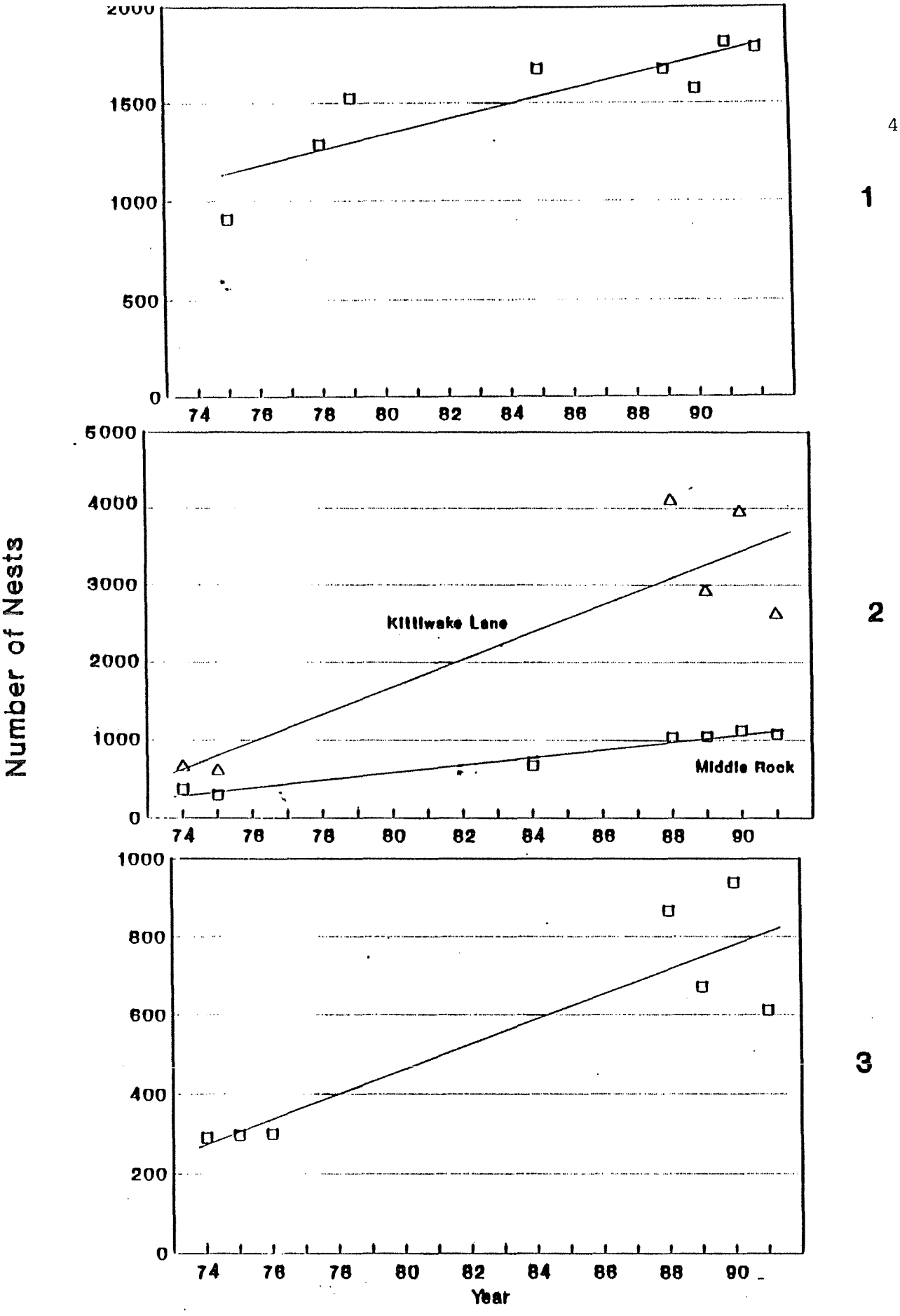
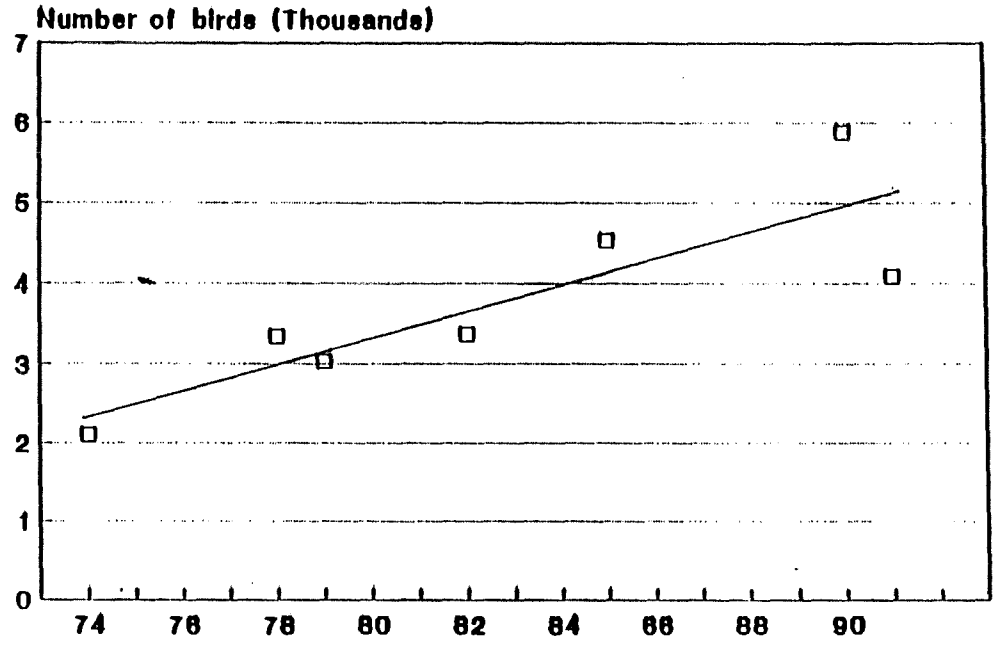


Figure 1. Trends in numbers of black-legged kittiwakes at 1) Agattu I., 2) Buldir I., and of red-legged kittiwakes at 3) Buldir I., Alaska, all from 1974-1991.



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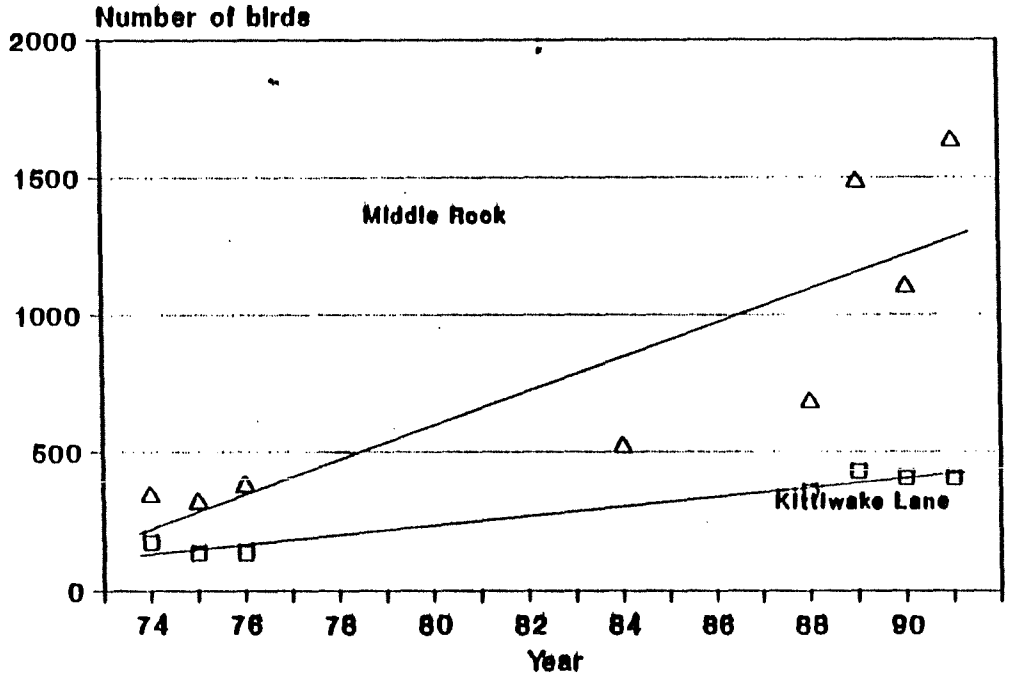

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Figure 2. 1) Trends in numbers of murres (common and thick-billed combined) at Aga Cove, Agattu I., Alaska, 1974-1991. 2) Trends in numbers of thick-billed murres at two locations on Buldir I., Alaska, 1974-1991.

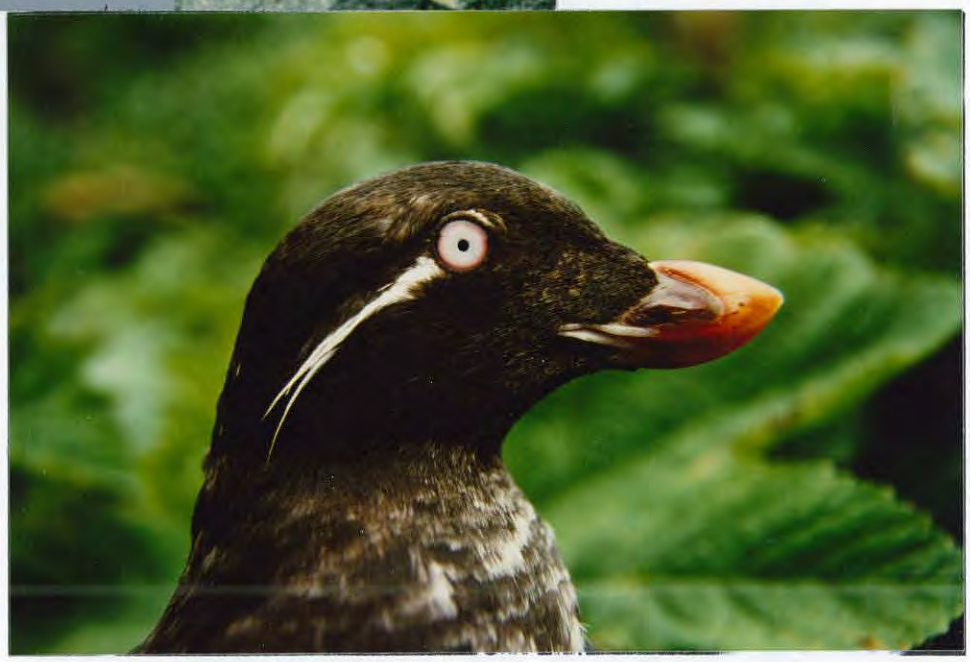
d. Crevice-nesters. Refuge staff, under direction of WB Byrd, have monitored reproductive success for five species of crevice-nesting seabirds at Buldir I. for several years. Observations were conducted incidentally to other studies. Nevertheless, we began locating nests in late May or June, early in the incubation period, and marked nest sites for subsequent visits. The fates of eggs and chicks were determined by checking sites at 5-8 day intervals up to the time a chick fledged. Fledging success was variable among species and between years, but ranged from 53-100% and averaged 75% in most years 1976-1991.

Auklet population monitoring plots were established on Kasatochi Island by Greg Thomson and Jeff Wraley in early June. They conducted counts every 15 minutes on all plots in an effort to document attendance patterns of least and crested auklets. Biological staff are still analyzing attendance data. It appears that there are more auklets at the colony than previously reported. Thomson reported 30,000 auklets rafting the water in front of the colony. Least auklets outnumber crested auklets from 2:1 to 5:1 based on counts.

e. Parakeet auklet (abstracted from Hipfner, J.M. and G.V. Byrd. In press. Breeding biology of the parakeet auklet at Buldir Island, Alaska. Manuscript submitted to Colonial Waterbirds). Parakeet auklet (Cyclorrhynchus psittacula) breeding colonies are widely distributed throughout the Bering Sea and across the Gulf of Alaska as far east as Prince William Sound. Within their range, parakeet auklets occur frequently with the more abundant and more colonial crested (Aethia cristatella) and least (Aethia pusilla) auklets, and in the Aleutian Islands these species are joined by the whiskered auklet (Aethia pygmaea). The breeding biology of the Aethia auklets has been studied at several sites in Alaska, but parakeet auklets have been intensively studied only at St. Lawrence I., Alaska in the northern part of its range.

In 1991, we examined the nesting habitat, nesting chronology, reproductive performance, and chick growth rates of the parakeet auklet at Buldir Island, Alaska. These auklets nested in rock crevices on vegetated talus slopes, in areas of mixed rock and soil, on vertical cliffs, and among large beach boulders above the high tide line. They also dug earth burrows in areas of deep soil. The timing of nesting events was later in parakeet auklets and their reproductive output was slightly lower than that of three species of auklets in the genus Aethia nesting at Buldir (47% compared to 64% for Aethia). Parakeet auklets usually incubated their eggs in 24 h shifts. Their eggs were found unattended on nearly 10% of site checks, similar to the rate of neglect in the Aethia. On average, parakeet auklet chicks weighed 27 g at hatching, gained 8.6 g/day during the linear phase of growth, peaked at 253 g, and eventually dropped to 208 g (about 84% of adult mass) at fledging some 36 days after hatching.

Tufted puffins are one key species that is surveyed on selected islands. (LL)



Parakeet auklet portrait. (JW)

f. Tufted puffin (abstracted from Byrd, G.V., J.C. Williams, R. Walder. 1991. Status and biology of tufted puffin in the Aleutian Islands after a ban on salmon driftnets. U.S. Fish and Wildlife Service Report. Adak, Alaska). From the early 1950's to 1988 the Japanese operated a salmon drift gillnet fishery in the North Pacific Ocean. The drift gillnets killed an estimated 95,000 - 200,000 seabirds annually, including 38,000 tufted puffins (Fratercula cirrhata). The fishing effort was concentrated in deep water south of the western Aleutian Islands during June and July, and concern was expressed that local breeding populations of puffins were being adversely affected. Legislation was introduced in the U.S. Congress in 1986 and 1987 addressing the gillnet problem, and in 1988 the fishery was banned.

The western Aleutian Islands are within the Alaska Maritime National Wildlife Refuge, and the U.S. Fish and Wildlife Service began an evaluation of the status of puffins in this area in 1988 immediately following the ban on drift gillnets there. We predicted that tufted puffin populations at islands near the fishery might be depressed as a result of the mortality caused annually by entanglement in nets. Thus, we documented population levels by delineating the extent of nesting colonies and by evaluating nesting density at islands located nearest the high concentration fishing areas. Furthermore, we studied some of the factors that could provide insight into the dynamics of breeding populations (e.g., reproductive success, chick growth, and chick food).

Conclusions about whether the gillnet fishery had been limiting local breeding populations had to be based upon meager information that was available prior to 1988 and upon observed characteristics of populations in the potentially affected areas near the fishery. We knew from past studies that tufted puffins usually nest in relatively high densities in areas free of mammalian predators where deep soil provides a suitable substrate for constructing nesting burrows. If tufted puffin breeding populations in the western Aleutian Islands had been depressed because of gillnet mortality, we would have expected to find unused nesting habitat (deep soil on sea-facing slopes, perhaps used by other burrow nesters, but not tufted puffins) or at least relative-low nesting densities. We did not expect to see major changes immediately following the ban on drift gillnets, because increases in puffin populations would likely occur after young birds, which survived at a higher rate after gill nets were removed, reached maturity (probably at about 3-5) and entered the nesting population.

Our study focused on tufted puffins in the western Aleutian Islands where the drift gillnet fishery was concentrated. We hypothesized that tufted puffin populations at islands near the drift gillnet fishery might have been adversely impacted and

probably remained at depressed levels in 1988, when this study began. Although we had no way of knowing the breeding location of birds caught in nets, it seemed reasonable to assume puffins from Buldir, Agattu, and Nizki-Alaid were involved. Thus, we should have found unused nesting areas and relatively low densities at all three locations. Furthermore, if puffins elsewhere in the Aleutian region exhibited different population characteristics (e.g., expanding populations or high densities), the suspicion that gillnet mortality had been limiting local populations in the western Aleutians would have been strengthened.

Consistent with the hypothesis, we found apparently unused nesting habitat at all three study sites (Agattu, Nizki-Alaid, and Buldir) in the affected area, but the characteristics of tufted puffin populations at Buldir seemed to be different from those at Agattu and Nizki-Alaid. Breeding populations on Agattu and Nizki-Alaid have expanded since the mid-1970's (i.e., while the gillnet fishery was going on nearby), after removal of introduced arctic foxes made safe nest sites available. Apparently there were enough "excess" puffins in the area, even during the gillnet fishery, to take advantage of newly available nesting habitat. Moreover, at eastern Aleutian study sites, puffin populations have either expanded (Bogoslof) or have remained stable at high densities (Aiktak) since the mid 1970's or early 1980's. In contrast, populations at Buldir have not obviously changed, and nesting densities at Buldir were the lowest we recorded anywhere. These results suggest that the tufted puffin breeding population at Buldir was depressed compared to other areas we studied in the Aleutians, and two possible explanations follow:

1. Gillnet mortality was responsible.

To evaluate whether this is a reasonable conclusion, we need to know whether Buldir birds were more prone to be caught in gillnets than puffins from breeding colonies at Agattu and Nizki-Alaid.

The highest concentration of fishing occurred in an area roughly equidistant between Buldir and Agattu, but the majority of the overall effort was closer to Agattu. Thus, if distance from the colony was the main influence, birds from the Agattu and Nizki-laid breeding colonies would have been more likely to have been caught than those at Buldir.

Alternatively, it is possible that tufted puffins nesting at Buldir had a different feeding strategy than birds nesting in the Near Islands (of which Agattu and Nizki-Alaid are a part), which caused the Buldir birds to be more likely to feed in areas where gillnet fishing occurred. Duff Wehle found that tufted puffins at Buldir fed primarily in offshore or oceanic waters during the

incubation period (mid-June to mid-July) where the most frequently taken prey in 1975 was squid (primarily Gonatus magister), the same prey puffins most frequently delivered to chicks at Buldir 1988-1991. Tony DeGange, USFWS, Marine Mammals indicated squid was the most commonly observed prey of puffins killed in gillnets based on a cursory examination. John Piatt, USFWS, Research indicated that squid was the most important prey of adult and subadult puffins at Agattu and Buldir in May and June 1988-1990. In contrast, no squid were found in our samples of prey delivered to puffin chicks at Agattu 1988-1990. Instead, sand lance was the most frequently taken prey there in all years. Sand lance was also the main prey delivered to chicks at Nizki-Alaid in 1990 and 1991. Differences in prey could account for differential feeding distributions of birds from the Near Islands and Buldir at least during the chick rearing period. Sand lance, especially adult fish, tend to concentrate in relatively warm, shallow water which is relatively abundant around Agattu and Nizki-Alaid compared to Buldir.

Duff Wehle pointed out that tufted puffins may feed nearshore throughout the breeding season, when availability of suitable prey allows. It is possible that breeders at Agattu and Nizki-Alaid were able to feed relatively nearshore during chick rearing because sand lance was available near the islands, and perhaps they seldom ventured into deep water where most of the gillnet fishing took place. In this event it might have been possible for tufted puffins breeding at Buldir to have experienced a higher mortality rate from drift gillnets than birds breeding in the Near Islands.

2. Buldir is marginal breeding habitat for tufted puffins and depressed populations are unrelated to gillnet mortality.

Availability of nest sites did not seem to be limiting breeding populations of tufted puffins at Buldir. There were a number of sea-facing slopes with deep soil at Buldir with very low densities of tufted puffins. These habitats appeared to be similar to habitats used commonly by puffins elsewhere and they contained breeding populations of other burrow nesting species which demonstrated suitability for burrowing. Competition with other burrow nesting species seemed an implausible factor since tufted puffins would almost certainly be the dominant burrow nesting species at Buldir in interspecific competition.

If puffins were not limited by nest sites, inadequate food is one possible alternative. As indicated, squid was an important element in the diet at Buldir, and Wehle considered this prey to be inferior to sand lance for rearing puffin chicks. Indeed, we recorded lower chick growth rates and reproductive success at Buldir, where chicks ate squid, than at Agattu, where puffins fed mostly sand lance to chicks.

Our overall conclusion is that tufted puffin populations probably are depressed at Buldir, but not in other study areas near the gillnet fishery or in the eastern Aleutians. As discussed, it is conceivable that drift net mortality might have been responsible for keeping breeding populations at Buldir below the capacity of the nesting habitat if, due to prey availability, puffins breeding at Buldir were more likely to encounter gillnets. Nevertheless, it is also conceivable that Buldir provides a lower quality environment for breeding puffins than some of the other areas studied. Only time will tell. The monitoring system set up at Buldir provides a basis for determining change in the future. If the gillnets were limiting breeding puffin populations, an increase should now begin.

6. Raptors

a. Bald eagles. RB Byrd and BT Williams began a program of eagle age classification using a system which allows observers to accurately identify eagles to within one year. Weekly surveys which tried to age all eagles around Adak were conducted primarily in fall, winter, and into spring. During winter, after leaving nesting territories, eagles concentrate around the Navy's landfill operation where food is abundant. During winters 1990 and 1991 (Oct. - March) the population contained about 17% - 20% juveniles (birds of the year), which was similar to data collected over three winters in the early 1980's (Table 7.)

Table 7. Age composition of bald eagles on Adak I., Alaska, winters 1981-84 and 1990-91.

	Age category[a]			
Year	Juvenile	Mottled	Eye-stripe	Adult
Winter 1981-1984	18-20%	23-33%	9-16%	33-49%
Winter 1990-1991	17-20%	21-27%	6-11%	42-55%

[a] Juveniles are birds of the year (1/2 year), mottled = eagles 1 1/2 - 2 1/2 years, eyestripe = 3 1/2, adult = 4+

The amazingly consistent proportion of juveniles suggests a saturated breeding population with a fairly constant summer environment.

b. Injured eagles. Nine bald eagles were found electrocuted during the year (Figure 3). The number of eagles electrocuted annually has continued to decline since 1978 when data were first collected.

BT Williams was very busy this fall and winter responding to injured eagle cases. One day found him checking on six different eagles, four of which were fed and held overnight. Approximately six other eagles were held, fed and then released in 1991. We also shipped a record number of eagles to the Arctic Animal Hospital in Anchorage. Dr. Jim Scott is extremely willing to care for any injured eagles we send him. Eight eagles were shipped to Dr. Scott, of which five should be returned to the wild. Three birds had contracted avian pox. Avian pox is a viral disease spread by contact; ideal conditions for large numbers of birds at the dump to contract the disease. In addition to the three birds sent to Anchorage, two dead birds were recovered during the summer and fall and at least two other birds with pox lesions on the head were seen.

An adult female was caught in an unstaked leghold trap which she carried around for approximately a week before she could be captured. Unfortunately, the bird was extremely weak and suffering from infection in the leg. It died shortly after arriving in Anchorage.

In addition to the birds sent to Anchorage, BT Williams provided overnight care for about 10 other eagles by feeding them or administering an electrolyte solution.

In 1991, we monitored the occupancy of nests along the northeast coast of Adak. Approximately 63% of the 19 nests found were occupied by adults. The same number of nests was present in 1991 as in the early 1980's. We were unable to see into all occupied nests, but in late June, at least seven nests had one juvenile each.

We receive quite a few calls during the winter months regarding dead eagles - some have been there quite a while. (LG)

This year we picked up three eagles that were infected with avian pox - two died. This bird was shipped to Anchorage for treatment. (EVK)

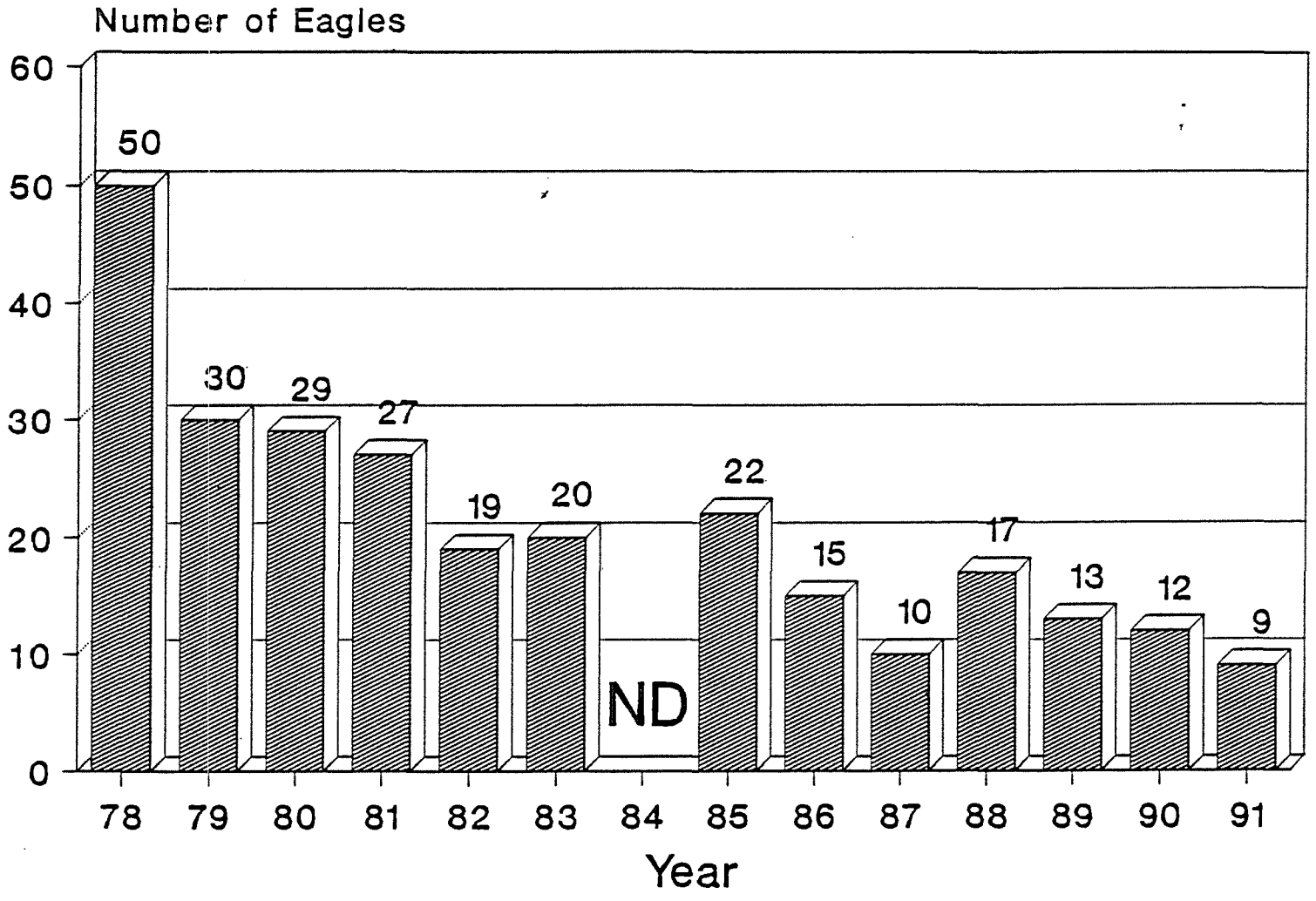


Figure 3. Number of bald eagles electrocuted annually at Adak I., Alaska. No data are available for 1984.

7. Other migratory birds

a. Christmas Count. The 1991 Christmas Bird Count was the 24th at Adak. It was conducted on December 21 by 15 participants. Nearly 3,000 birds of 37 species were counted. Most unusual were two dark-eyed juncos (the first record for Adak) and a single Lapland longspur (usually this species is gone from the Aleutians by November).

b. Breeding Bird Survey. The Adak Breeding Bird Survey was conducted June 22, 1991 by Scott Crabtree, a refuge volunteer. Twenty-five species were recorded, the most common species being Lapland longspur, glaucous-winged gull, and marbled murrelet.

8. Game Mammals

a. Caribou. (Excerpts from Byrd, G.V. and J.C. Williams. 1991. Annual Report on caribou management at Adak Island, Alaska.

Population Survey. On February 22, 1991 the refuge staff flew an aerial survey for caribou at Adak in a U.S. Coast Guard helicopter. Viewing conditions were only fair because patchy melted snow at lower elevations made it difficult to spot caribou. Up to 374 caribou were seen in 27 herds. Most herds contained 10-30 animals.

We estimated the island population to be at least 556 caribou prior to the beginning of the hunting season September 1, 1990 because 182 caribou had been taken by the time of our survey.

Hunter Success. During the 1990-91 hunting season, 201 caribou were taken by hunters at Adak. A total of 377 hunting permits were issued, and about 80% actually hunted. This is the second-highest harvest level on record. The primary management concern about this introduced caribou herd at Adak is that the population will increase beyond the ability of the hunters to control. Therefore, the harvest rate needs to remain relatively high to preclude such problems. The current target is to try to get the pre-calving herd down to 300-350 animals. Hunter access is the key to a high harvest, and continuing transportation to hunting areas by the Navy tug boat is essential to meet management objectives.

9. Marine Mammals

a. Whales. Although not technically "on" the refuge, an effort was begun to systematically record data on whale sightings from the M/V Tiglax. Captain Alvin Bayer and First Officer Kevin Bell logged every sighting anyone aboard made from the vessel in 1991. Information was recorded on approximate size of animals, exact locations, and number of animals in groups.

Usually one or more whales are found grounded in the Aleutians each year, but in 1991 none were reported.

b. Pinnipedia. A small walrus far out of its range was observed at Agattu during the last week of June. The animal had 5-6" tusks and weighed an estimated 200 lbs. An adult walrus skull, possibly a female, was found in early June at Armeria Bay along the northern coast of Agattu. It is unknown when the animal died.

BT Williams visited Bogoslof I. on August 21 and estimated there were 5,680 fur seals on the beach; at least 400 pups of the year were also present. This is a tremendous increase since the 1970's when the rookery was established on the island.

Numbers of sea otters continue to increase in the Semichi Island group, the last group in the chain where otters have not recolonized since their decimation by Russian fur hunters in the 18th and 19th centuries. Previous surveys at Shemya documented no more than 1-2 otters around the circumference of the island. Surveys in 1991 found 10-20 animals present and rafts of 100+ animals were seen in early January. It will be extremely interesting to note changes in the nearshore community as otters reoccupy the island. Sea otters are keystone species in the community because they forage heavily on sea urchins. As the density of otters increases, grazing pressure of urchins on kelp should decrease. This will allow more kelp beds to become established which in turn facilitates a different community structure.

14. Scientific Collection

In 1991, all collection of wildlife was in conjunction with the Amchitka Island PCB and DDE Study. During May, BT Williams, volunteer BT Hipfner, and Phil Schempf of Region 7 Raptor Studies in Juneau collected six bald eagle and two peregrine falcon eggs for contaminants analysis. This often meant climbing or rappelling into an extremely agitated eagle's aerie which offered little or no protection. BT Williams learned that some eagles are much more aggressive than others when he saw the cap he was wearing disappear from his head in the large talons of an upset female eagle. The eagle, discovering it had missed its target, returned to forcefully and repeatedly attack the briefcase under which BT Williams made a hasty retreat. In the end, the eagle pair had lost one egg while BT Williams lost some dignity and gained more respect.

Walrus are not commonly found in the Aleutians.
This young one was observed on Agattu Island. (LG)

Sperm whales are becoming a common sight among the Rat Islands. (EVK)

ROS Klett and BT Beyersdorf continued the collections of specimens during the summer and collected the following species:

Species	Number
Rock ptarmigan	6
Tufted puffin	3
Pelagic cormorant	3
Aleutian green-winged teal	6
Norway rat	3
Rock greenling	12
Pacific cod	12

BT Williams contacted several museums and sent a list of 26 species salvaged over several years which were stored in our freezers. All museums eagerly responded and specimens were disposed of on a first-come, first-served basis. Some species such as whiskered auklet, peregrine falcon, and Aleutian tern are poorly represented in collections and our salvage efforts made an appreciable contribution to the study of Aleutian avifauna. In addition to the birds above, the following were salvaged in 1991:

Species	Number
Bald eagle	21
Short-eared owl	9
Least auklet	1
Whiskered auklet	2
Horned puffin	1
Tufted puffin	3
Fork-tailed storm-petrel	4
Common raven	3
Sea otter	9

15. Animal Control

Introduced arctic foxes have devastated ground nesting birds in the Aleutian Islands. A program to remove foxes from selected islands has been underway for years. The process is to intensively trap an island for a season, and then recheck the island the following spring to determine if any animals are left. If fox sign is detected, trapping continues until all the animals have been taken. In 1991, rechecks were made at three islands, Carlisle, Little Tanaga, and Kasatochi, and initial efforts were made to remove foxes from two islands, Ulak and Amatignak. The following annotated list provides results.

Carlisle. In May 1991, two days were spent checking Carlisle for signs of foxes. It seemed clear that no foxes remained following trapping efforts in 1990.

Little Tanaga. (Excerpts from Byrd, G.V. and D.L. Boone. 1991. Survey of Little Tanaga for arctic fox in June 1991. U.S. Fish and Wildlife Service Report. Adak, Alaska). Fox trapping was conducted over the winter of 1989-1990, but in July 1990 it was discovered that a few animals survived. In June and July 1991, we made an effort to catch the remaining foxes on Little Tanaga to restore the island for native birds. Six days were spent in late June checking the island for fox sign and setting traps. A single female was taken, and one additional set of tracks indicated at least one animal was left. A recheck of portions of the island was made on July 18. One male fox was caught, and no fresh tracks were seen. Nevertheless, a followup trip to Little Tanaga on September 4, 1991 resulted in the discovery of tracks of a single fox at Narrows Bay. A total of 41 foxes have been removed from Little Tanaga. Plans are to return to the island in June 1992 to complete the eradication project.

Amatignak and Ulak (Excerpts from Bailey, E.P. 1991. Eradication of arctic foxes from Amatignak and Ulak islands, Aleutian Islands. U.S. Fish and Wildlife Service Report, Adak, Alaska). From mid-June to mid-August crews camped first on Amatignak then nearby Ulak islands while trapping arctic foxes. A total of 46 adults and nine pups were killed on Amatignak and 26 adults and 18 pups were taken at Ulak. No foxes were known to remain at Amatignak, but at least one or two were still present at Ulak. Both islands will be rechecked in June 1992.

Kasatochi (Excerpts from Thomson, G. and J. Wraley. Results of a survey of Kasatochi Island, Alaska for arctic fox and auklet in June 1991. U.S. Fish and Wildlife Service Report. Adak, Alaska). A program to eradicate foxes from Kasatochi began in 1984 when 55 adults and four pups were killed. Followup efforts in 1985 resulted in five more foxes being killed, but it was estimated at that time that at least five additional foxes had survived.

From May 31-June 12, Thomson and Wraley camped on Kasatochi. They planned to attempt to kill any remaining foxes. After several days of checking most likely locations for fox sign, it was concluded that no foxes remained. The only area not checked was the extreme north portion which is not accessible by foot. That area will be checked by boat in 1992.

16. Marking and Banding

Refuge personnel captured and banded 187 Aleutian Canada geese on Buldir Island. Most (183) were translocated to either Nizki-

Alaid or Little Kiska islands in August. BT Williams, BT Russell, BT Walder, and Mark Hipfner color banded 37 red-legged kittiwakes and 15 black-legged kittiwakes during the summer on Buldir. The objective is to estimate average annual adult survival rates through resightings in subsequent years, which is feasible since birds tend to return to the same nest site. We need to know something about adult survival so that we can predict levels of reproduction needed to maintain stable populations. This information will suggest whether recent reproductive failures signal serious problems. Capture rate was higher than other years because we used an 8 ft. fishing pole with a noose on the end which allowed us to approach many birds before they became alarmed.

Ken Russell showing off banded red and black-legged kittiwakes. (JW)

H. PUBLIC USE

1. General

Early in the year, ORP Cline continued her detail which began in August 1990 to the Subsistence Division office in Anchorage. In April 1991 she was permanently transferred to the Subsistence Division. The public use program was drastically reduced by this transfer. Consequently, public use figures are depressed compared to past years.

The new ORP, Laura Greffenius, EOD December 1st and arrived in Adak in mid-December.

The Visitor Center remained closed on weekends all year; however, for several weeks prior to Christmas, the ANHA sales outlet was open on Sundays.

Due to an absent ORP and a vacant ORP position throughout most of the year, the refuge staff no longer accepted requests for special programs. Weekly articles for Adak's newspaper, "Eagle's Call", were submitted by rerunning old articles.

Informal interviews on the local television station included the topics of eagle rehabilitation and hunting regulations to inform the public about steel shot requirements and license changes.

Monthly activities at the Visitor Center included Adak NAS "Blue Card/Firearms Safety" lectures (884 people), orientation lectures for new arrivals on Adak (389), two semesters of the University of Alaska "Alaska Mammals" course (24 students; ROS Klett and WB Byrd were guest lecturers for two class sessions), two classes "Basic Sailing and Seamanship" taught by Adak Coast Guard Auxiliary, and routine visitation of 5,845 people.

We also hosted meetings of the NAS Search and Rescue Team and Adak Historical Society, and provided classroom space for Construction Battalion training sessions.

A very welcome addition to our staff in October was Student Conservation Association Resource Assistant Amy Prosser. She stayed for a three-month internship and helped to train the new ORP. She also kept the ANHA sales outlet open on Sundays around Christmas, wrote articles each week for the local newspaper, made a Wetlands display for the front entryway, designed a display about caribou on Adak using historical photographs, and gave several presentations to pre-schoolers. She provided a good start to get the public contact programs rolling once again. Her contributions were greatly appreciated.

At year's end, efforts continued to juggle budgets so an SCA Resource Assistant could be hired for winter/spring 1992. During the school semester, their assistance is very much in need to fulfill environmental education commitments to the schools.

A big "thank you" is presented to our community volunteers. Their tasks included specialized skills needed to repair our seismograph, helping out in the Visitor Center to answer questions and to sell ANHA items, general maintenance, and reorganizing the slide library. The staff extends their gratitude to those who donated their time and skills to the refuge.

In December, we initiated a community volunteer program by advertising for interested persons via television, radio and the newspaper. We would like to once again increase community involvement at the Fish and Wildlife Center, and establish a cadre of trained volunteers.

2. Outdoor Classrooms - Students

Much of our springtime involvement with the schools was greatly reduced or canceled this year due to the absence of an ORP on the staff. Activities specifically hurt were: National/Alaska Wildlife Week and Sea Week.

School groups who were involved with Sea Week activities came to the Visitor Center. This included three 4th grade classes (65) and one 1st grade class (20). Classroom programs were also presented to 4th and 5th graders 79).

Traditionally, the refuge has coordinated summertime activities with children. This year there were none, due to lack of personnel.

3. Outdoor Classrooms - Teachers

The refuge provided environmental education materials to teachers. Items were given to teachers on Adak, and sent to Atka, Akutan, Nikolski and Unalaska schools.

The usual emphasis placed on Sea Week was limited. No Sea Week or Alaska/National Wildlife Week materials were sent to the Native schools, as none were received from the Regional Office.

5. Interpretive Tour Routes

Plans progressed minimally for the development of an interpretive Clam Lagoon Auto Tour Route. Funding for this project originated under the "America the Beautiful" program, plus a Challenge Grant with matching funds coming from Ducks Unlimited and State of Alaska Department of Fish and Game.

Several classes from the elementary school visited the Center during National Wildlife Week and made use of our displays to study Aleutian wildlife. (EVK)

Sue Matthews, ORP, Homer Office, was on Adak for three days in April to receive an orientation of the proposed Tour Route. A preliminary draft resulted recommending the planned layout which will include interpretive signs and spotting scopes at selected pullouts and platforms. The spotting scopes were ordered and received, with plans to erect them in spring 1992.

6. Interpretive Exhibits/Demonstrations

The Fish and Wildlife Center continues to be Adak's "must see" stop for everyone. This is easy enough to explain when you remember that our 5,500 population makes us Alaska's 8th largest community. Annual visitation by military and civilian personnel from other locations swell it by another 20%.

For this predominantly military constituency which includes some high-level decision makers with large budgets, it is an unsurpassed opportunity to present the Service's message. For the majority of Adak residents, refuge programs, classes, bookstore and technical assistance are a welcome relief from military duties and provide insight into an unusual area of a unique state.

For two weeks during May in the Visitor Center, we displayed the Take Pride in America exhibit, "Hike the Conservation Trail". This display was designed with the help of the Boy Scouts of America to augment their Take Pride in America merit badge program.

7. Other Interpretive Programs

Interpretive and environmental education programs beyond Adak were supported. We donated a selection of natural history books to the Shemya Air Force Base library. Informational materials (i.e., brochures, posters) were sent to the Native villages and to the other military facilities (Amchitka, Shemya and Attu). Goose posters and other goose literature were sent to Native villages and the military bases.

In May, RM Boone made a visit to the village of Atka while en route aboard M/V Tiglax. During the course of the year, refuge staff visited and made contacts with personnel at Amchitka, Shemya and Attu, although no formal programs were presented.

Special events at the Visitor Center were limited. Films shown included "Report from the Aleutians" and "Alaskan History" (12 people).

Refuge staff presented a variety of programs to various organizations on Adak. ROS Klett spoke to groups at the Ladies Lecture Luncheon, Military Women's Club, and new civilian employees. WB Byrd also spoke at the Ladies Lecture Luncheon.

Special Blue Card lectures were presented to two visiting Coast Guard cutters and an Army Reserve group. ROS Klett also gave four Refuge Orientation lectures to 360 people at the NSGA military training. BT Williams spoke to a Girl Scout group about wildlife and working as a biologist.

The Public Affairs office supplied us with a case of glossy color brochures explaining the various careers in the U.S. Fish and Wildlife Service. We mailed copies to our local school counselors and to all other schools within the Aleutian Islands Unit.

We received information from the Yukon Delta Refuge regarding the 1993 Goose Calendar contest. Packets about participating in this contest were sent to all the Native schools in our Unit.

Our office received a case of brochures on the dangers of unexploded ordnance. We sent copies to all military commands/communities within the AIU that had WW II sites on them where unexploded ordnance might be found.

8. Hunting

Specific species hunted in the Aleutians include caribou, ptarmigan, reindeer, fox and waterfowl. Areas closed to hunting are limited to Shemya Air Force Base and the Navy base at Amchitka. The USCG only allows a waterfowl season on Attu.

The Adak waterfowl and caribou hunts are monitored closely, given the high interest in the community. Adak's caribou are large and healthy and the popular hunt is enjoyed by many. A world record bull weighing over 700 pounds was taken at Adak in 1968. The NAS tug service as well as the NSGA charter vessel Kuluk Clipper provided transportation on a limited basis to hunters using the south side of the island. This support is vital to the refuge's ability to manage the caribou herd.

The 1990-91 caribou season ended on March 31. A total of 201 animals was taken and 377 permits were issued during that season. The 1991-92 season began on September 1. As of the end of December, we had issued 355 permits and the reported kill was 143.

Pre-season publicity of regulations and visible LE patrols may have contributed to no waterfowl violations. For the third year in a row, the Adak post office sold out its supply of Federal Duck Stamps. We obtained an emergency supply from the Regional Office to help us through until the post office was replenished.

9. Fishing

Both commercial and sport fishing are important activities in the Aleutians. Salmon, halibut, black bass, tanner and king crab are the primary commercial targets. Saltwater sports enthusiasts enjoy catching these species along with Japanese perch, lingcod and the infinite other surprises found off these shores. Adak saltwater fishing is usually from the breakwater, a private boat or NSGA's Kuluk Clipper. Stream and lake fisherman are looking for pink, red and silver salmon, Dolly Varden and the occasional rainbow.

Fishing pressure is heaviest in salmon streams close to the base on Adak. Weekend and evening patrols by refuge officers minimize violations. Because there were only two law enforcement personnel on the staff (RM Boone and ROS Klett), who were mostly in the field during the summertime, patrols could not be carried out as often as desired. The Navy commands continue to assist in managing the fishery by posting some streams for fly-fishing only or as closed.

The first red salmon were reported to be running in early July, one indicator of the beginning of summer and enthusiasm for outdoor activity! An estimate of Adak's hiking, hunting, and fishing activity on the island was compiled from license sales by the Navy Exchange and hike plans filed with NAS Quarterdeck.

A lucky catch from the Kuluk Clipper was a 322 pound halibut caught at the south end of Kagalaska Straits.

10. Trapping

The trapping season for fox ran from November 10, 1990 to February 28, 1991. Free refuge permits were issued to 19 trappers on Adak during the year. Though a few of the participants invest a serious amount of time in trapping, for the most part, it is recreational trapping.

11. Wildlife Observations

The annual Christmas Bird Count was held December 21st on Adak. Fifteen observers participated and found 37 species. Not bad for a day that ended in blowing snow and sleet. Noteworthy observations were tufted ducks, northern harrier, immature mew gulls, dark-eyed junco and Lapland longspurs. The day-long event was concluded with a potluck at the refuge bunkhouse to tally the day's results. Alaska Natural History Association paid participants entry fees.

13. Camping

The entire AIU, except Amchitka and Shemya, is open to camping. Most use, however, occurs on Adak where five FWS backcountry cabins are available on the south portion of the island on a first come, first served, reservation basis. As in past years, the cabins received moderate to heavy use by backpackers, fishermen, and caribou hunters. MWR's "gear issue" has camping items to rent at a very reasonable rate to those residents who want to get out and explore Adak's beauty but do not own tents, pots/pans, stoves, etc.

15. Off-road Vehicling

ORV's were not a problem this past year. No incidents were reported by NAS Security.

Newspaper articles and television spots were the focus of our preventive enforcement efforts aimed at keeping vehicles on the roads rather than on the tundra where they leave scars that take years to heal. The word was also put forth at all the NAS Blue Card and Welcome Aboard lectures.

16. Other Non-Wildlife Oriented Recreation

Cross-country skiing, snowboarding, sledding, tubing and snowshoeing are extremely popular winter activities on Adak when snow conditions are adequate. Hiking and beachcombing are popular throughout the year and berry picking is enjoyed by many during the fall.

17. Law Enforcement

RM Boone and ROS Klett attended the 40 hour Refuge Law Enforcement Officer refresher training session in Marana, Arizona in March. As in the past, while some speaker/topics left room for improvement, most speakers and the superior facilities made this a very worthwhile effort.

At present, most refuge enforcement work occurs on Adak Island. The lack of logistical support makes enforcement on other islands virtually impossible. By agreement with the Navy, resource-related infractions (hunting, fishing, ORV's) are cited under the Service's authority while other violations (litter, vandalism, etc.) will receive review by the Commanding Officer for possible military sanctions which may include loss of pay, demotion and extra duty.

ROS Klett attended a 40 hour Archaeological Resource Protection Act workshop in September. The National Park Service and National Forest Service instructors were excellent.

The Navy's volunteer natural resource patrol was reestablished in September. With an anticipated record salmon run, a proliferation of off-road vehicles and target shooting in unauthorized areas, two part-time refuge officers are stretched to monitor Adak's 5,000+ population for resource violations. We are pleased to have the help of these additional people. Refuge staff conducted two training sessions with them.

Routine law enforcement patrols included trips to Gannet Pass, Shagak Bay, Finger Bay, Lake Andrew and Clam Lagoon checking caribou hunters and fishermen. No citations were issued.

In October, Refuge Officer Klett qualified with his Service revolver at the Naval Air Station's outdoor range, shooting the FLETC practical pistol course under the watchful eye of the Service Firearm Instructor Phil Garrett. RM Boone accomplished his requalification in Anchorage.

During February and March, refuge officers checked licenses and permits of hunters returning on the Navy tugboat each Tuesday evening from the south end of the island. This half-hour spent with returning hunters seems to help compliance and provide a better return of information as well as giving us a current count of hunter success. The tug did not operate in September and October; consequently, hunter checks were not required.

Weekend checks of waterfowl hunters occurred after the season opened on October 8th. Pre-season publicity of license, duck stamp, and steel shot requirements plus visible patrols contributed to compliance with these regulations. For the third year in a row, the Adak post office sold out its Federal Duck Stamps. We obtained an emergency supply from the Regional Office to help us through until the post office was replenished.

In late October we received word from our Law Enforcement office in Anchorage regarding an investigation of a past commanding officer of the U.S. Coast Guard LORAN Station on Attu. Among the many possible violations being investigated by the Coast Guard were two counts involving Service regulations: offroad vehicle use and shooting protected migratory birds (ravens and gulls). After reviewing information on the two accounts, we requested that a citation be issued on the migratory bird violation. At year's end we had not received any information on the disposition of the case.

18. Cooperating Associations

For five years previously, the Adak Branch of the Alaska Natural History Association had been the highest selling branch. For FY 91, gross revenue totalled only half the previous year's sales. Several factors contributed to this: the Visitor Center

was not open weekends due to staff shortages; and there was no ANHA Branch Manager/ORP on the staff throughout most of the year.

In a military community such as Adak, there are few places to purchase natural history books and other related items. Our ANHA sales outlet is a highly welcomed part of the community. Cooperating association sales increase visitors' appreciation of the refuge and their understanding of conservation issues.

CTs Wheeler and Wiles provided a contagious enthusiasm at the front counter that makes it hard for visitors not to buy something.

Vital to everyday success is the character of the visitor center in the community as the location of interesting activities. For residents and visitors alike, a day on the island frequently includes a stop at the FWS Center.

Sales proceeds (85% returning to the refuge) were used in many ways: donations to the volunteer staff, presentation of "special events", purchase of new wildlife videos, donations to Ducks Unlimited for fund raising, fees for participants in the Christmas Bird Count, and to support interpretive and environmental education activities.

With no Branch Manager, the details of operating the sales outlet fell on CTs Wheeler and Wiles. They did an exceptional job insuring shelves were well stocked, maintaining inventory records, making deposits and keeping up with the job of tracking the order of sale items. Well done - our hats are off to you!

I. EQUIPMENT AND FACILITIES

1. New Construction

In the spring, personnel from the carpenter shop were busy nailing floors together in preparation for the upcoming field season. Floor sections (4' X 10") were fabricated of 1/2" plywood and 2 X 4s and painted in Adak. The 4' X 10' sections have proven much easier to handle and transport. On site, six of these sections are bolted together, forming a 12' X 20' floor. Field crews can then assemble any of several sizes of Hansen weather port on this standard floor to provide very comfortable field accommodations.

Two outhouses were also prefabricated in sections so that they could later be assembled in the field.

To aid in the storage of the field camp equipment in Adak, a 12' X 30' Hansen weather port was erected along the north side of the building. Due to its large size and the fact that it will remain up during the winter months, the floor's framing was

constructed with 4" X 4" X 20'. The lumber is believed to have originated from a barge spill during a storm the previous year and has been salvaged from a number of islands in the western Aleutians.

At the refuge residences, 40 yards of gravel were purchased and delivered by a local contractor. This much-needed fill was then smoothed with the JCB loader into the low-lying portions of the driveways and parking areas.

At the office complex where the field equipment is stored, a loft was constructed above one of the vehicle stalls. The loft is supported by 4 X 4 uprights with 2 X 10 floor joists and 3/4" plywood decking; it will hold many of the field items which are light in weight but consume space. The open area below can now be used to work on the Zodiac boats, weatherproofing tents, and other general field preparation jobs.

2. Rehabilitation

In January, another severe storm hit Adak. This one tipped over some contractor trailers, ripped the siding from Navy housing and supply buildings, and blew out car windows at the Bob Reeve High School. Here at the refuge office, the 17' Boston whaler was blown off its trailer and rolled. A new throttle cable, steering cables and steering helm were ordered, and MW Lewis reconstructed the console and seat and installed the new parts. The 70 hp Evinrude, shipped to Adak at a later date, was then mounted and a bay test performed, insuring operational readiness for its summer use. The trailer, which also suffered some damage, was straightened and had some new aluminum pieces fabricated and installed.

On Quarters 3, MW Tom Morey replaced a 4' X 6' floor in the front entranceway which had become unsafe due to age and years of damp conditions.

A new circulation pump was installed at the refuge headquarters boiler room. Also, the bearings in the motor on Air Handler Unit 1 were replaced.

Two cabins received some attention this year. The first was at Kasatochi, approximately 50 nautical miles NE of Adak in the Bering Sea. Due to the M/V TIGLAX's schedule, all the necessary materials for cabin repair and roof replacement had to ride out west with the M/V TIGLAX from Homer, as it would stop at Kasatochi before arriving at Adak. MW Lewis and MW Schulmeister, from Izembek NWR, met the M/V TIGLAX in Atka where the vessel was having open house, then continued to Kasatochi the following day. The normally difficult landing on Kasatochi was made even more difficult due to a northerly swell producing breakers for skiff operator Greg Snegden of the M/V TIGLAX to navigate. Several

loads of 2 X 4s, plywood, tar paper, plexiglass and tools were carried to the beach and up a steep incline to the cabin. Then the work began; the old roof was completely replaced, a door was remounted on new hinges, and windows were set in place. The job was completed in a day, and the cabin should provide cramped but adequate shelter for several years without major attention.

3. Major Maintenance

After the goose translocation, the Buldir cabin received some badly needed maintenance. During the previous winter (1990-91), the cabin (36' X 12') had been shifted approximately 10' forward and off its foundation. This shifting was apparently the result of some pretty strong winds. Although the cabin was resting partially on the tundra and partially on the old foundation, there did not appear to be any major structural damage. MW Lewis and MW Schulmeister (Izembek NWR) arrived via M/V TIGLAX from Shemya. They raised the cabin with some borrowed house jacks and set 4 X 4s in place, creating a new foundation. Cables and turnbuckles were used to secure the cabin and hopefully forestall any recurrence of this problem.

The M/V TIGLAX returned to Shemya where MW Schulmeister caught a flight back to Cold Bay. MW Lewis stayed on board, assisting in breaking camp and inspecting two cabins, one at Attu I. and the other on Agattu I., for structural soundness.

The Coast Guard transported our Dodge 4 X 4 pickup on a C130 back to Amchitka. MW Tom Morey repaired the carburetor, installed a camper shell, new starter and new battery, and gave it a tune-up. A bumper was fabricated by MW Lewis. The truck will be used by Fish and Wildlife personnel and volunteers detailed to Amchitka.

While MW Lewis was at OMC school in California, MW Morey installed the new Racor fuel filter systems on heating systems at all the refuge residences. He also installed fuel gauges so that usage could be determined for each residence.

All roadside Fish and Wildlife signs received new paint. The exteriors of refuge residence Quarters 1, 2, and 3 were painted. The interior of Quarters 1, for the new Refuge Manager, and Quarters 3, for the new Outdoor Recreation Planner, were also painted. The two remaining duplexes will be painted in the summer of 1992.

The refuge received two new replacement vehicles, a 1-ton Chevy 4 X 4 pickup and a half-ton two-wheel drive Chevy Suburban. Both were serviced and will see considerable use this field season. The 1-ton will also serve as the refuge's new snow plow vehicle.

MW Morey installed new dishwashers in residence Quarters 1, 2, 3, 4A and 5A. All occupants were pleased with this new addition.

In the spring, preparations for the upcoming field season were in full swing. MW Morey and MW Lewis rechecked all camp equipment. All outboard motors were rechecked and tested. The 13' Zodiac inflatables were repaired as needed. All the Coleman and Suzuki generators were started and tested for AC and DC output. The operational condition of the stoves, lanterns and heaters were carefully checked and given the field-ready OK.

In the fall, all the equipment was checked before storing for winter. Two outboard motors, one Suzuki generator, one Aloha heater and one Coleman stove were summer casualties. The outboard motors needing replacement parts will be ready for next year.

The two main fuel pumps at the refuge headquarters were replaced. A check valve was also installed in the line.

A new fire alarm system was installed by DOD personnel. After several false alarms, they finally got the bugs worked out of the system, which made the refuge staff and the Fire Department very happy!

J. OTHER ITEMS

1. Cooperatory Programs

A Special Use Permit was issued to the Bureau of Indian Affairs to continue the investigation of Aleut village and cemetery sites in the AIU. They chartered the M/V Tiglax for the period 27 April - 18 May to work the six small islands in the Delarof group, Tanaga, Kanaga and Adak. They were to continue investigating sites east of us via charter boat after that date.

BT Williams attended a workshop which evaluated the BEST (Biomonitoring of Environmental Status and Trends) concept to contaminants monitoring on service lands. While the ultimate goal of the program is laudable (identification and systematic monitoring of all service lands), the process is cumbersome, redundant, and difficult to follow. Nevertheless, BT Williams completed a contaminant monitoring plan for Great Sitkin Island as part of a team which included WB Nishimoto from Homer and Deb Rudis of Ecological Services in Juneau. The plan will be evaluated in Washington in the future.

3. Items of Interest

In late March, we were contacted by Mr. Jack Hodnik, local school teacher and taxidermist, regarding the mounting of an adult and immature bald eagle for display in the Visitor Center. We agreed, as he had previously mounted two arctic fox for display and did a fine job.

A first for our Visitor Center. AZ2 Knutson held her reenlistment ceremony in the conference room. The event was attended by 11 friends, cake, and punch. (EVK)

If you're starting to learn taxidermy, do NOT start with a bald eagle! All was not lost, as the wings and tail feathers were salvaged and sent to the national feather bank. (EVK)

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About a month later, Jack came in wondering if we had another eagle that we would like to have mounted. We did, so passed it on. As we did not need another eagle for the office, we figured that we would loan this one to the Adak museum to replace a moth-eaten one that they had. In August, a student brought the eagle into the office and told us his mother would not let him keep it and would we like to have it (photo above). Of course we took it, informed him that he could not have kept it anyway, and then sent the wing and tail feathers to the feather bank.

At year's end, we had received the completed immature eagle and word that the adult was on hold - pending time and location, as he lost his school work room when he was moved into the new middle school.

April brought to Adak the hottest USO show seen in years. Ten Dallas Cowboy cheerleaders, and their directors, arrived for a two day visit. They drew turn-away crowds at their performances. When they visited our office/Visitor Center, we were sadly disappointed that they were wearing jeans, sweaters and Navy issue parkas. You will have to make do with the posters.

4. Credits

The 1991 Narrative Report was authored by the following:

Introduction: Mike Boylan
A. Highlights: Dan Boone
B. Climatic Conditions: Van Klett
D. Planning: 2, 3 and 6 Dan Boone, 5 Jeff Williams
E. Administration: 1-5 Dan Boone, 6-8 Van Klett
F. Habitat Management: Van Klett
G. Wildlife: Vernon Byrd and Jeff Williams
H. Public Use: 17 Van Klett, remainder Laura Greffenius
I. Equipment & Facilities: Jeff Lewis
J. Other Items: Van Klett

Word processing, computer entry, photo placement and collating of text was accomplished by Melita Bradford. Final editing was provided by Daniel Boone.

So ends our tail - see you next year. (ES)

BERING SEA UNIT

ALASKA MARITIME NATIONAL WILDLIFE REFUGE

Homer, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1991

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

INTRODUCTION

Bering Sea Unit

Alaska Maritime National Wildlife Refuge

The Alaska Maritime National Wildlife Refuge (Maritime Refuge) was created by the Alaska National Interest Lands Conservation Act in 1980. It was established to conserve fish and wildlife populations and habitats in their natural diversity, fulfill international fish and wildlife treaty obligations, provide opportunities for continued subsistence uses by local residents, provide a program of national and international scientific research on marine resources and 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 through most of coastal Alaska and extend from Forrester Island in Southeast Alaska along the Gulf of Alaska to the Aleutian Islands and northward to near Barrow in northwest Alaska. There are over 3,000 islands, islets, and pinnacle rocks within the refuge which are used annually by millions of seabirds of at least 30 species. The Maritime Refuge has five units with all former refuges in designated subunits.

The Bering Sea Unit includes far-flung islands and headlands between the Aleutian Islands and the Bering Strait. The topography within this unit varies from small sandy islands, like the Sand Islands off the Yukon Delta, to large volcanic islands like St. Matthew. These areas all provide habitat for nesting seabirds. Marine mammals also occupy many of the sites.

Some of the most serious potential threats to the seabirds and marine mammals in this area are related to oil development in the outer continental shelf. Not only can oil spills directly cause decimation of birds and their food chain, but increased activities of airplanes, boats, and people in these relatively undisturbed areas may adversely affect marine animals as well.

Long-term refuge objectives include establishing a seabird monitoring scheme which is of sufficient intensity to detect population changes of 20 percent or greater with 90 percent confidence, and to measure annual changes in reproductive success. In addition, we should be able to identify the major causes of change. This will require a cooperative effort with other divisions in the Service, other federal, state and local government agencies, and private organizations. In 1991 monitoring was conducted at four sites: St. George Island (Refuge personnel) and St. Paul Island (local students with

training from Refuge staff) in the Pribilof Islands, and at Bluff, near Nome (University of Alaska personnel under contract from the Migratory Bird Management office in Anchorage) and St. Matthew and Hall Islands (Refuge personnel).

There are opportunities for interpretive programs in the unit, particularly in the Pribilof Islands where natural history-oriented tourists visit each summer. Also, environmental education opportunities exist at schools in the Pribilof Islands, and at some of the villages in Norton Sound which are located near refuge seabird colonies.

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H. PUBLIC USE (cont.)

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A. HIGHLIGHTS

Thick-billed murres and both species of kittiwake have good reproductive success at St. George Island in 1991 (Section G.5).

Work-study high school students on St. Paul Island help to monitor seabird plots through a cooperative arrangement with the Fish and Wildlife Service (Section G).

B. CLIMATIC CONDITIONS

The winter months (December, January and February) were colder than normal at St. Paul Island, while the rest of the year was warmer than normal. At Nome, every month except December was warmer than normal. This pattern continued the warming trend reflected in 1990 temperatures at these two locations. If a long term warming trend is occurring in the Bering Sea, wildlife populations will be affected. Small changes in ocean temperatures can greatly change such factors as winter ice extent, plankton and fish production and distribution. These are key factors that influence wildlife survival.

Table 1. Temperatures at St. Paul Island in 1991.

Month	Average Temp. (F)	Departure from Average (F)
Jan	25.0	-1.3
Feb	9.6	-12.3
Mar	27.6	4.3
Apr	28.1	0.3
May	36.5	1.7
Jun	41.9	1.0
Jul	48.5	2.8
Aug	49.3	1.8
Sep	45.8	1.3
Oct	40.7	3.0
Nov	33.7	0.3
Dec	26.7	-1.5

Table 2. Temperatures at Nome in 1991.

Month	Average Temp. (F)	Departure from average (F)
Jan	6.9	1.1
Feb	5.9	2.6
Mar	8.6	2.0
Apr	25.1	6.1
May	38.9	4.1
Jun	51.1	5.7
Jul	55.1	4.6
Aug	51.6	1.7
Sep	48.0	5.7
Oct	33.3	4.8
Nov	17.2	1.6
Dec	0.3	-4.0

D. PLANNING

1. Master Plan

See Homer office section.

2. Management Plan

See Homer office section.

5. Research and Investigations

AMNWR-NR91. Seabird monitoring at Bluff

Ed Murphy, Institute of Arctic Biology, University of Alaska, Fairbanks

Ref: Murphy, E.C. In prep. Population status of murres and kittiwake at Bluff, Alaska.

As part of a Fish and Wildlife Service/ Mineral Management Service cooperative project, seabird monitoring continued at Bluff in 1991. Methods were standardized as much as possible between comparable studies at Cape Pierce (Togiak National Wildlife Refuge), St. George and St. Paul Island, St. Matthew Island and Cape Thompson (Alaska Maritime National Wildlife Refuge). Kittiwakes and murres were censused and productivity measured on the same plots as has been done in previous years. Jay H. Schauer, University of Alaska, Fairbanks

AMNWR-NR90. Energetics of kittiwakes and murres: density dependent factors.(74500-BSU-49208)

Schauer is a graduate student at the University of Alaska and did field work at Bluff on seabirds. He is now in the process of completing his thesis which is expected to be finalized by May of 1992.

E. ADMINISTRATION

1. Personnel

See Homer office section.

4. Volunteer Program

See Homer office section.

5. Funding

See Homer office section.

6. Safety

See Homer office section.

8. Other

See Homer Office section.

F. HABITAT MANAGEMENT

7. Grazing

The annual reindeer survey of Hagemeister Island was completed on July 23, 1991. In past years surveys have been conducted when the island is mostly snow covered, allowing for easier sightings of reindeer groups. This year, due to the relatively late survey date, snow was virtually absent from the island. Good visibility and lighting provided adequate survey conditions, although continuous turbulence prevented close approach to groups and poor photographic results.

The island was surveyed by flying transect strips, each transect overlapped the visual range of the observers thus reducing the chance of overlooking reindeer groups. The pilot and observer scanned out approximately one-half mile from the aircraft. An estimate was made of each group and the location marked on a 1:63,360 scale topographic map. Photographs of the larger groups were taken with a 135mm lens on a Nikon F3

camera. Tri-X black and white, ASA 400 film was used with pictures taken at shutter speeds of 1/250 and 1/500 of a second. Total survey time was approximately 2 hours. Aircraft altitude ranged from 300 to 500 feet above ground level at airspeeds of 80 to 90 knots.

Location and group size was similar to last July with animals located in high mountainous areas or along beaches. This behavior was probably an attempt to avoid insects, similar to the behavior of caribou in other areas of Alaska.

During the survey 952 reindeer were counted in 5 different groups. Two of the 4 large groups were photo documented. This count represents a much lower number than were counted last July (1530). It is doubtful that this reduction is the result of harvest or natural mortality, but probably indicates animals were missed during the survey effort. No sex or age distinctions were made.

Hagemeister Island is already overgrazed and action needs to be taken to reduce the herd substantially or eliminate it completely. We have been encouraging the herd owner, a native from Togiak, to reduce the herd sharply.

G. WILDLIFE

The refuge continued its seabird monitoring program at the Pribilof Islands, concentrating its efforts on collecting productivity data on seabirds on St. George Island. Personnel and budget constraints precluded population monitoring on St. George, as well as any seabird monitoring by refuge staff on St. Paul Island. A cooperative agreement was set up with the City of St. Paul in 1991 to use work-study students to monitor a reduced number of productivity plots. Three students were provided with instruction at the beginning of the season and continued field work to mid-August. This cooperative pilot study between the FWS and local students was a success, and will be continued in the 1992 field season through a "Challenge" grant.

A Russian biologist, Dr. Alexander Golovkin, was invited by the City of St. Paul to conduct seabird monitoring and research on the Pribilof Islands in 1991. Dr. Golovkin worked with the work-study students on St. Paul and with Fish and Wildlife Service staff on St. George to redetermine the total number of seabirds nesting on the Pribilof Islands. The only other census of this kind in the Pribilofs was conducted by Hickey

Wildlife Biologist Sowls shows St. Paul students Patience Murclief (left) and Natasha Pletnikof (middle) how to record data on kittiwakes. This pilot cooperative project with the City of St. Paul will lead to a more active program in 1992. J. Gove 1991.

In 1991 red-legged kittiwakes had the second highest productivity ever recorded for the 16 years for which data are available for St. George Island. L. Fairchild 1991.

and Craighead in 1975-1976. Dr. Golovkin's findings concur with the Service's data documenting downward population trends in both species of murre (thick-billed, Uria lomvia and common, U. aalge) and both species of kittiwake (black-legged, Rissa tridactyla and red-legged, R. brevirostra) on the Pribilof Islands since 1976. It is hoped that we will have the opportunity to continue cooperating with Dr. Golovkin at the Pribilofs in future years.

The following information is summarized from the report on the refuge monitoring program at St. George in 1991. Data collected at Bluff and St. Matthew has not been finalized, but for both locations it does not appear to have been an exceptionally good or poor season.

5. Shorebirds, Gulls, Terns and Allied Species

Black-legged kittiwake. Black-legged kittiwakes had the highest rate of reproductive success since the first year of documented study on St. George Island in 1976. Productivity (number of chicks fledged/total number of nest starts) was 0.46, compared to the lowest level, 0.00 in 1987 and 1989, and the highest level, 0.62 in 1976. Black-legged kittiwake phenology was a bit earlier than usual, but was not outside the scope of previous years by a significant margin.

Red-legged kittiwake. Red-legged kittiwakes also had a good reproductive year in 1991 on St. George. Productivity was 0.45 young fledged per total number of nests. The lowest level recorded since monitoring began was 0.00 in 1989, and the highest level was 0.54 in 1977 and 1988. Phenology of red-leggeds was significantly earlier than all previously recorded years except 1986 and 1990.

Murres. Thick-billed murres had a good reproductive year on St. George as well. Productivity, measured as the number of chicks fledged per total sites with eggs, was 0.71, the highest productivity recorded since 1985. The lowest productivity of thick-billed murres on St. George was 0.15 in 1981, and the highest 0.72 in 1985. Phenology of murres on St. George was slightly earlier than in previous years, but not significantly so. A complete set of data for determination of productivity of common murres was not possible in 1991 due to bad weather and insufficient personnel to adequately monitor distant plots.

The MV Milos Reefer went aground at Glory of Russia Cape, St. Matthew Island in 1989. It was first inspected by refuge biologists in 1991 when seabird and marine mammals were censused. A. Sowls 1991

Fog surrounds Hall Island near St. Matthew. The cool Bering Sea turns the warm air from the prevailing southwest wind into blankets of fog, often making our seabird and marine mammal census work difficult. J. Gove 1991

Northern fulmars nesting on the cliffs of St. Matthew Island. In the St. Matthew Island group and the Pribilof Islands allmost all fulmars are the white phase. In the Aleutian Islands and Gulf of Alaska colonies the dark phase of the fulmar is dominate. A. Sowls 1991.

The cliffs of Hall Island, of the St. Matthew group, tower above refuge biologists traveling in a boat below. A. Sowls 1991.

8. Game Mammals

Paula White, refuge volunteer, continued a study on the natal dispersal of arctic fox (Alopex lagopus) at St. Paul Island. This was the second field season of a two year graduate research project with the University of California, Berkeley. The purpose of this study is to examine natal dispersal of arctic foxes in an insular system. Her thesis should be completed by May of 1992.

H. PUBLIC USE

1. General

See Homer office section.

7. Interpretation

Regular scheduled natural history tours continued in 1991 as in the past at the Pribilof Islands. About 1,000 people visited St. Paul and about 40 visited St. George Island. Tremendous increase of visitors due to the new port facilities brought in many people off commercial fishing ships. Many of these fisherman came during the winter.

I. EQUIPMENT AND FACILITIES

1. New Construction

The Pribilof "Terms and Conditions", an agreement signed by the Native Corporation and the Secretary of Interior, indicates corporations are to provide buildings for the refuge on one-acre leased administrative sites on each island. While discussions between the Tanadgusix Corporation and the Fish and Wildlife Service have occurred, no resolution to this problem has been found. Without the continued generous help from the National Marine Fisheries Service of providing us free housing on the Pribilof Islands our monitoring would not have been possible.

More information on new construction is also available in the Homer office section.

J. OTHER ITEMS

1. Cooperative Programs

The Nature Conservancy of Alaska initiated its first "Conservation Joint Venture" program at St. Paul Island in

1991. The purpose of the program is to help Alaska land owners manage their property for both economic gain and environmental conservation. Support for the Pribilof program comes from three St. Paul Island groups: the TDX Corporation, the City of St. Paul, and the St. Paul Traditional Council, as well as from the U.S. Fish and Wildlife Service. The project involved three initial steps which were completed in 1991: 1) a plant species inventory, 2) sharing of information between St. Paul Islanders and preserve managers at TNC's Ramsey Canyon Preserve in Arizona, and 3) a small interpretive brochure, funded in part by the Fish and Wildlife Service, to help St. Paul visitors protect the island's flora and fauna.

3. Items of Interest

See Homer office section.

4. Credits

The report was written and typed by Climo and Sowls.

CHUKCHI SEA UNIT

ALASKA MARITIME NATIONAL WILDLIFE REFUGE

Homer, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1991

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

INTRODUCTION

Chukchi Sea Unit

Alaska Maritime National Wildlife Refuge

The Alaska Maritime National Wildlife Refuge (Maritime Refuge) was created by the Alaska National Interest Lands Conservation Act in 1980. It was established to conserve fish and wildlife populations and habitats in their natural diversity, fulfill international fish and wildlife treaty obligations, provide opportunities for continued subsistence uses by local residents, provide a program of national and international scientific research on marine resources and 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 through most of coastal Alaska and extend from Forrester Island in Southeast Alaska along the Gulf of Alaska to the Aleutian Islands and northward until near Barrow in northwest Alaska. There are over 3,000 islands, islets, and pinnacle rocks within the refuge which are used annually by millions of seabirds of at least 30 species. The Maritime Refuge has five units with all former refuges in designated subunits.

Lying primarily north of the Arctic Circle, the Chukchi Sea Unit includes scattered areas extending from just west of Point Barrow to just north of the Bering Strait. Unlike other units of the Alaska Maritime Refuge, this unit includes mainland areas. Habitats range from low, sandy barrier islands in the Arctic Ocean to high, rocky spires in the western Brooks Range.

Nearly half a million kittiwakes and murres breed on cliffs at Cape Lisburne and Cape Thompson; these are the most spectacular concentrations of seabirds on the unit. Chamisso and Puffin Islands in Kotzebue Sound are the largest island colonies in the unit. An extra-limitable population of black guillemots, a species which normally is found in the north Atlantic, extends as far south as Cape Thompson and may be increasing. The most common species of bird nesting on the low barrier islands between Cape Lisburne and Point Barrow is the common eider. One of the refuge islands, Solivik Island, has the largest eider colony in the Chukchi Sea (>500 birds).

Up to several hundred walruses haul out annually at Cape Lisburne when the sea ice recedes well offshore. In winter, polar bears occur at Cape Lisburne. Other terrestrial mammals that occur in the unit include grizzly bear, musk ox, wolverine, moose, Dall sheep and caribou. Thousands of caribou from the Western Arctic Caribou Herd congregate near Cape Lisburne and Cape Thompson in a summer post-calving aggregation.

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K. FEEDBACK

A. HIGHLIGHTS

Seabird monitoring continues at Cape Thompson with partial funding from the Minerals Management Service. Kittiwake populations remain stable at levels higher than those reported in 1960; murre numbers appear stable after a big decline sometime between 1960 and 1977 (Section G.5).

Regional Office (Region 7) biologists initiate seabird monitoring program on Little Diomede Island (Section G.5).

B. CLIMATIC CONDITIONS

Data from the National Weather Service at Kotzebue probably best represents weather conditions for the Chukchi Unit. In 1991 there were slightly warmer than normal temperatures in spring, summer and fall, with winter temperatures generally about average.

Table 1. Temperatures at Kotzebue in 1991.

Month	Average Temp. (F)	Departure from Average (F)
Jan	-3.0	---
Feb	-4.7	1.4
Mar	-2.9	-2.3
Apr	14.6	1.6
May	33.1	2.4
Jun	50.3	6.5
Jul	54.4	1.3
Aug	51.8	-0.1
Sep	45.8	4.2
Oct	29.5	5.9
Nov	7.7	-0.1
Dec	-4.5	-0.7

D. PLANNING

1. Master Plan

See Homer office section.

2. Management Plan

See Homer office section.

4. Compliance with Cultural Resource Mandates

The U.S. Fish and Wildlife Service had contracted with SJS Archaeological Services to perform an archaeological survey at Pingasagruk, Point Franklin, Alaska, which is part of the Alaska Maritime National Wildlife Refuge. Goals were to evaluate the site in terms of eligibility to the National Register of Historic Places, to assess erosion and other damage to the site and to suggest aspects of a management plan for the cultural resources. Implementation required site delineation and definition, careful mapping, evaluation of endangerment, and estimation of Pingasagruk's possible research significance through field and laboratory analysis.

Fieldwork took place in the summer of 1986, 1987 and 1989. The report was completed in 1991. It recommends that the site be considered eligible for nomination to the National Register of Historic Places. Cultural affiliations of the site were determined as recent and historic, and recent prehistoric, no further back than roughly 1400 years AD. There is little chance of an extensive earlier occupation being represented in the site as it exists today. At one time the site was several times as large as what can be seen now, comparable to other major whaling centers such as Point Barrow and Point Hope. Age-categorized cultural resources were found to be unevenly distributed across the site, with oldest deposits to the west. The entire site is endangered and undergoing continuous erosion by natural forces, with the most imminent danger to the oldest resources. Although the project's main objective was to assess the status of the site, over 20,000 artifacts were recovered during fieldwork.

E. ADMINISTRATION

1. Personnel

See Homer office section.

4. Volunteer Program

See Homer office section.

5. Funding

See Homer office section.

6. Safety

See Homer office section.

7. Technical Assistance

See Homer office section.

8. Other

Table 2. Special use permits issued, 1991.

Permittee	Location	Purpose
Mobil Exploration	Cape Thompson/Lisburne	Surface Geological Survey
Phil Driver	Cape Thompson/Lisburne	Guiding

G. WILDLIFE

5. Shorebirds, Gulls, Terns and Allied Species

Refuge staff conducted seabird monitoring at Cape Thompson between June 30 and August 23, 1991. Species monitored were thick-billed murres (Uria lomvia), common murres (U. aalge) and black-legged kittiwakes (Rissa tridactyla). Seabird populations at Cape Thompson have been monitored intermittently since 1960, comprising the oldest quantitative data on seabirds in Alaska. Nine plots established by Swartz in 1960 were counted in 1991, along with selected plots that had been established by Fadely in 1988. An additional five plots were established in 1991.

Black-legged kittiwake. No significant difference in kittiwake populations was found between 1990 and 1991, although there was an increase in kittiwake numbers from 1988 to 1990. Kittiwake populations at Cape Thompson appear to have increased slightly in recent years, following the general upward trend since 1960.

Murres. Common and thick-billed murre populations appear to have remained stable since 1988, but are still far below 1960 levels. Total murre counts on plots dropped from about 25,000 in 1960 to between 9,000 and 10,000 in recent years. The cause of the precipitous decline in murres at Cape Thompson since 1960 is unknown.

Refuge biologists continued seabird population monitoring at Cape Thompson by counting birds on cliff-side plots. M. Nishimoto '91.

Murre populations at Cape Thompson seem to have stabilized in recent years after a precipitous, unexplained decline took place between 1960 and 1977. M. Nishimoto '91.

A seabird monitoring program was initiated on Little Diomede Island in 1991 by biologist Ada Fowler of the U.S.F.W.S. Region 7 Office, Migratory Birds Division. Although Little Diomede is not part of the Alaska Maritime Refuge, seabird monitoring efforts here are valuable to the Refuge in contributing to our knowledge of Bering/Chukchi Sea ecosystem dynamics, and for comparisons with sites being monitored within the Refuge.

Species being monitored on Little Diomede include least and crested auklets (Aethia pusilla and A. cristatella), black-legged kittiwakes, and common and thick-billed murres. In addition to establishing population and productivity monitoring plots for the above species, population counts of all seabirds on Little Diomede Island and Fairway Rock were conducted from a boat. Continued monitoring of colonies at Little Diomede will contribute greatly to the Alaskan seabird monitoring program.

4. Scientific Collections

Refuge staff collected 16 thick-billed murres, 5 common murres and 10 black-legged kittiwakes at Cape Thompson for food habits studies.

H. PUBLIC USE

8. Hunting

Hunting guide Phil Driver was issued another permit in 1991 for hunting on Cape Thompson and Cape Lisburne refuge lands. Driver guided a caribou hunt in the Ogatorak Valley in September. He reported seeing a large herd of caribou, estimated at 200,000 animals, on the eastern side of Cape Thompson refuge lands during the first week of July.

17. Law Enforcement

See Homer office section.

I. EQUIPMENT AND FACILITIES

4. Equipment Utilization and Replacement

See Homer office section.

J. OTHER ITEMS

3. Items of Interest

See Homer office section.

4. Credits

The report was written and typed by Sowls and Climo.

GULF OF ALASKA UNIT

ALASKA MARITIME NATIONAL WILDLIFE REFUGE

Homer, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1991

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

INTRODUCTION

Gulf of Alaska Unit

Alaska Maritime National Wildlife Refuge

The Alaska Maritime National Wildlife Refuge (Maritime Refuge) was created by the Alaska National Interest Lands Conservation Act in 1980. It was established to conserve fish and wildlife populations and habitats in their natural diversity, fulfill international fish and wildlife treaty obligations, provide opportunities for continued subsistence uses by local residents, provide a program of national and international scientific research on marine resources, and 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 through most of coastal Alaska and extends from Forrester Island in Southeast Alaska, along the Gulf of Alaska to the Aleutian Islands, and northward almost to Barrow in northwest Alaska. There are about 3,000 islands, islets, and pinnacle rocks within the refuge, which are used annually by millions of seabirds of at least 30 species. The Maritime Refuge has five units with all former refuges designated subunits.

The Gulf of Alaska Unit extends 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, Pye, Chiswell, Middleton, St. Lazaria, Hazy, and Forrester.

This unit has the only forest habitat on the Maritime Refuge. Spruce-hemlock forests are the dominant plant community on nearly all the islands outside Cook Inlet. The transition zone occurs in the Barren Islands, where there is only a small forested area on Ushagat Island, with alpine tundra being the dominant vegetation type. 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. Besides terrestrial habitat, submerged lands also occur around Afognak and some waters around Kodiak Island.

Seabird colonies in this unit are probably the most visited in Alaska. Unlike most units, two colonies are readily accessible by charter boat or pleasure craft: St. Lazaria Island is 15 miles from Sitka and the Chiswell Islands are 35 miles from Seward.

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H. PUBLIC USE

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J. OTHER ITEMS

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K. FEEDBACK

A. HIGHLIGHTS

Middleton Island black-legged kittiwake population estimated at 38,967, a 53% decline from a peak of 82,885 recorded in 1981. (Section D.5)

Refuge decides to terminate monitoring Gull Island seabirds and marbled murrelets in Kachemak Bay since they are off-refuge lands/waters. (Section J.3)

B. CLIMATIC CONDITIONS

Although it does not extend as far south as the Aleutians, the Gulf of Alaska has the most moderate climate among the units of the Alaska Maritime National Wildlife Refuge. Winter temperatures normally remain above 0° F except for lands adjacent to the Kenai Peninsula. The temperate climate in Southeast Alaska is often overcast, but seldom experiences the wind and summer fog of the other units.

The year began with rain and ice. Locals referred to this winter as one of the "old time ice" winters. Winter temperatures range from 0.6° - 3.5° F above normal. The refuge staff thought that this was one of the worse summers in Homer, but rainfall was only 0.03 inches above normal in July and there were only ten days of measurable precipitation. September was wet with 0.54 inches more precipitation than the long-term average. It also rained on 22 days. We had relatively mild fall temperatures; mean temperatures did not dip below freezing until December. Snow dumped on us during the last month of the year. Fourteen inches of snow fell on the 31st giving us a total of 30.7 inches for the month.

Table 1. Meteorological Data - Homer 1991

	Temperatures		Precipitation			
Month	Max.	Min.	Avg.	Dep. Norm.	Total	Snow
Jan	44	1	24.3	-0.25	1.40	5.3
Feb	47	0	24.9	-0.53	1.40	13.7
Mar	44	9	29.6	0.67	1.95	17.9
Apr	49	24	38.6	-0.50	0.81	0.7
May	61	29	43.9	0.47	1.54	T
Jun	71	35	50.3	0.25	1.30	0.0
Jul	67	42	54.1	0.03	1.50	0.0
Aug	66	49	52.7	-0.16	2.20	0.0
Sep	63	37	50.3	0.54	3.40	0.0
Oct	55	23	38.9	-2.36	0.92	1.0
Nov	51	9	32.5	-1.18	1.73	7.9
Dec	41	7	27.3	3.29	5.87	30.7

C. LAND ACQUISITION

3. Other

D. PLANNING

1. Master Plan

See Homer office section.

2. Management Plan

See Homer office section.

5. Research and Investigations

AMNWR NR91AKM "Seabird population monitoring, Middleton Island, Alaska, summer 1991"

Personnel of the Alaska Fish and Wildlife Research Center (AFWRC) conducted studies of seabirds on Middleton Island during April-August 1991. Those participating in the project included Scott Hatch (Project Leader), Brian Fadely and Bay Roberts (Wildlife Biologists), and three volunteers, Jennifer Gervais, Martin Robards, and Karen McGibbon. The objectives of the field work were: (1) to estimate the annual survival rate of banded black-legged kittiwakes on Middleton, (2) to census the populations of kittiwakes, murres, and pelagic cormorants, and (3) to assess the productivity of kittiwakes and cormorants in 1991. Objectives 1 and 2 were accomplished during an extended visit to the island from 19 April through 21 June. Resighting of banded kittiwakes went slowly in 1991 because of exceedingly poor attendance of kittiwakes at their breeding sites early in the season. From arrival of the field party through the second week of May, it was estimated that the population on the island averaged only about 10-20% of the kittiwake numbers expected for that time of year. Low activity at the colony was coincident with a die-off of adult kittiwakes observed in the north-central Gulf of Alaska, particularly Kachemak Bay, during April-May 1991 (D.R. Nysewander, pers. comm.). There was apparently an acute food shortage during that period which may have been alleviated after mid May, when kittiwake attendance returned to near-normal levels on Middleton Island.

Resighting effort in late May and early June was adequate to yield an accurate estimate of annual survival (0.913 $\pm$ 0.209; breeders only) for 1990-1991. Although over-winter survival was the lowest observed in 4 years (1988-1991), the 1991 estimate did not differ significantly from the highest of previous estimates (0.938 survival in 1989). The 4-year average survival rate of breeding kittiwakes is 0.925 $\pm$ 0.0055, with no detectable difference between the sexes.

The census of kittiwakes, cormorants, and murres, conducted from 14-20 June, indicated a total of 38,967 kittiwake nests. This represents a decline of 53% from the peak population of 82,885 nests observed on the island in 1981. The cormorant population totaled 3,181 nests in 1991, which was substantially lower than the year before (4,498 nests) but somewhat higher than the mean numbers observed from the mid 1970's to the mid 1980's. Murre numbers have shown considerable annual variation but no long-term trend since 1974. A total of 5,400 murres was counted on Middleton in 1991.

Two brief visits to the island were made on 24 July and 1 August to assess the productivity of cormorants and kittiwakes. Both species did poorly, cormorants raising only 0.07 young/nest (n=569 nests) and kittiwakes failing completely to raise any yound in 1991. Cormorants have averaged 0.88 young/nest in 10 years si8nce 1978, whereas kittiwakes have had total or near-total failure in 7 of the last 9 years on Middleton (mean productivity 0.17 young/nest in 12 years since 1978).

E. ADMINISTRATION

1. Personnel

See Homer office section.

4. Volunteer Program

See Homer office section.

5. Funding

See Homer office section.

6. Safety

See Homer office section.

7. Technical Assistance

Nishimoto reviewed a draft letter, prepared by Western Alaska Ecological Services, to the Corps of Engineers concerning a general permit on mariculture structures.

8. Other

F. HABITAT MANAGEMENT

3. Forests

Forested islands exist only in the Gulf of Alaska Unit, with Ragged Island (5,400 acres) in the Pye Islands being the largest island totally covered by spruce. Except for Forrester and St. Lazaria in southeast Alaska, all forested islands including Discoverer and Delphin Islands near Afognak Island were incorporated into the refuge by the Alaska Lands Act. Though better timber exists on other Federal, State and Native lands, the Alaska National Interest Lands Act provides for the Afognak Joint Venture use of timber on both Discoverer and Delphin islands. Both islands are heavily used by Sitka black-tailed deer and brown bear. Delphin also has a small seabird colony and nesting eagles. Delphin Island is particularly important to wildlife and has magnificent trees of up to five feet in diameter.

Studies by the Alaska Department of Fish and Game suggest that old growth forests provide important winter range for black-tailed deer by retaining snow on the forest canopy and reducing ground snow depth and hence access to winter feed. Due to slow growth rates, Alaskan old growth forests have been recognized as a non-renewable resource.

In the past, former U.S. Forest Service lands on Afognak Island have been logged and the timber transferred through a barge loading facility at Perenosa Bay. Under Alaska National Interest Lands Act, these lands were transferred to Native Corporations. In 1986, several Native corporations working through Koncor, Inc., resumed logging on the north side of the island. Logging continued through 1987. A dive survey conducted in October 1987 indicated that bark had accumulated on the submerged lands adjacent to the transfer facility.

The Afognak Native Corporation constructed a low gradient slide log transfer facility at Kazakof Bay, Afognak Island during the fall of 1988. An inspection of the site by personnel from the Western Alaska Ecological Services office in the summer of 1989 found that the logging operation used an unauthorized log storage site. They also have not complied with several administrative stipulations and these deficiencies have been reported to the Refuge Manager. The Right-of-Way permit also requires creation of artificial reefs and eelgrass transplants. Data on the amount of mitigation required were collected in 1989, 1990 and 1991. In 1991, the refuge ordered the permittee to construct artificial reefs. Afognak Native Corporation submitted plans for mitigation by late 1991. However, the proposal was contrary to plans described in the environmental assessment for that project. The refuge requested the permittee to submit a new proposal.

In 1989, the Service issued Koncor Forest Products Company a Right-of-Way permit to construct a log transfer facility within four miles from the Afognak Native Corporation's project at Kazakof Bay. They had originally planned to develop a barging facility, but in 1989 decided to also develop a low gradient slide. A second underwater survey was conducted at Barefoot Cove in the summer of 1989 to locate a site that would minimize impacts to eelgrass beds and sandlance habitat. The first dive in 1988 determined that the preferred site would occur on sandlance habitat. This species is a major forage fish for seabirds. Several seabird colonies occur within this bay.

The Koncor facility became operational in July 1990. This facility was monitored for the first time In June 1991. No bark deposits were observed off the log transfer facility, but we discovered that the applicant had constructed their inclined slide at an unauthorized site, perhaps 200 yards west of the site approved under our Right-of-Way permit. To date, no action had been taken on this alleged unauthorized structure.

Koncor constructed their log transfer facility west of the site approved under the Service's Right-of-Way permit at Kazakof Bay, Afognak Island. M. Nishimoto 1991.

Bark deposits were found at the Afognak Native Corporation's log transfer facility at Kazakof Bay, Afognak Island. M. Nishimoto 1991.

Refuge waters at the head of Women's Bay, Kodiak Island. M. Blenden 1991.

12. Wilderness and Special Areas

Only Forrester, Hazy, St. Lazaria and Chisik (Tuxedni subunit) islands are designated Wilderness areas in the unit.

Below is a breakdown of these areas:

Island	Acres	Designation Date
Forrester	2832	10/23/70
Hazy	32	10/23/70
St. Lazaria	64	10/23/70
Tuxedni	5547	10/23/70

G. WILDLIFE

1. Wildlife Diversity

This is the only unit on the refuge which supports a population of forest birds. No other unit has forest habitat.

2. Endangered and/or Threatened Species

Occasional individuals of the endangered or threatened subspecies of the peregrine falcon may visit the area during migration.

3. Waterfowl

Migrating and wintering waterfowl are abundant around the Pye Islands, Afognak Island, Womens Bay at Kodiak Island and in the Barrens. Canada and white-fronted geese as well as brant visit the

Barrens in migration. Populations of common eiders and white-winged scoters can be found in waters around Duck and Chisik islands.

4. Marsh and Water Birds

Little breeding habitat for loons and grebes exists, except for Ushagat Island in the Barrens. Many such birds winter around the Pyes, Chiswells, Barrens, and off Kodiak.

Storm-petrels. Dr. Dee Boersma, University of Washington, was funded for a second year by the EXXON Corporation to study fork-tailed storm-petrels as well as other seabirds at East Amatuli Island. Although she was required to provide us with study results under her Special Use Permit, we have not yet received the requested data.

5. Shorebirds, Gulls, Terns, and Allied species.

Many species of shorebirds utilize the islands, especially Ushagat, during migration. Oystercatchers nest on nearly all of the islands.

Murres. The T/V *EXXON Valdez* damage assessment study on Murres at the Barren and Chiswell islands continued to be funded. Release of study data had been restricted pending litigation. Although the government's case have been settled out of court, only brief summaries of the study have been released.

7. Passerines

Common ravens, four species of sparrows (golden-crowned, fox, song, and savannah), and two species of swallow (violet-green and bank) are commonly seen on most of the islands.

8. Game Mammals

Black bears wander onto the Pye Islands, while brown bears periodically visit Delphin and Discoverer islands, Latax Rocks and other islands near Afognak and Kodiak. Sitka deer inhabit Delphin and Discoverer Islands.

9. Marine Mammals

Sea otters and harbor seals are common in Kachemak Bay and around the Barren Islands. 4 sea otters were found dead on the beach in Homer in January and were sent to the National Wildlife Health Lab for necropsies.

H. PUBLIC USE

1. General

Most public use in this unit occurs as wildlife observation from offshore waters. There are several charter boat services that offer tours from Sitka, Seward, and Homer, specifically to observe seabird populations on Alaska Maritime National Wildlife Refuge lands.

6. Interpretive Exhibits/Demonstrations

See Homer office section.

17. Law Enforcement.

See Homer office section.

I. EQUIPMENT AND FACILITIES.

4. Equipment Utilization and Replacement

Nothing to report.

5. Communications Systems.

See Homer office section.

J. OTHER ITEMS

3. Items of Interest

Due to reduced funding, we decided to terminate monitoring Gull Island and waters in Kachemak Bay since they are located off the refuge. These areas have been monitored since 1984 primarily for environmental education purposes. Gull Island is one of the most visited seabird colonies in Alaska and is within five miles of the refuge headquarters. We had also studied marbled murrelets in the bay during 1988-1990 since there are iminent plans to log the adjacent forests. To continue these monitoring projects, we explored it as a challenge grant project with the Center for Coastal Studies, but they were not interested.

4. Credit

Sections A,B, C, f, G and J were written by Nishimoto. Blenden and Hagglund prepared Section E. Section H was written by Benson. Nishimoto and Blenden prepared Section I. The report was edited by Blenden.

____	Snowy Owl	R-sr
____	Short-eared Owl	R-m
____	Boreal Owl	AC
____	Northern Saw-whet Owl	AC
____	Chimney Swift	AC
____	Common Swift	AC
____	Fork-tailed Swift	AC
____	Belted Kingfisher	AC
____	Northern Flicker	AC
____	Eastern Kingbird	AC
____	Eurasian Skylark	CA
____	Horned Lark	AC
____	Purple Martin	AC
____	Tree Swallow	R-m
____	Violet-green Swallow	AC
____	Bank Swallow	R-m
____	Cliff Swallow	CA
____	Barn Swallow	CA
____	Common House-Martin	AC
____	Common Raven	R-sr
____	Winter Wren	C-b
____	Middendorff's Grasshopper-Warbler	AC
____	Arctic Warbler	CA
____	Golden-crowned Kinglet	AC
____	Siberian Rubythroat	AC
____	Northern Wheatear	R-m
____	Eye-browed Thrush	CA
____	Gray-cheeked Thrush	AC
____	American Robin	AC
____	Yellow Wagtail	R-m
____	Gray Wagtail	AC
____	White Wagtail	AC
____	Black-backed Wagtail	AC
____	Olive Tree-Pipit	AC
____	Red-throated Pipit	AC
____	Water Pipit	R-b
____	Bohemian Waxwing	AC
____	Orange-crowned Warbler	CA
____	Yellow Warbler	CA
____	Yellow-rumped Warbler	CA
____	Wilson's Warbler	CA
____	Savannah Sparrow	R-m
____	Fox Sparrow	CA
____	Song Sparrow	AC
____	Golden-crowned Sparrow	CA
____	White-crowned Sparrow	CA
____	Dark-eyed Junco	CA
____	Lapland Longspur	A-b
____	Rustic Bunting	AC
____	Snow Bunting	C-b
____	McKay's Bunting	R-b
____	Rusty Blackbird	CA
____	Brambling	AC
____	Rosy Finch	C-b
____	Pine Grosbeak	AC
____	Common Rosefinch	AC
____	Red Crossbill	AC
____	White-winged Crossbill	CA
____	Common Redpoll	R-m
____	Hoary Redpoll	CA
____	Pine Siskin	AC
____	Hawfinch	AC

UNSUBSTANTIATED LIST

Species that have appeared on earlier lists but the source of the record is not currently known.

Common Ringed Plover

Black Turnstone

Ruby-crowned Kinglet

Northern Shrike

Eurasian Bullfinch

Phylogenetic sequence and English names of species follow the American Ornithologists' Union (AOU) checklist of North American Birds (6th edition, 1983. Thirty-fifth supplement [Auk 102(3): 680-686, 1985.])

Funding for production of this checklist was provided by a grant from the State of Alaska, Division of Tourism.

Statistical data compiled by Vernon Byrd, Dan Gibson, and Bill Rodstrom; winter 1986.

Cover illustration by © John C. Pitcher 1986.

PRIBILOF BIRDLIFE

Alaska's Pribilof Islands support some of the most outstanding marine wildlife spectacles in North America. The islands' rich birdlife has been of interest to wildlife enthusiasts since Henry W. Elliott first published information about them in 1881. Over the years, the Pribilofs have come to be recognized as a "world class" attraction to visitors interested in the natural history of Bering Sea marine birds and mammals.

Over 2.8 million seabirds nest on the four main Pribilof Islands (St. Paul, St. George, Otter and Walrus), the vast majority of which are found on the steep cliffs of St. George. The most abundant species are Thick-billed Murres, Common Murres, Least Auklets, Parakeet Auklets, Horned Puffins, Tufted Puffins, Black-legged Kittiwakes, and Red-legged Kittiwakes.

The Pribilofs provide landing sites for numerous wind-blown migrant birds from North America and Asia. Of the 208 species on this checklist, over half are casual or accidental sightings. The most likely time to see these infrequently observed species is during periods of migration in spring (mid-May to early June) and fall (early August to mid-September).

St. Paul has more diversified habitat than St. George, and wetlands like Salt Lagoon and Webster Lake often attract migrants. The immense colonies of breeding seabirds are best observed on St. George at such places as First Bluff, the High Bluffs, or Ulakaia Ridge. The reader should keep in mind that the status indicated on this checklist for a particular species may not apply equally on St. George and St. Paul.

Because they fully recognized the sensitivity of the seabird nesting areas to disturbance, the islands' Aleut residents sold the major nesting areas to the U.S. Government in 1984 for inclusion in the national wildlife refuge system. These lands are now part of the Alaska Maritime National Wildlife Refuge. Visitors are encouraged to view the seabird rookeries, but care must be taken not to disturb the birds by approaching them too closely or making unnecessary noise.

The annual summer gathering of almost one million Northern Fur Seals on their island breeding rookeries also constitutes a wildlife spectacle unique to the Pribilof Islands.

REPORT NEW OR UNUSUAL SIGHTINGS

There is still much to learn about the birds of the Pribilof Islands, and you can help. If you see birds not on this list, or record additional sightings of accidental or casual species, please send details of your observations to Refuge Manager, Alaska Maritime National Wildlife Refuge, 202 Pioneer Avenue, Homer, AK 99603 (907) 235-6546.

BIRDS OF THE PRIBILOF ISLANDS, ALASKA

A CHECKLIST

NATIONAL AUDUBON SOCIETY
ST. GEORGE COMMUNITY COUNCIL
ST. GEORGE TANAQ CORPORATION
U.S. FISH AND WILDLIFE SERVICE

LEGEND

A **abundant** ..... species occurs repeatedly in proper habitats, with available habitat heavily utilized, and/or the region regularly hosts great numbers of the species.

C **common** ..... species occurs in all or nearly all proper habitats, but some areas of presumed suitable habitat are occupied sparsely or not at all and/or the region regularly hosts large numbers of the species.

U **uncommon** ..... species occurs regularly, but utilizes some or very little of the suitable habitat, and/or the region regularly hosts relatively small numbers of the species; not observed regularly even in proper habitats.

R **rare** ..... species occurs, or probably occurs, regularly within the region, but in very small numbers.

CA **casual** ..... species has been recorded no more than a few times, but irregular observations are likely over a period of years.

AC **accidental** ..... a species so far from its normal range that further observations are unlikely; usually occurs singly.

m **migrant**

sr **summer resident**

b **breeder**

w **winter visitor**

** **formerly found, but no records this century**

CHECKLIST

	SPECIES	STATUS
____	Red-throated Loon	R-m
____	Arctic Loon	CA
____	Pacific Loon	CA
____	Common Loon	CA
____	Yellow-billed Loon	R-m
____	Horned Grebe	R-m
____	Red-necked Grebe	R-m
____	Short-tailed Albatross	**
____	Northern Fulmar	C-b
____	Short-tailed Shearwater	U-m
____	Fork-tailed Storm-Petrel	R-m
____	Leach's Storm-Petrel	R-m
____	Double-crested Cormorant	AC
____	Pelagic Cormorant	R-b
____	Red-faced Cormorant	C-b
____	Black-crowned Night Heron	AC
____	Tundra Swan	R-m
____	Whooper Swan	CA
____	Bean Goose	CA
____	Greater White-fronted Goose	CA
____	Snow Goose	CA
____	Emperor Goose	R-m
____	Canada Goose	CA
____	Green-winged Teal	U-m, R-b
____	Baikal Teal	CA
____	Falcated Teal	CA
____	Mallard	R-m
____	Northern Pintail	U-m, R-b
____	Garganey	CA
____	Northern Shoveler	U-m
____	Gadwall	CA
____	Eurasian Wigeon	R-m
____	American Wigeon	R-m
____	Common Pochard	CA
____	Canvasback	CA
____	Redhead	AC
____	Ring-necked Duck	CA
____	Tufted Duck	R-m
____	Greater Scaup	U-m
____	Lesser Scaup	AC
____	Common Eider	CA-sr
____	King Eider	R-sr
____	Spectacled Eider	CA
____	Steller's Eider	U-sr
____	Harlequin Duck	C-sr
____	Oldsquaw	C-m, U-b
____	Black Scoter	AC
____	Surf Scoter	CA
____	White-winged Scoter	C-w
____	Common Goldeneye	U-m
____	Barrow's Goldeneye	CA
____	Bufflehead	U-m
____	Smew	CA
____	Hooded Merganser	AC
____	Common Merganser	R-m
____	Red-breasted Merganser	R-m
____	Osprey	CA
____	Bald Eagle	CA
____	Steller's Sea-Eagle	AC
____	Rough-legged Hawk	CA
____	Northern Hobby	AC
____	Peregrine Falcon	CA
____	Gyrfalcon	CA
____	Eurasian Coot	AC
____	Sandhill Crane	U-m
____	Black-bellied Plover	CA
____	Lesser Golden-Plover	U-m
____	Mongolian Plover	R-m
____	Semipalmated Plover	U-b
____	Killdeer	AC
____	Black Oystercatcher	AC
____	Common Greenshank	CA
____	Greater Yellowlegs	CA
____	Lesser Yellowlegs	R-m
____	Spotted Redshank	CA
____	Wood Sandpiper	R-m
____	Solitary Sandpiper	AC
____	Wandering Tattler	U-m
____	Gray-tailed Tattler	R-m
____	Common Sandpiper	CA
____	Terek Sandpiper	CA
____	Eskimo Curlew	**
____	Whimbrel	R-m
____	Bristle-thighed Curlew	R-m
____	Far Eastern Curlew	CA
____	Black-tailed Godwit	CA
____	Bar-tailed Godwit	U-m
____	Ruddy Turnstone	C-m
____	Great Knot	AC
____	Red Knot	CA
____	Sanderling	CA
____	Semipalmated Sandpiper	CA
____	Western Sandpiper	R-m
____	Rufous-necked Stint	R-m
____	Little Stint	CA
____	Temminck's Stint	CA
____	Long-toed Stint	CA
____	Least Sandpiper	R-b
____	Baird's Sandpiper	R-m
____	Pectoral Sandpiper	U-m
____	Sharp-tailed Sandpiper	U-m
____	Rock Sandpiper	C-b
____	Ruff	R-m
____	Dunlin	R-m
____	Curlew Sandpiper	CA
____	Stilt Sandpiper	CA
____	Buff-breasted Sandpiper	CA
____	Short-billed Dowitcher	CA
____	Long-billed Dowitcher	R-m
____	Jack Snipe	AC
____	Common Snipe	R-m
____	Red-necked Phalarope	R-b, U-m
____	Red Phalarope	R-m
____	Pomarine Jaeger	U-m
____	Parasitic Jaeger	U-m
____	Long-tailed Jaeger	U-m
____	Franklin's Gull	AC
____	Bonaparte's Gull	AC
____	Common Black-headed Gull	R-m
____	Herring Gull	R-m
____	Thayer's Gull	CA
____	Slaty-backed Gull	R-m
____	Glaucous-winged Gull	U-b
____	Glaucous Gull	R-sr
____	Black-legged Kittiwake	A-b
____	Red-legged Kittiwake	A-b
____	Ross' Gull	CA
____	Sabine's Gull	CA
____	Ivory Gull	CA
____	Common Tern	CA
____	Arctic Tern	R-m
____	Aleutian Tern	CA
____	Dovekie	CA
____	Common Murre	A-b
____	Thick-billed Murre	A-b
____	Pigeon Guillemot	C-w, R-sr
____	Marbled Murrelet	CA
____	Kittlitz's Murrelet	CA
____	Ancient Murrelet	R-sr
____	Parakeet Auklet	A-b
____	Least Auklet	A-b
____	Crested Auklet	C-b
____	Tufted Puffin	C-b
____	Horned Puffin	C-b
____	Common Cuckoo	AC
____	Oriental Cuckoo	AC

Enjoying Alaskan Seabirds

Alaska is one of the world's richest marine bird areas. More than 50 million seabirds from around the North Pacific come to Alaska every summer to breed and raise their young along its rugged coastline. Millions more fly to Alaska in the summer just to feed in its rich coastal waters.

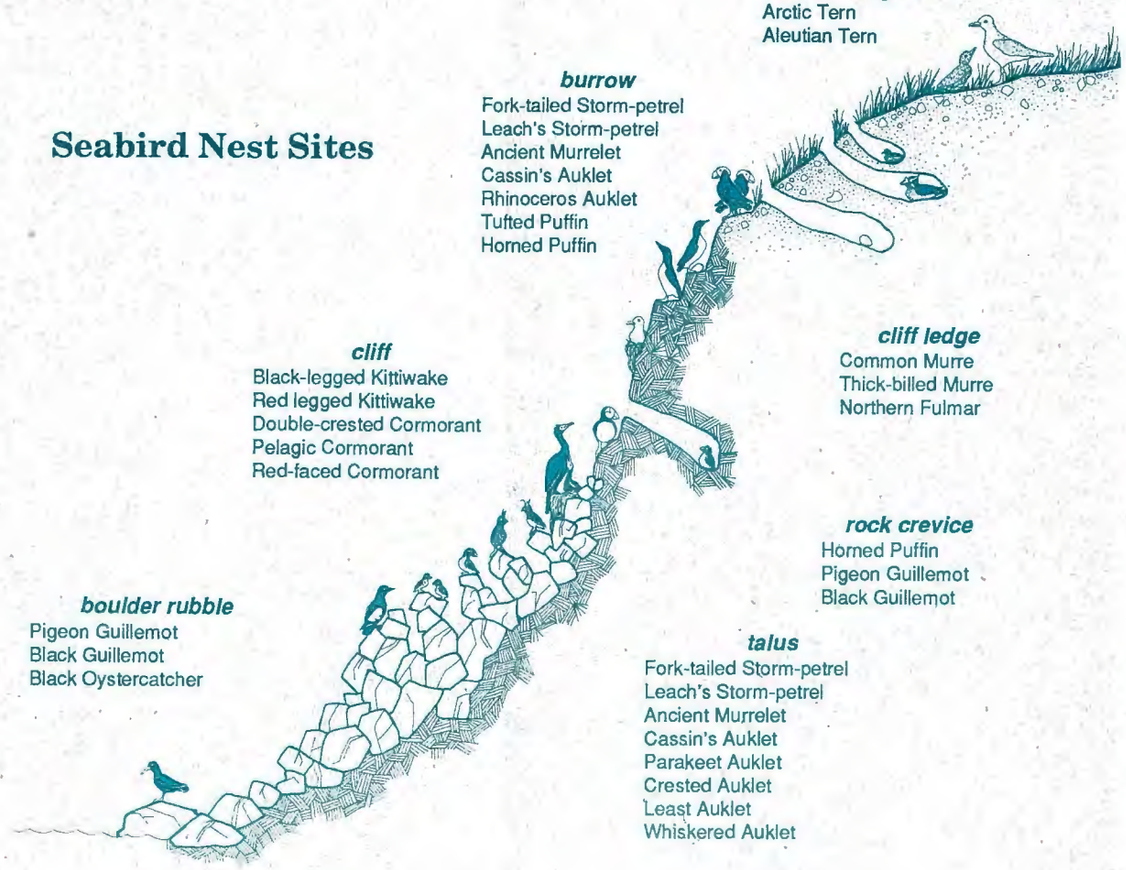
Seabirds are important indicators of the health of the oceans. Pollution and other environmental changes often are first detected by observing the health of marine birds.

Alaska offers the opportunity to see many interesting species, often nesting in colonies of thousands or even millions of birds.

Most seabirds nest in large colonies composed of several different species. Colonies are usually on offshore islands and rocks which are free of mammalian predators. Colonies on the mainland are primarily on coastal cliffs isolated from predators.

Different species use slightly different nesting and feeding strategies. Some species (storm-petrels, ancient murrelets, Cassin's auklets, rhinoceros auklets, and whiskered auklets) come and go from the colony only at night. They nest in holes or cracks. Rarely would daytime visitors even be aware of their presence.

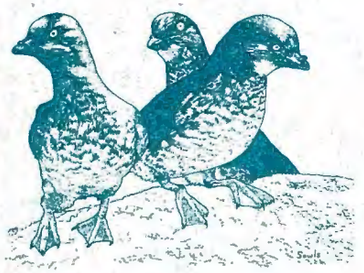
Seabird Nest Sites



Seabird Viewing Areas

Boat tours out of Seward, Whittier, Kodiak, Valdez, Homer, Sitka, and Glacier Bay are the most popular way to view seabirds. Tours are also available of the spectacular colonies on the Pribilof Islands. Seabird and wildlife viewing charter trips can be arranged in most coastal communities.

Riding the state ferries also provides an excellent opportunity to see marine birds and mammals. Ferries run in southeast Alaska, Prince William Sound, and between Homer, Kodiak, Seward, and Dutch Harbor.



Most of Alaska's seabird colonies are part of the Alaska Maritime National Wildlife Refuge. For further information, contact:

Refuge Manager
Alaska Maritime National Wildlife Refuge
2355 Kachemak Bay Drive
Homer, Alaska 99603
(907) 235-6546

This brochure was produced by the U.S. Fish and Wildlife Service in cooperation with the Pacific Seabird Group and The Nature Conservancy of Alaska.

Printing courtesy of Chevron, USA.

Cover Photo: Kim Heacox/The Nature Conservancy of Alaska

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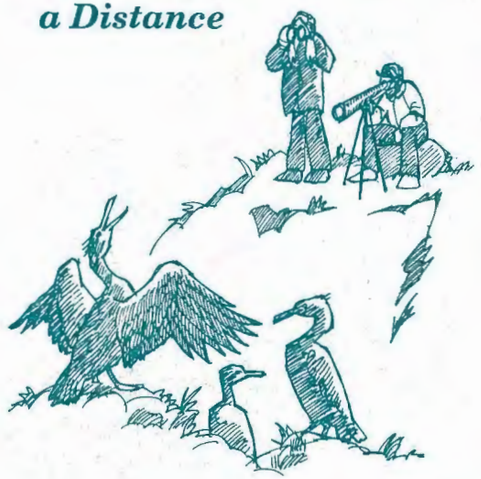
Seabirds and You

You can help maintain our fascinating and diverse seabird populations by observing the following guidelines:

1. Observe from a Distance



Use binoculars and spotting scopes to view seabirds from a distance. You will see better, observe natural behaviors, and prevent disturbance.

How close is too close? When you interfere with a bird's normal behavior! Approach nesting seabirds quietly and slowly. Do not make sudden movements. If the birds raise their heads, stand up slightly off of the nest, call more frequently, or exhibit other signs of alarm, you are too close and should slowly back off.

2. Know the Regulations

Before approaching closely or landing on any seabird island, be sure it is permitted by the land owner. Many are wildlife sanctuaries, which may be closed to human access.

3. Give Nesters a Chance

Yelling, blasting boat horns, and buzzing cliffs by plane to "see the birds fly" are all activities harmful to seabirds. If nesting birds are flushed, especially in large colonies:

A. Eggs and chicks are often knocked out of nests.

B. Chicks and eggs may die from excessive heat or cold.

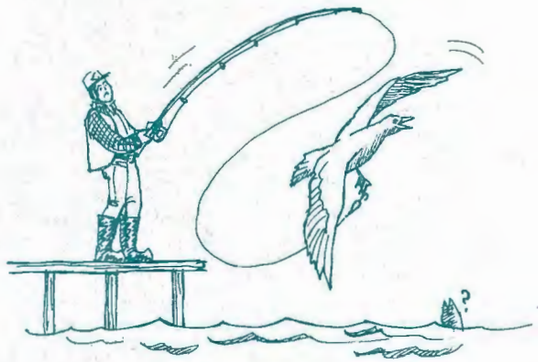
C. Predators, especially gulls, will eat unguarded eggs and chicks.

D. Nests can be abandoned.

4. Watch Your Step, Leave Pets Behind

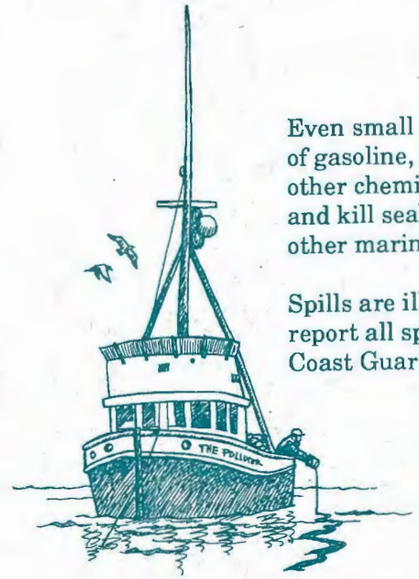
Some species nest in burrows dug into the ground. Walking in burrow nesting areas can collapse seabird homes and cause long-term erosion. Dogs and cats destroy nests and chase birds.

5. Release Hooked Birds



Occasionally seabirds will get hooked on fishermen's lines. If this happens, carefully bring the bird in and remove the hook. If tightly lodged, cut the line as close to the hook as possible. It will eventually rust away and the bird may survive.

6. Prevent Spills



Even small amounts of gasoline, oil, and other chemicals harm and kill seabirds and other marine life.

Spills are illegal, report all spills to the Coast Guard.

7. Take It With You

Birds, fish, and marine mammals are often caught by and die in discarded net scraps, fishing lines, and other garbage. Seabirds eat plastic particles from trash they apparently mistake for food. Dumping any plastics at sea is illegal under federal law. Dispose of all plastics and other garbage at approved disposal sites on shore.